

Comments received during the external review of the first order draft of the thematic assessment of invasive alien species and their control.								Response
The review period was from 31 August to 18 October 2021								
Reviewer Name (Last, First)	Government representative	Chapter	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comments / Feedback	Response
Castro-Diez, Pilar	No	1	0	0	0	0	Harmonize citation and reference styles.	Thank you very much. We have harmonized citations and reference styles in the second order draft.
Castro-Diez, Pilar	No	1	0	0	0	0	The concept of ecosystem services is scarcely mentioned throughout this introduction chapter. This is quite shocking given that IPBES means "Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services". I wonder if this concept is hidden under the wider concept of NCP, which is not defined until in line 1039. In any case, I think that the concept of Ecosystem services should be explicitly mentioned in this introduction.	Thank you for your comment. We have addressed these points in the second order draft.
Dannunc, João	No	1	0	0	0	0	In addition to the characteristics of the environment they are also crucial in determining the invasive process. Not all species are capable to invade all available environments. Each species is more or less likely to invade one are depending on the characteristics of the environment. Diverse characteristics of ecosystems seen to influence their susceptibility to biological invasions, such as species diversity, the heterogeneous environments would be more easily invaded, the variations in availability of resources (the more resources available, the greater the chance of invasion), interactions (presence of enemy species in the community devices the chance of invasion and the presence facilitating native species increases the chance of invasion) and the level of environmental stress (for example arid and high latitude areas would be less likely to be invaded (Davis, 2009). These factors interact between regions and over time, when makes it difficult generalization, because, depending on the combination of factors, particularly any type of environment can be invaded by an IAS. In general, the spatial and temporal variations in resource availability is the parameter that best explains the vulnerability of an environment invasive species (Davies 2009). A fire provides nutrients in the soil and causes mortality in native biota possibly facilitating condition for the colonizing of species invasive. Invasive grasses alter the fire regime, increasing the chances of fires and promoting the conditions for its maintenance in the system. This process is known as grass-fire cycle (D'Antonio & Vitoulli 1982). Invasive woody species are also capable altering ecosystem process, including the fire regime, in order to promote their maintenance and expansion (Mandle et al., 2011). Species that alter ecosystem processes or the structures of the invaded environment are called engineering species and generate great impact in invaded environments (Loewood 2007). Once widely dispersed and capable of colonizing diverse environments, species invasive cause biotic and abiotic impacts that interfere with biodiversity conservation and ecosystems, including predation and herbivory of fauna and flora; competition for resources; change in habitats, the physical environment and ecosystems process, such as burning, water cycle or nutrients by the invaders, the spread of disease or pathogens themselves are invasive; transportations or facilitating the introduction of other invasive species, and the hybridization of invasive species with native species (Davis, 2009). In the advance stage of the invasive process, without any control efforts, the change caused by invasive	Thank you very much for your feedback
Dannunc, João	No	1	0	0	0	0	Through risk analysis considering the characteristics of a species it is possible to predict the likelihood of it becoming invasive, this being the most efficient and intensive why control of these species, followed by early detection and indirect actions. In the analysis risk factors are considered several characteristics of the species and calculated a probability that it becomes invasive. So far, the best information for detecting a possible EEI in a risk analysis has been the fact that a species has already invaded other areas (Marthelti et al., 2004).	Thank you very much for your feedback
Feest, Alan	No	1	0	0	0	0	Comment on Chapter: There is nothing on homogenization of nature or the Founder Effect e.g. without the adaptive genes colonisation might not be successful.	Thank you for your comment. We have addressed this point in the second order draft.
Josefsson, Melanie	No	1	0	0	0	0	Address the question of "benefits" of IAS (next to threats). Some impacts are considered as "beneficial" for some parts of society (e.g. introduced species who are economically interesting), and this is an important question that has great consequences for decision-makers.	Thank you very much for your comment. This is a good point and authors do address benefits (as well as adaptation); this is why the assessment veers from the one-dimensional CBD definition to include definitional narratives that incorporate the beneficial of IAS -- and why it is more relevant and realistic for policymakers
Josefsson, Melanie	No	1	0	0	0	0	There could be a better way (e.g. footnotes) to refer/point to relevant content of other chapters of the assessment. Chapter 1 could include/serve as roadmap to the rest of the assessment.	Thank you for your comment. We have increased cross-referencing between chapters in the second order draft of this assessment and made sure Chapter 1 provides a roadmap to the other
Josefsson, Melanie	No	1	0	0	0	0	For scientists & IAS experts = the general structure is straightforward, it is easy to retrieve information from it, the content is very accessible and understandable. For non-specialists = it might be a bit too complex & need for more structuring and generalisation.	Thank you very much. Your comment is taken into consideration by authors in the second order draft.
Stas, Michiel	No	1	0	0	0	0	The in-text citations are heterogeneous (e.g. first author et al.; first author and other authors; Initial of first author and family name...). Please harmonize	Thank you very much for your comment. We have harmonized citations and reference styles in the second order draft
Kühn, Ingolf	No	1	0	0	0	0	General knowledge or research gaps could already be mentioned in Chapter 1; while detailed knowledge gaps could be mentioned in the relevant chapters.	Thank you very much for your comment, knowledge and research gaps are now included throughout the chapters and in the summary for policymakers in the second order draft
Lindblad, Cecilia	No	1	0	0	0	0	Table, figure, boxes could be mentioned in the text before appearing facilitating interpretation and contextualization.	Thank you very much for your comment, the text has been revised in the second order draft, including references to tables and figures.
Marchante, Elizabete	No	1	0	0	0	0	Table, figure, boxes could be mentioned in the text before appearing facilitating interpretation and contextualization.	Thank you, authors have formatted the second order draft according to the IPBES standard
Papadopoulou, Paraskevi	No	1	0	0	0	0	Check the figure and table legend formatting (some words begin with capital and some are not).	Thank you very much for your comment, we have harmonized the legend formatting in the second order draft.
Papadopoulou, Paraskevi	No	1	0	0	0	0	Diagrams are very good but need magnification to be read (consider taking some information out from some as they appear overcrowded).	Thank you very much for your comment, authors have considered your comment in the second order draft.
Papadopoulou, Paraskevi	No	1	0	0	0	0	Overall a well written chapter. Some editing is necessary.	Thank you very much for your comment, this has been addressed in the second order draft.
Ranarijaona, Hery Lisly Tiana	No	1	0	0	0	0	You should have to add the global distribution of Eichhornia crassipes, including established and casual populations. Where information has been provided by country, these administrative areas have been shaded. Where more precise distribution data is available, this is indicated as dots, with established population indicated as circles, and ephemeral populations as triangles. Please read the reference Darren J. Kriticos, Sarah Brune. Assessing and Managing the Current and Future Pest Risk from Water Hyacinth, (Eichhornia crassipes), an Invasive Aquatic Plant Threatening the Environment and Water Security, Darren J. Kriticos, Sarah Brune. 2016: PLOS ONE | DOI:10.1371/journal.pone.0120054	Thank you very much for your comment. Authors have included many case studies and examples of IAS in the second order draft.
Reggala, Maria Elena	No	1	0	0	0	0	Modernization has resulted in a disconnection with nature, which has brought about an insensitivity and inability to read the signs and messages from nature and the unseen. It is from this viewpoint that the indigenous peoples' to read the signs and messages from nature and the unseen. It is from this viewpoint that the indigenous beliefs in the unseen are labelled as superstitious nonsense. The unseen are ever-present in the indigenous peoples'. In the Philippines in Kankana-ey, all of these literally meaning "cannot be seen." People constantly invoke the unseen spirits, as they go about their daily tasks in securing their livelihood from the land. When working near a spring, or cutting branches from a tree, people first ask permission and goodwill from the spirits. Unseen spiritual beings include God, ancestral spirits, nature spirits, souls of living people and other spirits." (Source: 2015, Judy Carino-Fangloy, Mercl Dulawan, Vickey Macay, Maria Elena Reggala and Lucy Ruiz. Indigenous Earth Wisdom: A documentation of the cosmologies of the indigenous peoples of the	Thank you very much for your comment. Authors have edited the section on indigenous and local knowledge in the second order draft.
Romero, José	No	1	0	0	0	0	It is important to keep "academic freedom" and that the authors/experts do not restrain themselves to conform to a certain limits, like the length of chapter. The target audience/readers expect the authors to provide their views on what they deem appropriate and meaningful to include in the assessment; and then it's up to the readers to detect sentences that are relevant for their activity and to extract what they need from it.	Thank you for your comment.
Zisenis, Marcus	No	1	0	0	0	0	The page numbering is inconsistent after page 29, which starts again with page 1. This can be easily corrected. I used therefore the page numbers of the pdf reader instead from page 30 on.	Thank you for your comment, this has been addressed in the second order draft
Zisenis, Marcus	No	1	0	0	0	0	There is a discussion missing on the other scientific viewpoints of distinguishing the different biodiversity values of non-native from native species and declaring not clearly defined foreigners in space and time as being "invasive". Plenty of less dogmatic scientific literature is available (examples see above), which is not cited nor discussed. Therefore, the conceptual approach seems to be rather biased.	Thank you for your comment, authors have expanded the text on perceptions and values in the second order draft.
Smith, Emily	No	1	0	1	1	1	The introduction Chapter largely focuses on control and management with limited mention of prevention or control. The term biosecurity only features once at the end of the chapter (p31). This presents a key management approach for unintentional pathways of introduction, so there should be a reference and definition of what biosecurity is somewhere within the introduction. This could potentially sit on p7 which refers to international policy goals for IAS.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Josefsson, Melanie	No	1	1	1	54	54	Include references to the other places in the assessment where the reader can go in depth with the different sections.	Thank you for your comment. Authors have increased cross-referencing between chapters in the second order draft.
Josefsson, Melanie	No	1	1	1	38	38	Many of the "classical" references from 1990-2010 from the early work in IAS are missing. The reader is given the impression that work with IAS and biodiversity started first after 2010.	Thank you for your comment. Authors have (and will continue to) refer to most relevant publications. Many references have been added in response to suggestions from external reviewers in the second order draft.
Josefsson, Melanie	No	1	1	1	54	54	The chapter very much needs a storyline, not just many facts thrown together under different headings.	Thank you very much for your comment. Authors have included it in the second order draft.
Josefsson, Melanie	No	1	1	1	2	2	The conundrum of IAS also many times having a positive effect on socioeconomic values, especially economic values, while at the same time having a negative effect on biodiversity needs to be highlighted in the conclusions. This makes management and prevention of introduction and spread of IAS very difficult for policy-makers. It is important for decision-makers and managers to understand that trade-offs need to be understood, impacts need to be measured and put into decision-making process and managed to the benefit of biodiversity.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Lopez-Alzina, Diana	No	1	1	1	1	6	May the definition include something about adaptation?	Thank you very much for this suggested change. Authors have included it in the second order
Romero, José	No	1	1	1	1	42	About the Executive Summary = it is an essential part of the document, especially since the SPM will be based on it. It is important to find the right narrative, and already introduce important figures and numbers for which there is background information in the rest of the assessment. In addition, the word "anthropogenic" only appears in paragraph 7, and should be put earlier in context.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Asth, Matheus	No	1	1	3	1	6	The existence of an impact on the ecosystem and on local species could not be included as a condition for the definition of IAS. Item number 4 (lines 16 to 19) describes the invasion process as a series of stages that end in the spread phase. Suggestion: "... have become established and dispersed, and potentially generating an impact on local ecosystems and species."	Thank you very much for this suggested change. Authors have extended the text on the definition in the second order draft.
Baguion, Nestor T.	No	1	1	3	1	6	BRIGHT, CHRIS. Life Out of Bounds, Bio-invasion in a Borderless World. JARED DIAMOND. 2000. Blitzkrieg against the Moas. SCIENCE Vol 287, No. 5461, pp. 2170-2171. Literature above reports invasive alien species (e.g. ancestors of Maori people) in New Zealand have reduced Moa populations (big flightless bird species) many got extinct. This event also recalls the deforestation of Easter Island (also located in the Pacific) by Polynesian settlers.	Thank you very much for your comment

Baguion, Nestor T.	No	1	1	3	1	6	Can we revise the definition to see the phenomenon of bioinvasion more holistic, e.g. looking at the Planet Earth from outside the box so that "out of Africa" man spread throughout the planet. This is like saying "All organisms introduced by people (he also introduced himself) into places out of their natural range of distribution, then became ecologically malignant (not benign) to their respective host natural ecosystem.	Thank you very much for your comment. The definition used through the assessment aligns with the scoping document.
Baguion, Nestor T.	No	1	1	3	1	6	Definition: Invasive Alien Species (IAS) are animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, and generating an impact on local ecosystems and species. Can we expand the scope of IAS to include Homo sapiens as IAS? Above definition limits IAS to lower forms of life that people directly or indirectly	Thank you for your comment. The definition used through the assessment aligns with the scoping document.
Baguion, Nestor T.	No	1	1	3	1	6	EMMECHE, CLAUDIA. 2001. Bioinvasion, globalization, and the contingency of cultural and biological diversity – some ecoseismic observations. SIGN SYSTEMS STUDIES Vol. 29 (1): 235-262. THE PHILIPPINES – Example for IAS Negroid peoples (Aetas and Dumagats) are called aborigines in the Philippines, they are racially related to Papuan aborigines in New Guinea, Australian aborigines and dwarf negritos in Malay Peninsula. Anthropologists believe they arrived about 50,000 years ago using landbridges. Only Australian aborigines are blamed for introducing IAS in Australia. They brought the Dingo Canis lupus ssp dingo that escaped then proliferated bringing carnivorous marsupials to very keen competition. In 1995, I did my Ph.D. dissertation in Palawan mountains close to Puerto Princesa. I lived with Aetas (they call themselves Batak). That time, a white American arrived and collected blood samples from Batak people and he told me they are conducting DNA analysis of all human races in our planet. Later, I encountered the scientific results through Science journal, concluding the "Mitochondrial Eve" evolved in Africa and added "we are all Africans". Their results confirm existing anthropologists theory that all humans originated in Africa. Prehistory unveiled that after black people moved out from Africa, other human races evolved from black human ancestors. About 3,000 years ago, brown skin-straight haired Austronesian speaking people left continental Asia through ocean-going vessels sailing east to Polynesia in the Pacific (reaching as far as Easter Island and New Zealand), archipelagic islands occupied by Philippines, Indonesia and Malaysia, then westward pass Indian Ocean to Madagascar. They mainly occupy coastal areas with villages surrounded by permanent rain-fed flat lowland farms. Slash and burn agriculture are practiced by tribes occupying steep uplands covered with rainforests at medium elevations. In Northern Luzon at Cordillera highlands, rice terraces coupled to natural forests are typical at Ifugao province. All introduced farm plants and animals are benign and did not spread deep in secondary and primary rainforests. Animals and plants they brought avoid dense dipterocarp lowland rainforests because they are light-demanding species while animals they brought are grazers of open grasslands. Cats and dogs stayed with humans and never escaped. Unintentionally introduced animals like rats and mice prefer to live in human settlements instead in surrounding forests, while unintentionally introduced plants	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	Finally, at the 4th Plenary of IPBES, Kuala Lumpur Malaysia, a Syngenta representative announced it plans to market its new GMO corn internationally. I reacted against the plan and said "not in tropical America where the corn ancestor, Teosinte, still thrives in the wild". Alien GMO corn genes certainly will contaminate wild corn population gene pools. Corn Zea mays is wind pollinated.	Thank you very much for your comment
Baguion, Nestor T.	No	1	1	3	1	6	I served the Bureau of Forestry as forest guard from 1966 to 1971. I witnessed logging concessionaires construct logging roads. I have seen other logging roads in the province of Cagayan. I consider the network of logging roads as arteries of natural forest destruction. The roads constructed by loggers also became access roads for slash-and-burn farmers to reach once inaccessible natural forests. From year 1971 to 1976, I took my B.S. Forestry and also continued my M.S. Forestry graduating in 1982. I was recruited faculty at the Department of Forest Biological Science, College of Forestry and Natural Resources (CFNR), UPLB. I also took my Ph.D. Forestry in UPLB and graduated 1997. Forest Ecology and Environmental Science became my chosen discipline.	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	If the above definition of IAS is not revised, then one may accuse me as "barking at the wrong tree". Following the above definition of IAS to the letter, I can share what I know as a forester, hence, next write up would concentrate on plant species, but limited only to tree species. This topic is relevant because lowland fragmented natural rainforest patches distributed around the archipelago are very vulnerable to invasion by aggressive alien tree species. Who introduced alien tree species in the Philippines? Answer to the above requires recognition of the following periods: (1) Prehistoric, (2) Spanish Period, (3) American Period, (4) Present. Each period is provided with examples. Prehistoric introduction of trees in the Philippines was through Austronesian (also Malayo-Polynesian) ancestors. They brought various species of trees with food value. Some examples are (1) Mango Mangifera indica L. (benign), (2) Huani Mangifera odorata Griff. (benign), (3) Mangosteen Garcinia mangostana L. (benign), etc. Spanish colonial period introduction of trees tropical America into the Philippines for their edible fruit and firewood value: (1) Guyabano Annona muricata L. (benign), (2) Anonas Annona reticulata L. (benign), (3) Ates Annona squamosa L. (benign), (4) Ipil-ibil Leucaena leucocephala (Lam.) de Wit. (malignant). American period introduction of trees in the Philippines: (1) Big leaf mahogany Swietenia macrophylla King (malignant) (from tropical America introduced by Americans in metro Manila year 1907, then planted in the College of Forestry, UP Los Banos, Laguna (Mt. Makiling) in 1913 together with its related tropical American tree, (2) Small leaf mahogany Swietenia mahogani (L.) Jacq. (College of Forestry was founded in 1910); (3) Paper mulberry Broussonetia papyrifera (L.) L'Her. Ex Vent. (malignant) (from continental tropical Asia introduced in 1935 at same campus mentioned above as pulp and paper source). Japanese alder Alnus japonica (malignant) introduced in Cordillera highlands. Present time introduction of trees in the Philippines: (1) Amherstia Amherstia nobilis Wall., (2) Golden shower Cassia fistula L., (3) Dhak Butea monosperma	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	In 1984, based on a report prepared by Philippine Forestry Statistics, Bureau of Forest Development nurseries nationwide, produced 52,487 total seedlings, 82.37% are seedlings of exotic species and 17.63% are seedlings of indigenous or native tree species. Top exotic species seedlings are Leucaena leucocephala (41%) and Swietenia macrophylla (33%), both confirmed to be IAS. If government nurseries produce more exotic than native seedlings, this explains why NGP planted more alien species. Why the arboretum per province was not implemented could be due to (1) inability of DENR field personnel to identify appropriate native tree seedlings for	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	In the publication Invasive Alien Species, published on October-December 2002, by ASEAN Regional Centre for Biodiversity Conservation (ARCBC), John R. MacKinnon under Special Reports presented his article "IAS in Southeast Asia" stating "foresters have consistently introduced exotic trees for plantations". It silently sends the message that the gray paradigm in the field of Forestry is also true to other Southeast Asian Countries. What is the possibility that the same gray paradigm is also true to the rest of the world?	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	Many undergraduate and graduate students selected me as their adviser. Most of my students were challenged to do research on alien tree species. These are enumerated as follows: CASTILLO, REYMAR R. 2001. Vegetation analysis of undergrowth plants of Mt. Makiling as a tool in assessing the advance and spread of Big Leaf Mahogany (Swietenia macrophylla King.). Bachelor of Science in Forestry Thesis. 191 pages. Adviser: Dr. Nestor T. Baguion. THINLEY, PHUNTSO. 2002. Negative interaction between Large Leaf Mahogany (Swietenia macrophylla King.) and some indigenous tree species in lowland forest of Mt. Makiling – allelopathy a possible cause? Bachelor of Science in Forestry Thesis. 239 pages. Adviser: Dr. Nestor T. Baguion. PIOQUINTO, PIOQUINTO, LORENA PUNAY. 2003. Performance of White Lauan (Shorea contorta S. Vidal) seedlings under different forest stands and microclimate conditions in Mount Makiling. Bachelor of Science in Forestry Thesis. 102 pages. Adviser: Dr. Nestor T. Baguion. DURAN, RODORA FERNANDEZ. 2004. Assessment of the bioinvasiveness of Paper Mulberry (Broussonetia papyrifera Vent.) in the open and gap lowland vegetation of Makiling Forest Reserve (MFR), Los Banos, Laguna. Bachelor of Science in Forestry Thesis. 102 pages. Adviser: Dr. Nestor T. Baguion. ROCES, INIGO ROBERTO PASTOR. 2005. Dominance of alien tree taxa in a kilometer strip of lowland in the Makiling Forest Reserve at Los Banos, Laguna, Philippines. Bachelor of Science in Forestry Thesis. 79 pages. Adviser: Dr. Nestor T. Baguion. RUIZ, DENNIS VIGILIA. 2009. Dendrochronological study of the spread rate of Large Leaf Mahogany (Swietenia macrophylla King) in a Makiling Forest Reserve stand. Bachelor of Science in Forestry Thesis. 81 pages. Adviser: Dr. Nestor T. Baguion. COMBALICER, ARMANDO A. 2009. Dispersion of Big-leaf Mahogany (Swietenia macrophylla King) in a portion of lowland Mount Makiling Forest, Philippines. Master of Science in Forestry Thesis. 98 pages. Adviser: Dr. Nestor T. Baguion. Combining the research results of my theses advisees, there is only one Conclusion: Without doubt, Mahogany Swietenia macrophylla King is invasive alien species in the secondary and primary lowland rainforest of Mt. Makiling. At open shrub lands and young second growth forest, the invasive alien tree species is Paper Mulberry Broussonetia papyrifera Vent.	Thank you very much for your comment and interesting perspectives.

Baguion, Nestor T.	No	1	1	3	1	6	<p>One final issue linked to the definition of IAS is the word species. All species have members that interbreed and produce fertile offsprings. If the members appear morphologically uniform across their geographic range, the species is monotypic. If the members appear different in appearance but collectively share common morphological characters and also interbreed and produce fertile offsprings, the species is polytypic. Biosystematists classify the members of polytypic species based on shared and unshared characters into infraspecific taxa, as forma, subspecies or variety. Both monotypic and polytypic species have their respective geographic distributions.</p> <p>There are those limited only in a given island (e.g. Narek Hopea cagayanensis only in Cagayan province, Luzon) but there are also those that are naturally distributed among string of islands (e.g. White Lauan Shorea contorta). Bagras Eucalyptus deglupta is an example of a monotypic species ranging widely (three countries, i.e. Papua New Guinea, Indonesia (Moluccas, Celebes) and Philippines (Mindanao)). Anisoptera thurifera ssp. thurifera (only in Philippine archipelago) and Anisoptera thurifera ssp. polyandra (only in New Guinea, Moluccas, Sulawesi) are infraspecific members of one polytypic species Anisoptera thurifera (Blanco) Blume.</p> <p>With the monotypic Bagras Eucalyptus deglupta, if intentionally collected in Mindanao and then planted in New Guinea, do you consider the Mindanao material planted in New Guinea an alien species? From the view of taxonomy the answer is no, not alien, because the introduction episode is within the geographic distribution of the species. How about from the view of ecology? The material from Mindanao then introduced in New Guinea is ecologically an alien. Here is a real story that gives a good lesson. A logging company took saplings of Bagras from New Guinea and intended to plant them in Mindanao where said company logged mature Bagras trees. Few days after, all Bagras saplings were girdled to death by an unknown bark beetle. The company called my academic adviser who is an insect ecologist. He discovered that the culprit bark beetle is the same species that naturally lives in the bark of Mindanao Bagras. My adviser explained that through co-evolution the Mindanao Bagras and said bark beetle became mutual friends (or commensal) but not with the alien New Guinea Bagras. Alien Bagras has no genetic defense against said bark beetle and hence were girdled to death. My adviser was glad that alien Bagras were girdled to death because if not there is chance they may spread inferior genes to Mindanao Bagras gene pools and cause transgenerational selective girdling of hybrids.</p> <p>Given the above story, it is recommended that, for both monotypic and polytypic species, it is unsafe to introduce conspecific aliens for the possibility of exchanging inferior genes that can wreak havoc to native populations. Furthermore, once the mistake is done, it will be very difficult to resolve the problem imposed by inferior gene pool contamination. So conspecific species abroad, although taxonomically are not aliens, if introduced ecologically they may be</p>	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	<p>Our campus University of the Philippines Los Banos is at the northeastern slope of Mt. Makiling, an extinct volcano. Because it was a volcano, ecological succession made the slopes vegetated with native tree species. Among the native trees are only three dipterocarp tree species, namely, Bagtikan Parashorea malaanonan (Blanco) Merr., White Lauan Shorea contorta Vid. and Guijo Shorea guiso (Blanco) Blume. All other dipterocarp species scattered around the campus are aliens with respect to Mt. Makiling as a geographic spot. They were all collected from other parts of the country and brought to Mt. Makiling for instruction purpose (e.g. Dendrology). Their few seedlings are limited only near the mother tree, hence not invasive unlike Mahogany and Paper Mulberry. Being a university offering B.S. Forestry, species of other families other than Dipterocarpaceae were also collected from other Philippine islands and introduced for the same reason above. There is no evidence that they are behaving like IAS although most of them reproduce and disperse their seeds to account presence of wildlings near mother trees.</p> <p>Exotic tree species introduced into the Philippines from other countries are also planted in the campus. Graduates of B.S. Forestry have no knowledge about invasive alien species even if Mahogany and Paper Mulberry are spreading fast in Mt. Makiling. Note that foresters are hired by government as field personnel to implement forestry projects. This is the reason why, in NGP, Mahogany ranks second most planted species. Mindset or paradigm also plays a big role for the spread of IAS, especially when said IAS has high commercial value.</p> <p>The impact of mindset (gray paradigm) is unbelievably very strong. I shared my advisees' theses results about Mahogany and Paper Mulberry to my fellow Senior Foresters through our E-group. Reaction of my colleagues was unexpected, they got angry at me, even if they are aware of the Convention on Biological Diversity and its Precautionary Principle as per 1992 Earth Summit. Only one colleague defended me. He said in the loop, "Dr. Baguion is just presenting the scientific accomplishments of his advisees". It seems that even after the 1992 Earth Summit, Filipino foresters continue serving in line with the old normal "gray paradigm". NGP used taxpayers money sourcing plantable seedlings, alien or native. It is possible in projects like NGP, "gray paradigm" foresters serve as consultants and/or suppliers of planting materials, indeed money matters.</p> <p>I did not force the issue to change the mindsets of brother foresters. I avoid making enemies. So I opted to share my IAS experiences with other groups in the Philippines as well as abroad. Hence, below are my recent publications on IAS in the Philippines.</p> <ol style="list-style-type: none"> 1. BAGUION, N. T. and JACQUELINE T. MIEL. 2013. Threat of Potential Bioinvasion in a Natural Forest in Poitan, Banaue, Ifugao, Cordillera Administrative Region. PHILIPPINE JOURNAL OF SCIENCE, vol. 142, No. 2, December 2013 issue. 2. BAGUION, N. T. 2011. Plant Bioinvasions in the Northeastern Slopes of Mt. Makiling, Luzon, Philippines 1998-2009. ASIA LIFE SCIENCES Supplement 6:13-30. 3. BAGUION, N. T., J.M.C. BAGUION, E.A.L. CLEMENTE and J.C.L. REBULANAN. (2007). Contamination of plant communities by alien plants in lowland Mount Makiling, Laguna, Philippines. JNATURE STUDIES 6: 69-85. 	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	<p>Pre-colonial Filipinos consider land as common good. But succeeding colonial periods institutionalized private ownership of land. After the Philippines became independent, government offered Alienable and Disposable Land (A&D) to Filipino citizens so that lands as private property were guaranteed by land titles. Presidential Decree 705 (1973) also added uplands with average slope of 17% as A&D, a policy that increased land titling at elevations about 1000 m and below. See the difference between the 1900 versus 1999 forest covers.</p> <p>According to Merrill, Elmer Drew, from sea level to 1000 m altitude, this range of land for the whole Philippine archipelago is home of 84% of total native plant species, broken down to the following: 0-500 m (low elevation) has 44% of native plant species and then from 500-1000 m (middle elevation) has 40%. Above 1000 m (high elevation), 16% of native plant species are found. The 1999 Forest Cover Map superimposed with Philippine topographic map, shows deforested areas coincide with elevation ranging from 0 to 1000 m, where 84 % of Philippine native tree species are spread in 7,100 islands. To determine or quantify the extent of biodiversity loss through "ground truthing" is a must and it will reveal how many plant species became extinct, critically endangered, endangered and extant. Nationwide satellite images would reveal the locations of fragmented natural forest patches where ground truthing operations will be done nationwide.</p> <p>IAS role in the above biodiversity loss of the Philippines is not stated, unless we revise the given IAS definition and include humans as IAS. Another way of interpreting the above deforestation is to look at bioinvasion from the level of ecosystems, e.g. man-made ecosystems replacing natural ecosystems. Note that <u>expanding man-made ecosystems replacing natural ecosystems is a function of population growth, especially when the rate of growth is changing from linear</u></p>	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	<p>Problem is systemic, so no person is to be blamed. If not solved, remaining fragmented natural forests will be very vulnerable to invading tree IAS.</p> <p>The above Philippine systemic problem is due to a wrong mindset taught in forestry schools. Forestry started in the Philippines as a college course in 1910 at the University of the Philippines Los Banos, College, Laguna. This campus is located at the northeast-facing slope of the extinct volcano Mt. Makiling, province of Laguna, municipality of Los Banos. The forest concept taught by American forester mentors is consistent from 1910 version to present day, as "a vast tract of land dominated by trees artificial or natural". The United States National Science Development Board (1972) defined forest as "a natural or artificial vegetation unit encompassing many different tree associations and harboring a multitude of other life forms, which use it for food or shelter or both." Consistent with this is the definition of reforestation after Tamesis and Sulit (1937), "it is the restoration of an area to forest either by artificial or natural means". We brand this mindset as "gray paradigm" because two mutually exclusive entities can be mixed like black and white equals gray. The mindset in Ecology is complementation of opposing entities in time and space, no mixing. Ecological mindset is branded "yin-and-yang paradigm". Natural ecosystems are products of evolution and coevolution while man-made ecosystems (artificial ecosystems) are just products of the human mind based on self-vested interests. Using gray paradigm context, Forester Ireneo Domingo said during the First ASEAN Forestry Congress in 1983 "when we convert a dipterocarp forest to pulpwood plantation, what we are doing is just transferring the jungle regrowth onto a tree species of our choice for pulpwood. Substituting the economically unnecessary but ecologically necessary jungle regrowth with an economically important pulpwood plantation does not change, it might even enhance the normal ecological pattern. The plantation can provide the same ecological benefits that the jungle regrowth provides. . . the power of jungle regrowth has to be artificially controlled to prevent it from choking the planted species."</p>	Thank you very much for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	<p>Resistance to accept "yin-and-yang" paradigm is apparent, even some faculty members of the Forestry discipline. I discovered this resistance based on conflicting literature written by two faculty members of the College of Forestry and Natural Resources (CFNR), UPLB. The two literatures are:</p> <ol style="list-style-type: none"> 1. VILLANUEVA, T.R. and FOLLEDO, R.A. JR. 2000. Multi-Resource Inventory, Land Use and Biodiversity in Mt. Makiling Forest Reserve (MFR). Symposium-Workshop on Facing the Challenge of Sustaining Biodiversity Conservation in Mt. Makiling, held 20-21 September 2000 at CFNR, UPLB, Philippines sponsored by ASEAN Regional Centre for Biodiversity Conservation. p. 11-20. 2. LAPITAN, P.G., PAMPOLINA, N.M. and CASTILLO, M.L. 2010. Chapter 3. Mt. Makiling Forest Reserve: Protected Area of Longest History of Biodiversity Studies in the Philippines, page 40, in Book entitled "Biodiversity and Natural Resources Conservation in Protected Areas of Korea and the Philippines". 248 pp. <p>In publication No. 1 above, the finding is that, out of 10 tree species randomly sampled (395 sampling plots) in lowland northeast slope of Mt. Makiling, Mahogany Swietenia macrophylla is first in dominance (9.35 m3/ha) and also ranks 3rd in the number of wildlings (371 seedlings/ha). In publication No. 2, Mahogany is not included in the list of tree species for northeast slope of Mt. Makiling.</p> <p>Publication No. 1 agrees with the above theses results of my advisees and my published papers (Baguion, N.T. 2011, Baguion, N.T. et al. 2007, Baguion, N.T. et al. 2005), message Mahogany is invading Mt. Makiling. On the other hand, Publication No. 2 presents different results (Authors extend the message Mahogany was not seen at northeast slopes of Mt. Makiling). So No. 2 being different from the rest, what is the silent message? No.2 sends the message, CFNR-UPLB located at northeast slope of Mt. Makiling is doing its biodiversity conservation role (No bioinvasion by IAS in Mt. Makiling). Its lead author was former</p>	Thank you very much for your comment and interesting perspectives.

Baguion, Nestor T.	No	1	1	3	1	6	The aforementioned countrywide serious deforestation led Philippine President N. Aquino to declare two Executive Orders (E.O.), the first EO23 is Total Log Ban and the second EO26 is National Greening Program (NGP). Department of Environment and Natural Resources (DENR) Secretary Ramon Paje commanded NGP will use mainly native tree species and even issued a directive for each province to establish an arboretum to display native and endemic tree species still extant in all municipalities. NGP aimed to plant 1.5 billion trees in 1.5 million hectares beginning year 2011 up to year 2016. At the end, project failed to meet said target, while the trees planted in the field were almost all alien or exotic tree species. Failure of DENR field personnel to gather native tree seedlings for NGP and for provincial arboretums suggest there is a serious problem. They even planted invasive alien species like Mahogany Swietenia macrophylla King. Between 2011 and 2013, a total of 4,224,511 Mahogany seedlings were planted throughout the country. Other alien tree species planted were Rubber Hevea brasiliensis (3,399,195), Falcata Paraserianthes falcataria (3,342,405), Coffee Coffea sp. (3,299,562), Yemane Gmelina arborea (1,572,949), Mangium Acacia mangium (1,199,335), Cacao Theobroma cacao (1,201,410) and Nangka Artocarpus heterophyllus (673,595).	Thank you for your comment and interesting perspectives.
Baguion, Nestor T.	No	1	1	3	1	6	Under business-as-usual for the Philippines, like no change in Forestry curriculum, the IAS problem regarding Philippine forestry will not be solved. Planting alien tree species like the National Greening Program will continue. The systemic problem remains.	Thank you very much for your comment and interesting perspectives.
Barrios Caballero, Yolanda	No	1	1	3	1	6	Definition is missing generating impacts also on economy and society. It is important that these other impacts are included in the general definition.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Barrios Caballero, Yolanda	No	1	1	3	1	6	Species can be introduced via, seeds, eggs, not necessarily "organisms". Suggest reconsidering using or taking into account the original definition of the CBD for alien species: "A species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce".	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Blackburn, Tim	No	1	1	3	1	3	What is an alien? define too. "Aliens species are defined is... If they have negative impacts upon... then they are termed invasive alien species (IAS)."	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Brooks, Thomas	No	1	1	3	1	6	This is similar to, but not identical to, the CBD definition. Strongly recommend sticking with the CBD definition verbatim, and citing it here. Introduction of a new definition will cause confusion and reduce policy relevance.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Government of Germany	Yes	1	1	3	1	6	The current version of the definition of IAS is also not clear about whether species dislocated due to climate change are counted as IAS or not (see for example IPCC AR5 WGII-SPM B-2; Figure SPM.5). Please clarify. Multiple passages in the report suggest climate change as an important driver (see for example L11-14 same page and Ch. 4, page 150, L4041-4046). If species dislocated due to climate change are included in the definition, the paragraph 1.4 (The Invasion Process) should be rewritten in order to acknowledge climate change as a factor. Page 11, L605-606 can be interpreted to allude to that fact. Chapter 3, p. 6, L173-175 definitely lists climate change as direct factor increasing the introduction rate of alien species.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Government of Germany	Yes	1	1	3	1	6	The given definition for IAS is indefinite: what kind of impact is meant - negative, positive, or both? And among impacts on the local ecosystem and species, impacts on biotopes and ecosystem services should be added too.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Josefsson, Melanie	No	1	1	3	1	6	Definition of Invasive alien species does not correspond with the CBD definition. There are three major concerns about this; 1) the proposed IPBES definition excludes alien species that are not yet established and dispersed. This will make it more difficult to carry out eradication on newly arrived alien species that may not yet be established. This also excludes long-lived invasive alien species that cause harm to biodiversity through predation, transmission of disease or competition such as the red-eared slider in Scandinavia and the Chinese mitten crabs Eriocheir sinensis which are frequently transported in ballast water and cause harm to biodiversity, 2) the multitude of IAS databases are based on the CBD definition and will make using them for the IPBES assessment very difficult, 3) much confusion will be created among policy-makers with the use of different IPBES definitions of Invasive alien species which will negatively complicate	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Kanneh, Ambrose Bockarie	No	1	1	3	1	6	How does this assessment considered non native species which are not harmful or crating any negative impact in their new environment or establishment but rather survive successfully with the native species without any impact or harm and to an extent offers some potential benefits for survival of the native species.	Thank you for your comment - the definition text has been expanded.
Linnamägi, Merike	No	1	1	3	1	6	How to define IAS is very important in this document. With the current definition, where the establishment is required IPBES leaves out many alien species with strong and detrimental impacts (such as long-lived species, species with constant releases / strong propagule pressure). I strongly disagree with IPBES assessment using this definition (compared to the definition used by CBD, where the establishment is not prerequisite for species being invasive). Would recommend changing this throughout the document to be in line with CBD, especially important in chapters about establishment such as 1.4.3. It is very important also to note that in general, the most cost-effective solution is an early warning and rapid response, if possible even before establishment. But then, based on IPBES definition, we are eradicating species which are NOT invasive and trying to finance the effort against non-invasive alien species. Communicating this to public and politicians that we focus most of our work on alien species which are NOT invasive is very hard and confusing. If IPBES will continue with this current definition it is very important that everywhere where CBD targets and goals are referenced it is clearly marked that CBD definition of IAS is wider and encompasses more species. THIS should then clearly be marked throughout all the chapters wherever CBD is referenced. Same should be done on possible other conflicting definitions.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Marchante, Elizabete	No	1	1	3	1	6	The definition of IAS needs to include that the establishment and dispersal of these species occurs without direct intervention by humans (or else alien species widely used by humans, but that do not spread by themselves, may be mistakenly considered invasive according to this definition). I understand that this is the definition accepted by IPBES/6/INF/10, 2018 and that "established species" in the Glossary clarifies that the species "establishes self-sustaining populations", but I still think it is very important to include this information in order to clearly distinguish invasive alien from alien species planted/sown and dispersed directly	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Marchante, Elizabete	No	1	1	3	1	6	The definition of IAS needs to include that the establishment and dispersal of these species occurs without direct intervention by humans (or else alien species widely used by humans, but that do not spread by themselves, may be mistakenly considered invasive according to this definition). I understand that this is the definition accepted by IPBES/6/INF/10, 2018 and that "established species" in the Glossary clarifies that the species "establishes self-sustaining populations", but I still think it is very important to include this information in order to clearly distinguish invasive alien from alien species planted/sown and dispersed directly	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Pourkazemi, Mohammad	No	1	1	3	1	4	"introduced by people directly or indirectly", I think it is better to say introduced intentional and un-intentional, because there are some cases of invasive species being introduced by water current (such as tilapia) or Wind (pests) which are NOT people.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Shimura, Junko	No	1	1	3	1	6	CBD Article 8h needs to be referred. Impacts that threaten ecosystems, habitats or species. Consequence in the loss of ecosystem services that include social and economic aspects e.g. cultural values associated with biodiversity, natural products and nature based regulatory functions should also be mentid.	Thank you for your comment - the definition text has been expanded.
Smith, Emily	No	1	1	3	1	6	The definition in the Executive Summary refers to 'direct' and 'indirect' introduction. Use of this phrasing has caused some confusion or issues with policy makers in defining the line between movement of invasive due to intentional or accidental movement, or due to climate change/ human-induced habitat changes. I would potentially recommend altering this wording to 'animals, plants or other organisms introduced intentionally or accidentally by people into places outside... This would also bring the definition in closer alignment with the CBD and IUCN	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Stas, Michiel	No	1	1	3	1	6	In general, expand a bit more about the choice of words for the definition of IAS in the body of the text.	Thank you for your comment - the definition text has been expanded.
Walton, Paul	No	1	1	3	1	6	This definition in the Executive Summary and on page 11 includes the concept of 'indirect introductions'. This might lead to confusion - in terms of what is an indirect introduction? Might that mean a species moving to new areas owing to anthropogenic habitat change, or to climate change? This confusion was evident in a recent (2019) UK Parliamentary Inquiry into IAS. I suggest that IAS should be considered only 'those species moved through direct human agency' - though that of course can be deliberate or accidental. NOTE: following a UK webinar Prof Helen Roy helpfully clarified that, in this definition, the words 'direct' and 'indirect' are taken as synonymous with 'deliberate' and 'accidental'. However that is not made explicit and clear in the current text and I'd still like to make the points above. In my view an assumption that readers will automatically understand this novel equivalence in those terms is unsafe. These words are not considered synonymous in any other context that I know of. The risk of confusion and misunderstanding, particularly in terms of species shifting their ranges because of other anthropogenic drivers (such as climate envelope shifts) being taken as IAS, is in my view high.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Xue, Huajie	No	1	1	3	1	6	The definition only emphasizes the impact on ecosystems and species, but the draft also describes the impact on human beings and the economy. Should the definition also be revised?	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Camacho, Rulo A.	No	1	1	4	1	4	The word "people" should be changed to "human actions/activities". Use of the word "people" in the IAS definition restricts the scope of the definition.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Joshi, Chudamani	No	1	1	4	1	4	Introduced directly or indirectly by people need to be discussed. How about invasive species introduced by wild animals and migratory birds? Can we consider natural invasion as well?	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Vopledo, Aljandra	No	1	1	4	1	4	The definition should be revised because if it only includes people it would not include other factors such as climate change that are mentioned in item 3.	Thank you very much for your comment - the definition text has been expanded in the second order draft.
Blackburn, Tim	No	1	1	5	1	5	"Range of distribution" is odd phrasing - either geographic range or geographic distribution would be better.	Thank you for your comment. This has been addressed in the second order draft.
Blackburn, Tim	No	1	1	5	1	5	Unclear if "have dispersed" or "have been dispersed".	Thank you for your comment. This has been addressed in the second order draft.
Blackburn, Tim	No	1	1	6	1	6	Rephrase "generating an impact on" as "have negative impacts upon"	Thank you for your comment. This has been addressed in the second order draft.
Baguion, Nestor T.	No	1	1	8	1	9	True, especially at ecosystem, species and genetic levels, the phenomenon bioinvasion can occur at the same time and space.	Thank you very much for your feedback
Copp, Gordon	No	1	1	8	1	8	Here, the American spelling of 'recognise' is used, i.e. one of nine uses (including the gerund form). In some other locations, the British spelling (recognise) is used - there are seven such instances, including the gerund form (e.g. page 7, line 133). I checked a few other of the 'ize/ise' words and in some cases (e.g. prioritize, homogenization) the American spelling is used, whereas in others (e.g. minimise) the British spelling is used. The word 'finalize' is used once, and there is a single use of 'finalise'; a similar inconsistency in the spelling of colonize and colonise is also apparent. So, consistency is needed in this chapter and perhaps elsewhere (assuming that the same inconsistency exists in the other chapters).	Thank you very much for your comment. Authors have harmonized the spelling across the chapters in the second order draft
Lope-Alzina, Diana	No	1	1	8	1	9	May this include a brief reference about why are IAS are a major threat to biodiversity and ES?	Thank you very much for your comment. Authors have harmonized the spelling across the chapters in the second order draft
Maric, Filip	No	1	1	8	1	14	The framing of IAS as a threat further underscores my previous arguments insofar it further demonizes the non-human species in question rather than clearly naming and problematizing the exclusively human drivers of their migration in originary and recipient ecosystems (including globalization, technological development, culture, ...) and including human-driven environmental drivers like climate change and biodiversity loss. Their framing as a threat to, ultimately human health reveals a heavily anthropocentric interest driving the language and intentions of IAS control. This is highly problematic at the best of times. We need - in all parts of the language used - clearer recognition and acknowledgement of the existence of non-human interests in competition with human interests. This is necessary to identify the decisions that are being made in favour of non-human and human interests alike, and to be able to question their rationale, legitimacy (in terms of ethics and justice) and short-term and long-term efficacy in achieving the interests that have been aimed for.	Thank you very much for your comment - the definition text has been expanded in the second order draft.

Setsaas, Trine Hav	No	1	1	8	1	9	The executive summary could benefit by including one or two short, but very illustrative examples of IAS severe impacts on ecosystems and human well-being.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	1	11	1	11	"The rate of first records" is unclear without a definition here.	Thank you very much for your comment- authors have rephrased to clarify this point in the second order draft.
Lope-Alzina, Diana	No	1	1	11	1	14	This sentence may sound confusing, suggesting that some drivers may be less important than others.	Thank you very much for your comment - authors have rephrased to clarify this point in the second order draft.
Blackburn, Tim	No	1	1	12	1	12	Likewise - saturation in what exactly?	Thank you very much for your comment - authors have rephrased to clarify this point in the second order draft.
Blackburn, Tim	No	1	1	13	1	13	"Considered a primary driver" of? Need to be more explicit.	Thank very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	1	1	13	1	13	"Transportated globally is considered" does not soud correct grammer. This clause reads oddly.	Thank very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Volpedo, Alejandra	No	1	1	13	1	14	This phrase should be clarified by the presence of climate change, contrary to the definition of item 1	Thank you very much for this suggested change. Authors have included it in the second order
Baguoin, Nestor T.	No	1	1	16	1	18	4. The invasion process is considered as a series of stages (transport, introduction, establishment, and spread). A species must overcome various barriers (geography, captivity or cultivation, survival, reproduction, dispersal and environmental) to move between stages.	Thank you very much for your comment
Baguoin, Nestor T.	No	1	1	16	1	18	My comment for first sentence is to suggest changing the word "introduction" with the word "arrival". The second sentence may be improved. Instead of "A species" change it into "Organisms representing a species"	Thank you very much for this suggested change. Authors have rewritten this section in the second order draft.
Blackburn, Tim	No	1	1	16	1	16	Rephrase as "process by which a species become an alien" rather than "invasion process".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	1	16	1	16	Use "sequence" rather than "series".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Copp, Gordon	No	1	1	16	1	17	'Impact' has been left out of the list of stages (in parentheses) of the invasion process. T he definition of IAS in item 1 (lines 3–6) refers to four stages (introduction, establishment, dispersal, impacts). The lack of mention of 'impacts' amongst these stages in item 4 this therefore inconsistent with the definition given in item 1. In fact, the usual four stages of the invasion process are as listed above, the activity of 'transport' being part of the 'Introduction' phase.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Volpedo, Alejandra	No	1	1	17	1	17	Oceanographic barriers should also be included.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Ethiopia	Yes	1	1	18	1	18	Better to improve as "... dispersal and environmental conditions) ..."	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Baguoin, Nestor T.	No	1	1	21	1	27	Humans as IAS in the Philippines causing deforestation is a function of exponential population growth, private land ownership system, network of roads created by loggers and miners, landless farmers, attractive market and policy change on alienable and disposable land rules. Progressive contextualization combined with the above modeling moves forward as a synthesis. Benchmarking is the term that is used from which bonafide stakeholders can also contextualize and from which informed-decisions could arise. Scenarios drawn from benchmark would give various possibilities that lead to landscape level land use planning. Land use planning leads to separating the given landscape into Land for Man and Land for Nature (on the ground and on the map), becomes the basis for Ecological Governance and Monitoring of actions including prevention and control of IAS. Unless this procedure is done, management	Thank you very much for the information shared.
Kanneh, Ambrose Bockarie	No	1	1	21	1	27	What are the defining parameters (examples) in a recipient ecosystem that determine the Biological invasion of species.	Thank you very much for this suggested change. Authors have included it in the second order
Maric, Filip	No	1	1	21	1	23	This point adds the notion of <i>management</i> to the resonant notion of IAS <i>control</i> . There is lacking effort here to at least engage with notions of co-inhabitation due to human-mediated ecosystems change, as opposed to the perpetuation of human dominion over the non-human realm. Co-inhabitation is partially implied where adaptation is considered (chapter six).	Thank you very much for this suggested change. The executive summary for Chapter 1 has been deleted, but took note of your comment for relevant sections in the second order draft of this assessment
Blackburn, Tim	No	1	1	22	1	22	Use "better to" rather than "to better".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	1	24	1	24	"Ecological factors needs to be addressed" for what?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	1	25	1	25	Insert "characteristics of" in front of "the species invading".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	1	26	1	27	I don't think this is well expressed. It's also the key element, but reads as an added extra.	Thank you very much for this suggested change. Authors have included it in the second order
Baguoin, Nestor T.	No	1	1	29	1	34	Above for me is okay (regional, global and thematic IPBES assessments have considered the role of IAS on the current biodiversity crisis), then, Next, "but an in-depth assessment of IAS has not been conducted". The first part is "think globally" and the second "act locally". Under Philippine situation, the above "act locally" will continue to be undone unless there is resolution to the "systemic problem", e.g. paradigm shift from gray to yin-and-yang plus bringing the human population at carrying capacity levels (by correcting the exponential population growth).	Thank you very much for this information shared.
Blackburn, Tim	No	1	1	30	1	30	Assessment of what about IAS?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	1	32	1	33	How? What gaps?	Thank you very much for this suggested change. Authors have included it in the second order
Baguoin, Nestor T.	No	1	1	36	1	42	Failure to see the boundary that divides Land for Man and Land for Nature on the ground is a hindrance. Top down land use map is nothing to the commons on the ground, especially when there are no ground markers dividing the two. Present systemic problem includes this "top-down procedure", better is to show to bonafide stakeholders the benchmark situation regarding the existing ecological anarchy happening at landscape level and the possible scenarios under business-as-usual. Collective decision-making on final land use plan implemented on the ground with reinforced "Land-use Covenant" becomes the basis for "Landscape Ecological Governance". This process replicated for the rest of the Philippines is also countrywide reconciliation of Man and Nature. A process that brings anarchy to order. The primary systemic problem being resolved would turn ecological anarchy to reverse, hence order gained.	Thank you very much for this interesting discussion point.
Copp, Gordon	No	1	1	36	1	36	Although widely used, the term 'anthropogenic' derives from anthropogenesis (= creation of mankind) and should really be replaced by 'human-generated'. Doubtless this comment will be ignored, but if nobody comments about the misuse of terms, then they become even more widespread.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Barrios Caballero, Yolanda	No	1	1	37	1	37	Suggest using effects on the natural environment, instead of on "nature". The term nature is not found in the glossary of CDB terms. Natural environment is define as "The natural environment comprises all living and non-living things that occur naturally on Earth. In its purest sense, it is thus an environment that is not the result of human activity or intervention. The natural environment may be contrasted to "the built environment", and is also in contrast to the concept of	Thank very much for this suggested change. Authors have given additional attention to clarifying terminology in the second order draft.
Blackburn, Tim	No	1	1	38	1	38	Use "change" rather than "changes".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Lacerda De Matos, Ana Carolina	No	1	1	39	1	39	There should be the reference of the framework here, so the readers could check the framework while they are reading the text.	Thank you for your comment. Authors have considered this link to the main text in the second
Barrios Caballero, Yolanda	No	1	1	40	1	40	Delete one nature in "and nature and Nature's".	Thank you very much for this suggested change. Authors have included it in the second order
Blackburn, Tim	No	1	1	40	1	40	Insert comma after "can be reduced".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Dupont, Lise	No	1	1	40			"and nature" is repeated	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Dupont, Lise	No	1	1	40	1	41	The reference to "Nature's Contributions to People" is not understandable here	Thank you - authors have rephrased to clarify this point in the second order draft
Blackburn, Tim	No	1	1	41	1	41	GQL???	GQL stands for Good Quality of Life. This acronym is no longer used in the second order draft of this assessment report.
Blackburn, Tim	No	1	1	41	1	41	Insert comma after "maintaine".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Castro-Diez, Pilar	No	1	1	41	1	41	Provide the full name for GQL as it is the first time mentioned.	GQL stands for Good Quality of Life. Acronyms are no longer used in the second order draft of this assessment report (except for IPBES)
Dupont, Lise	No	1	1	41			GQL should be defined here since this is the first time this acronym is encountered (Good quality of Life; hereafter GQL)	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Government of Ethiopia	Yes	1	1	41	1	41	Since 'GQL' is use for the first time good to use the extended form 'Good Quality of Life.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Government of Germany	Yes	1	1	41			We suggest to write the full words "good quality of life" before the abbreviation GOL, since it is mentioned for the first time in the text.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Lacerda De Matos, Ana Carolina	No	1	1	41	1	41	There should be an explanation in this line of the acronym GQL.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Marchante, Elizabete	No	1	1	41	1	41	The abbreviation GQL appears without the full name in the first appearance	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Mestre, Mircia	No	1	1	41	1	41	This is the first time that "GQL" appears. Needs to be defined here.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Núñez Lendo, Carmela Isabel	No	1	1	41	1	41	The acronym GQL has not been spelled for the first time in the text yet.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft
Peck, Harry	No	1	1	41	1	41	Perhaps include non-abbreviated form of "GQL" as this is the first time it is used in the main text.	Thank you for your comment, the acronyms have been spelled out across the chapters (except IPBES) in the second order draft

Alaux, Christine	No	1	1	347	5	474	Same remark as for the previous table: too long to be placed in the middle of the report + Very poor presentation: use better software and better represent each case individually	Thank you, this has been fixed in the second order draft
Lacerda De Matos, Ana Carolina	No	1	1	347	5	473	I suggest an explanation about the choice of these species, so it will be clear to the reader why these species are being referenced.	Thank you, this box has been deleted in the second order draft.
Rosa, Hugo Henrique Marques da	No	1	1	347	2	384	An example for the socio-economic impacts of Acacia. Invasion by Acacia mangium in an indigenous land in north of Brazil Souza, A. O., Chaves, M. D. P. S. R., Barbosa, R. I., & Clement, C. R. (2019). Spatial Distribution and Abundance of Acacia mangium on Indigenous Lands in the Serra da Lua Region, Roraima State, Brazil. <i>Human Ecology</i> , 47(2), 303-310.	Thank you, this box has been deleted in the second order draft.
White, Michael	No	1	1	347	5	473	Box 1.2 very good	Thank you very much for your feedback
Castro-Diez, Pilar	No	1	1	348	5	473	Box 1.2 appears before being cited or introduced, so it seems to be out of context. It seems to contain detailed information on some selected IAS, but the reader does not know the criteria to select the species. Harmonize citation styles (Vaz et al. 2017). The line numbering changes in this page. Previous page is 29, but this page is number 1 again. Highlight more the title of the taxa and be consistent with the placement of citations (beside or below the title). Harmonize the size	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	1	349	1	349	What does this panel show?	Thank you, this box has been deleted in the second order draft.
Khuroo, Anzar Ahmad	No	1	1	349	1	351	Picture quality of 3 species of Acacia are of poor quality. Need to be replaced by better one which are easily available from published sources.	Thank you for your comment. This table has been deleted from the main text.
Ariño, Arturo H.	No	1	1	351	4	449	GBIF maps in Box 1.2 will require updating. We have new PBR extending ranges.	Thank you, this box has been deleted in the second order draft.
Peck, Harry	No	1	1	351	4	449	For each of the distribution maps in this region, it is unclear what the colour of dots refers to. Perhaps a key should be added with an indicator of magnitude	Thank you, this box has been deleted in the second order draft.
Khuroo, Anzar Ahmad	No	1	1	353	1	353	The bias with using GBIF occurrence records is that they include also those from different regions in the world where a particular species is cultivated only and hasn't established (naturalized) and become invasive. This bias needs to be taken into consideration, or at least highlighted while presenting Invasion distribution maps using GBIF data.	Thank you, this box has been deleted in the second order draft.
Kudelska, Theresa	No	1	1	353	1	384	Text is quite focused on the impact it is having in South Africa, the CABI compendium contains several additional points and supporting references which may be helpful to review and consider including in this section: https://www.cabi.org/isc/datasheet/2207	Thank you, this box has been deleted in the second order draft.
Baguoin, Nestor T.	No	1	2	43	2	46	43 The assessment consists of six chapters written by experts from over 40 countries: 44 Chapter 1 introduces the concept of IAS and the risks posed to marine, terrestrial and 45 freshwater systems, describes the main framework features employed throughout the 46 assessment, and identifies some key themes that emerge. My suggestion for Chapter 1 is to insert a topic on the method of selecting appropriate persons (with appropriate training and experience) who would conduct field identification and be able to warn stakeholders about the presence of IAS and that they may be singled out from native species.	Thank you very much for this suggested change. The process of author selection is outlined in Annex 1 of decision IPBES-3/3 in the second order draft
Government of Ethiopia	Yes	1	2	44	2	45	Better to rectify as "... fresh water, marine and terrestrial ecosystems, ..."	Thank very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Brooks, Thomas	No	1	2	45	2	45	Change "systems" to "biodiversity".	Thank you very much - the concepts extend beyond biodiversity
Government of Germany	Yes	1	2	45	2	45	It is suggested to include "worldwide" after "... Freshwater systems, ...". The sentence would read "marine, terrestrial and freshwater systems worldwide, describe ..."	Thank very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Baguoin, Nestor T.	No	1	2	47	2	48	47 Chapter 2 provides an analysis and synthesis of past and future trends in the spread, 48 pathways, evolutionary change and distribution of IAS. My suggestion for Chapter 2 is to insert a topic on how to conduct ground truthing to confirm whether the introduced alien(s) is/are benign or malignant. Also, Chapter 2 set rules to determine which alien(s) are malignant and therefore be confronted by experts with help of bonafide stakeholders.	Thank you for your comment. Authors have addressed these points in the second order draft.
Baguoin, Nestor T.	No	1	2	49	2	50	49 Chapter 3 provides an analysis and synthesis of direct and indirect drivers responsible 50 for the introduction, spread, abundance and dynamics of IAS. I have no comment for Chapter 3 except that using progressive contextualization as a method may help in attaining the chapter objectives.	Thank you for your comment. Authors have addressed these points in the second order draft.
Baguoin, Nestor T.	No	1	2	51	2	53	51 Chapter 4 provides an analysis and synthesis of the environmental, economic and social 52 impact of invasive alien species focusing on their impact on nature and nature's benefits 53 to people and a good quality of life. My comment for Chapter 4 is the point that even from the same country, different landscapes have different past to present events.	Thank you very much for your comment.
Takahashi, Yasuo	No	1	2	52	2	53	nature's contributions to people' in IPBES terminology, not 'nature's benefits to people'.	Thank you for your comment. Authors have addressed these points in the second order draft.
Government of Ethiopia	Yes	1	2	53	2	53	This time it is appropriate to use 'GOL' instead of 'Good Quality of Life'.	Thank you very much for your comment.
Baguoin, Nestor T.	No	1	2	54	2	57	54 Chapter 5 reviews the effectiveness of past and current programmes and tools for the 55 global, national and local prevention and management of IAS and their impacts. 56 Chapter 6 explores future options for the prevention and management of IAS and 57 provides an analysis of possible policies and support tools for decision makers. My comment for Chapter 5 and 6. Appropriate programmes and tools are case-to-case basis and the local IAS should be investigated.	Thank you for your comment. Authors have addressed these points in the second order draft.
Government of Germany	Yes	1	2	57	2	57	We encourage the authors to include "policy-makers". The sentence would read: "... possible policies and support tools for policy and decision makers." Rationale: Policies are plans, procedures and actions that should influence decision-making.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Baguoin, Nestor T.	No	1	2	59	2	65	Indigenous and local knowledge reveal wild plant species with food and medicinal values. Human health is a function of the nutrient quality of food intake from childhood to adulthood and also corresponding lifestyle of the individual (if possible, minimal mental stress only) plus the surrounding environment (absence or presence of adverse pathogens and allergens). In times of illness, availability of appropriate medicine is important. Good quality of life (GQL) is partly determined by good health and behavioral practice in accordance with accepted norms, values and mores of society (if possible friends only no enemies). However, trends of the past to present are scenarios that may temporally and spatially continue. If the trend is positive, well and good, but if negative, solution is required. For example, exponential population growth and deforestation/IAS (past to present time) under business-as-usual scenario may lead to a point of no return. A systemic solution should now come in before it is too late.	Thank you very much for this suggested change. Authors have given this attention throughout the assessment but particularly Chapter 6 of the second order draft.
Government of Ethiopia	Yes	1	2	59	2	59	This time it is appropriate to use 'GOL' instead of 'Good Quality of Life'.	Thank you very much for your comment
Zisenis, Marcus	No	1	2	59	2	65	The inclusion of indigenous and local knowledge (see pages 54-57) and other mentioned aspects such as climate change should be more explicitly outlined. Otherwise, one might get the impression that this paragraph just states what should be also considered in the report. On the other hand, the mentioned generic circumstances seem to be too wide and should be targeted more specifically like the global biodiversity crisis, the role of technology, and the role of	Thank you very much for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	2	60	2	60	There are so many "ands" that it is unclear what the cross cutting themes actually are.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	2	62			At this point in the report it is not clear whether the authors include „climate change“ under the term „environmental change“ (it is clarified later on page 30, L1216-1218). Please clarify the definition at this point.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	2	64	2	65	A footnote describing the concept/meaning of "One Health approach" is missing	Thank you very much for your comment.
Baguoin, Nestor T.	No	1	2	67	2	71	In the Philippines, the issue on IAS has yet to be seriously attended at the government level (national down the line to local government units) and not only at the academic level. If only at the academic level IAS is ventilated through a scenario of sloganeering scientists "talk only, no walk the talk" then what may unfold in the future is sheer uncertainty. The reverse will be welcome when we think globally yet we act locally. The term "act locally" is realized when systemic barriers are bridged (e.g. from being blind to being able to recognize and identify IAS for appropriate shaping of systemic solutions based on science). At the academic level, scientists can be organized into disciplines and per biogeographic zones, for A. Terrestrial Botany: (1) Trees, (2) Shrubs, (3) Epiphytes, vines, stranglers, (4) Herbs; 5. Terrestrial Non-photosynthetic Plants (Fungi to Bacteria), B. Terrestrial Zoology: (1) Mammals and birds, (2) Insects and other arthropods, (3) Annelids and Mollusks; C. Freshwater and marine aquatic animals: (1) Fish, (2) Crustaceans, (3) Annelids and other segmented animals. D. Freshwater and marine aquatic plants: (1) Angiosperms (e.g. water lily, etc.), (2) Algae, (3) non-photosynthetic plants. These scientists can provide trainings for government environmental field personnel to develop field collection and identification skills and be able to distinguish native from alien species. They can also serve as consultants for unidentified taxa and in identifying them. Field personnel who become experts in the identification of native local species	Thank you very much for these perspectives
Setsaas, Trine Hay	No	1	2	67	2	71	This paragraph should be moved and become a new paragraph 6. on page 1. Policy options should be moved up to increase the attention to it. Policy options also come naturally after status, impacts, scenarios and then policy options. The text is lost a bit where it is now. Also, the paragraph could be reformulated to put more emphasis on the importance of developing and implementing policies and management practices towards limiting the impacts of IAS. Suggestion: The challenges posed by IAS are severe in terms of impacts on both ecology and human communities (social-ecological systems), and management practices have improved considerably during recent decades. Limiting the impacts of biological invasions is important to ensure well-functioning ecosystems in future, and	Thank you very much for your comment
Government of Germany	Yes	1	2	69	2	71	It is suggested to insert 'negative' before impacts, since otherwise the sentence wouldn't make sense because positive impacts shouldn't be limited. So, it would read then: "Limiting the negative impacts of biological invasions is in the interests of everyone and there is a growing menu of policy options that can help achieve this."	Thank you very much for your comment
Wedegärtner, Ronja Elisabeth Magdalene	No	1	2	69	2	70	Considering possible positive impacts of some invasive species, could it be helpful to clarify "Limiting the negative impacts..."	Thank you very much for your comment
Schaffner, Urs	No	1	2	370		371	This sentence needs to be rephrased or moved elsewhere; if removal of Acacias in South Africa indeed leads to social conflicts, I wonder why this is mentioned under 'Negative socio-economic impacts'.	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	1	2	372	2	373	Please provide references to support the statement that criminals in South Africa are harboured in the dense vegetation of <i>Acacia mearnsii</i> .	Thank you, this box has been deleted in the second order draft.
Khuroo, Anzar Ahmad	No	1	2	372	2	373	"Harbouring of criminals in dense vegetation of Acacia mearnsii in South Africa". The same can be true for dense vegetation by native plants as well. We know throughout the world, dense forests have been safe refuges for large gangs. E.g. In India, Naxals inhabit the dense forests of Central India. I suggest to delete it.	Thank you, this box has been deleted in the second order draft.
Shin, Thant	No	1	2	372	2	373	Harbouring of criminals should not be impact of IAS.	Thank you, this box has been deleted in the second order draft.

Khuroo, Anzar Ahmad	No	1	2	375	2	381	Acacia mearnsii: for brevity, it is not important to continue full form of generic epithet in scientific writing, once it has been written in full form already. Instead, it is better to write A. mearnsii, just it has been followed in A. saligna, A. longifolia. I suggest to use this scientific convention in writing scientific names in this Chapter, as well as others.	Thank you, this box has been deleted in the second order draft.
Khuroo, Anzar Ahmad	No	1	2	382	2	382	"a" in "amongst" should be in upper case.	Thank you for your comment, well noted and revised in the second order draft
Government of Germany	Yes	1	2	386	3	412	The given information about the Genus Lumbricus regarding "Native range: western half of the Pyrenees (Europe)" (L393) is questionable. For example, in Germany several indigenous but none alien Lumbricus species are known.	Thank you, this box has been deleted in the second order draft.
Blackburn, Tim	No	1	2	388	2	388	Legend to this photo?	Thank you, this box has been deleted in the second order draft.
Kudelska, Theresa	No	1	2	390	3	412	The CABI compendium contains some useful additional references which you may wish to review and consider including in this section of the chapter https://www.cabi.org/isc/datasheet/109385	Thank you, this box has been deleted in the second order draft.
Girod, Christophe	No	1	2	393	2 (p.36 of the pdf)	393	Accepted native range of Lumbricus terrestris is Western Europe (which is slightly larger than Western half of Pyrenees)	Thank you, this box has been deleted in the second order draft.
Baguion, Nestor T.	No	1	3	72	3	99	The exponential population increase coupled with the rate of deforestation in the Philippines when included in temporal/spatial scenario into the future will make IAS problem worst. Why? Because common people think and act pragmatically in order to get what they need (food, water, shelter, health, etc.) in order to continue living. Problems outside such pragmatic desires tend to be sidelined. Government plus academe must cooperate to solve the systemic problem and then informed-decisions by government and by the governed are realized on the ground. Population becomes pegged at carrying capacity while forest restoration brings biodiversity back to secured state ending in the realization of climate adaptation/mitigation plus attainment of sustainable development goals (hopefully, correctly starting at local situations then from said successful models (or their synthesis) they are replicated countrywide –the systemic solution turns global after countries share their respective experiences [e.g. historical analysis leading to benchmark ecological situation, comparison of scenarios, then decision-making for systemic solution]. Man-made ecosystems are coupled to natural ecosystems (fixed on the ground and map), transgenerationally become complementary yin-and-yang style (IAS no longer a problem after piecemeal solutions became encompassed in a systemic solution).	Thank you very much for these important perspectives.
Maric, Filip	No	1	3	72	3	73	My main interest is in the terminology used in the context of the IAS Thematic Assessment. It seems to me that the IPBES has a unique opportunity and responsibility to change beliefs and attitudes and this must be accompanied by changing terminology. This already relates to the terminology represented in this title and its featuring in the rest of the assessment. The notions of invasive and alien species appear to dangerously obscure what makes the species in question invasive and alien. This is underscored by the notion of control that they are put in relation to. Through these terms, there a responsibility for environmental damage seems relegated to non-human species and conversely, the rectification of this situation ascribed to humans. While the latter is partially true, I am inclined to believe that we must refrain from the publication of this assessment until better terminology for its framing has been found and integrated from the very title of the publication throughout the entire rest of the text. That is, we need a new term for IAS that clearly identifies the human responsibility in non-human migration and fugitivity that is clearly stated in Introduction Executive summary point 1. As an alternative suggestion, would it not be more accurate to speak of them as (anthropogenically) displaced species? This then would set the stage for the transformational change called for by the IPBES itself in already published reports and assessment – here in terms of where the control of these migrations, invasions and alienations actually needs to begin.	Thanks very much for this suggested change. Authors have considered and clarified the terminology throughout including in a new figure in the second order draft.
Brooks, Thomas	No	1	3	74	3	74	Footnote 1: this is similar to, but not identical to, the CBD definition. Strongly recommend sticking with the CBD definition verbatim, and citing it here. Introduction of a new definition will cause confusion and reduce policy relevance.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	3	74	3	74	The given definition for IAS is indefinite: what kind of impact is meant - negative, positive, or both? And among impacts on the local ecosystem and species, impacts on biotopes and ecosystem services should be added too	Thank you very much for this suggested change. Authors have included it in the second order draft.
Linnamägi, Merike	No	1	3	74	3	74	See also previous comment. How IPBES defines IAS is one of the most important elements around which the rest of the assessment is built on. Whatever definition is used - this should be clearly stated in the paragraph (not added as a footnote as irrelevant additional information).	Thank you very much for this suggested change. Authors have included it in the second order draft.
Plesnik, Jan	No	1	3	74	3	74	From definition its is not clear whether "established" means "created a viable population"(as stated in line 560-577) or "begun to live and reproduce" as well as the baseline for "natural range".	Thank you very much for this suggested change. Authors have included it in the second order draft.
Ranarijaona, Hery Lisiv Tiana	No	1	3	74	3	86	Which kind of habitat there are more IAS: forest, lakes, ricefield, ...and which localities in rural, in urban zone?	Thank you very much for your comment - this is addressed in Chapter 2 of the second order
Zisenis, Marcus	No	1	3	74	3	76	There is a need to define invasive alien species (IAS) clearly in spatial and time related terms with their particular impacts on the different biodiversity levels and values as defined in the Convention on Biological Diversity. Non-native species do not have per se negative impacts on the different values of biodiversity. There is an impact assessment necessary for each individual case in space and time of the positive and negative impacts of non-native species. The used definition fails to distinguish the negative term 'invasive' from native species, because all species have an impact on local ecosystems and species (e.g. Davis, M.A., Chew, M.K., Hobbs, R.J., Lugo, A.E., Ewel, J.J., Vermeij, G.J., Brown, J.H., Rosenzweig, M.L., Gardener, M.R., Carroll, S.P. and Thompson, K., 2011. Don't judge species on their origins. Nature, 474(7350), pp. 153-154. https://www.nature.com/articles/474153a.pdf). The question is, if we as dominant species on earth value this impact as negative or positive, irrespectively if it is a native or non-native species. Moreover, there is no scientific proof that IAS are "a major threat to biodiversity and ecosystem services", because human induced ecosystem deterioration and climate change are the major reasons why non-native species can establish after introduction from other regions on earth. For instance, the flora of cities consists naturally and typically mainly of non-native species of various biodiversity values (e.g. Zisenis, M., 2015. Alien plant species: A real fear for urban ecosystems in Europe?. Urban Ecosystems, 18(2), pp. 355-370).	Thank you very much for this suggested change. Authors have included it in the second order draft.
Camacho, Rulao A.	No	1	3	75	3	76	Implications can be both negative and positive. If this is only highlighting the negative, then perhaps use consequences rather than implications.	Thank you very much for this suggested change. Authors have included it in the second order
Setsaas, Trine Hay	No	1	3	75	3	75	Has there been any consideration on how to use ecosystem services vs. nature's contribution to people in this assessment? With ref to IPBES conceptual	Thank you very much for this suggested change. Authors have included it in the second order
Blackburn, Tim	No	1	3	76	3	76	Use "increase" rather than "escalation".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	76	3	77	We expect the total number to increase (it's unlikely to decrease) but the key point of Seebens is that the annual numbers increase too - thus the rate is increasing, not just the number.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	3	76	3	76	Over the last century" is a prepositional phrase, so a comma is needed after 'century'.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	3	76	3	76	Kindly check, whether references to the four regional IPBES assessments can also be inserted after "IPBES, 2019". Rationale: decision IPBES-4/1 states: "In addition, two of these ten experts from each of the regional assessments will be fully integrated, [...] for the invasive alien species assessment [...] to ensure full coherence ... "(Source: para 12, Annex III of decision IPBES-4/1).	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	77	3	77	Seebens et al. analyses established populations, not introductions.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft. Seebens studied first records.
Copp, Gordon	No	1	3	78	3	78	A comma is needed after "Historically"	Thank you very much for this suggested change. Authors have included it in the second order
Government of Ethiopia	Yes	1	3	79	3	79	Needs to be amended as "... or aesthetic benefits (Reichenbach, 1994) as well as environmental stabilization."	Thank you for your comment.
Kudelska, Theresa	No	1	3	79	3	79	Additional reference in relation to the use of IAS for economic, recreational and aesthetic reasons: Sladonja, B. Poljuha, D. & Uzelac, M. 2018. Non-native invasive species as ecosystem service providers. Intech Open. Available from: https://www.intechopen.com/books/ecosystem-services-and-global-ecology/non-native-invasive-species-as-ecosystem-service-providers	Thank you for your comment.
Copp, Gordon	No	1	3	81	3	81	A comma is needed after "al., 2020"	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Setsaas, Trine Hay	No	1	3	82	3	83	issues in plural to be used?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Walton, Paul	No	1	3	82	3	82	suggest added wording for clarity '...not increased evenly across territories'	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	84	3	84	"Strategic policies and viable technique" to do what?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	84	3	84	Would it be "this IPBES assessment" rather than "this assessment"?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Ethiopia	Yes	1	3	85	3	85	Better to rectify as "... immense environmental, economic and social challenges ...".	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	3	85	3	85	Clarification required: Does the term "social challenges" include cultural aspects, such as the impact of IAS on cultural diversity ?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	88	3	89	Meaning unclear. What is a first record, and saturation of what?	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Kühn, Ingolf	No	1	3	88	3	99	I think in this context an early reference to impacts (and costs?) would be nice, e.g. Vilà M, Basono C, Pyšek P, Josefsson M, Genovesi P, Gollasch S, Nentwig W, Olenin S, Roques A, Roy D, Hulme PE. DAISIE (2010) How well do we understand the impacts of alien species on ecosystem services? A pan-European, cross-taxa assessment. Frontiers in Ecology and the Environment 8: 135-144. doi:10.1890/0808083. or the more recent work (to be published) by Franck	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Verma, Madhu	No	1	3	88	3	99	The phenomenon of increasing rate of first records across the globe may be further elaborated for more clarity	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Walton, Paul	No	1	3	88	3	88	rate of first records' needs more clarity - suggest 'the rate at which new alien species are recorded'	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Copp, Gordon	No	1	3	89	3	89	The sentence should start with "The increase in..."	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	3	90	3	90	"Considered a primary driver" of? Need to be more explicit.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.

Copp, Gordon	No	1	3	90	3	91	Why are Daniel Chapman's initials given here? Although his middle initial is missing from the other 'Chapman et al.' reference list (i.e. 2017), the email contact address is the same for both Chapman's of the 2016 and 2017 articles. Similarly, why are Phil Hulme's initials given here? He is the 1st author of all three 'Hulme et al.' articles listed in the Reference List, and the reason for giving his first name in full in line 1056 (page 25) and in the Reference List (page 38, line	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Kudelska, Theresa	No	1	3	90	3	91	Additional references which relate to global trade increasing IAS invasions: Westphal, M. I. Browne, M. MacKinnon, K. & Noble, I. 2008. The link between international trade and the global distribution of invasive alien species. <i>Biological Invasions</i> , 10,391-398. Seebens, H. Essl, F. Dawson, W. Fuentes, N. Moser, D. Pergl, J. Pysek, P. van Kleunen, M. Weber, E. Winter, M. & Blasius, B. 2015. Global trade will accelerate plant invasions in emerging economies under climate change. <i>Glob Chang Biol</i> , 21, 4128-40. Levine, J. M. & D'Antonio, C. M. 2003. Forecasting Biological Invasions with Increasing International Trade. <i>Conservation Biology</i> , 17,322-326. Meyerson, L. A. & Mooney, H. A. 2007. Invasive alien species in an era of globalization. <i>Frontiers in Ecology and the</i>	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Dupont, Lise	No	1	3	93	3	95	It seems to me that the link between the COVID-19 epidemic and the disruption of biodiversity is still debated; in any case a reference is necessary here	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Kudelska, Theresa	No	1	3	93	3	93	Additional reference relating to impact of INNS and climate change: Firn, J, Maggini, R, Chadès, I, Nicol, S, Walters, B, Reeson, A, Martin, T, G. Possingham, H, P. Pichancourt, J.-B. Ponce-Reyes, R. & Carwardine, J. 2015. <i>Priority threat management of invasive animals to protect biodiversity under climate change. Global Change Biology</i> , 21, 3917-3930.	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Schaffner, Urs	No	1	3	93	3	95	Explain why COVID-19 pandemic has demonstrated to the world that threats to biodiversity are threats to human health? What is the link to biodiversity? Do the authors refer to a publication?	Thank you very much for this suggested change. Authors have included it in the second order draft.
Shimura, Junko	No	1	3	94	3	99	COVID-19 is human infectious disease. If origin of COVID-19 virulence is needed to highlight here, use language in line with "alien species can carry microorganisms that cause spillover of human/animal pathogenic agents such as zoonotic disease causing agents"	Thank you very much for this suggested change. Authors have included it in the second order draft.
Barbosa, Andres	No	1	3	95	3	96	Microorganisms has been considered as IAS from long time. It has been cited as an important problem in Antarctica.	Thank you very much for this suggested change. Authors have included it in the second order
Kühn, Ingolf	No	1	3	95	3	97	I think it would be fair to substitute this with a reference, e.g. Nuñez MA, Pauchard A, Ricciardi A (2020) Invasion Science and the Global Spread of SARS-CoV-2. <i>Trends in Ecology & Evolution</i> 35: 642-645. doi: https://doi.org/10.1016/j.tree.2020.05.004 .	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Girod, Christophe	No	1	3	96	3	97	Might be interesting to cite a study on Aedes mosquito species and its potential to propagate arboviruses in invaded countries (e.g. in Europe, European Centre for Disease Prevention and Control. Guidelines for the surveillance of invasive mosquitoes in Europe. Stockholm: ECDC; 2012)	Thanks for this suggested change. Authors have tried to include a diverse range of examples in the second order draft.
Blackburn, Tim	No	1	3	97	3	97	Use "zoonoses" rather than "zoonosis"	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Walton, Paul	No	1	3	97	3	97	suggest the plural 'zoonoses'	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	1	3	98	3	98	"Establish international policy goals" is vague.	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Government of Ethiopia	Yes	1	3	98	3	99	It is sufficient to use 'GQL' only .	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Pourkazemi, Mohammad	No	1	3	98	3	98	establish regional and International policy goals	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	1	3	99	3	99	It says "See Box 1.5" but shouldn't the numbers reflect the order of appearance? Also not obvious why 1.5 is cited here.	Thank you for your comment - authors have checked the internal references in the second
Blackburn, Tim	No	1	3	99	3	99	Social-ecological above. Also, do you mean ecological rather than economic?	Thank you very much for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Dunn, Christopher	No	1	3	99		99	GQL was defined near the beginning of the chapter, but it would be good to do so again	Thank you for your comment. Acronyms will no longer be used in the second order draft (except for IPBES)
Government of Germany	Yes	1	3	99	11	277	Clarification required in foot-note: For the purpose of the assessment, the definition of IAS was provided under Annex III to decision IPBES-4/1. We acknowledge that this definition is quite general in the sense that it just talks about "impact", without specifying, whether the term "impact" includes detrimental as well as beneficial effects of IAS. It is therefore suggested to follow up on the IAS definition by providing some more specific information on how the definition is being applied in this assessment. Without such additional information (which should be provided early on in this report), the narrative of the assessment may be difficult to understand (e.g. L277 mentions beneficial impacts in a section that is actually targeting detrimental impacts). Please note, whereas it is important to acknowledge beneficial impacts of alien species, it may be questionable to define those alien species as IAS that have exclusively beneficial impacts. We also recommend discussing the definition used in this assessment against the definition used e.g. by the CBD. Both definitions are not in line: CBD's	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	3	99	3	99	Admittedly, I am not sure that the reference to box 1.5 is appropriate	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Setsaas, Trine Hay	No	1	3	114	4	115	Should consider using the term good quality of life OR human well-being?	Thanks for this suggested change of wording. It is an improvement and Authors have adopted it in the second order draft.
Kudelska, Theresa	No	1	3	214	4	244	The CABI compendium contains some useful additional references which you may wish to review and consider including in this section of the chapter: https://www.cabi.org/cisc/datasheet/108973	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Khuroo, Anzar Ahmad	No	1	3	294	3	294	There should be consistency in usage of words; why to use word "Transferred", if "Transported" is used at other places.	Thank you. Changed in the second order draft.
Blackburn, Tim	No	1	3	297	3	297	What do you mean by "also natural dispersal during rainfall"?	Thank you. This box has been deleted in the second order draft.
Blackburn, Tim	No	1	3	400	3	400	Insert "of" after "reduction"	Thank you. Changed in the second order draft.
Blackburn, Tim	No	1	3	404	3	406	Are these positive impacts? If they were not naturally present, surely they are damaging the native ecosystem?	Thank you. This box has been deleted in the second order draft.
Blackburn, Tim	No	1	3	414	3	414	Which is <i>Sargassum muticum</i> ? Caption for photo also.	Thanks for this suggested change. Authors have included it in the second order draft.
Barbosa, Andres	No	1	4	100	4	102	Figure 1.1 should include polar regions as places where IAS have important impacts.	Thank you, this figure has been deleted in the second order draft.
Dunn, Christopher	No	1	4	100	4	117	Fig. 1.1 is good and includes IPLCs; however, the text makes NO mention of indigenous peoples	Thank you very much for the comment
Joshi, Chudamani	No	1	4	100	4	100	Figure 1.1 the quality is poor. Need to increase the picture resolution	Thank you. This figure has been deleted in the second order draft.
Volpedo, Alejandra	No	1	4	100	4	100	Fig. 1.1. The term native peoples or native peoples is more correct than using the term indigenous peoples. This aspect should be reviewed throughout the	Thank you. This figure has been deleted in the second order draft.
Willette, Demian	No	1	4	100	4	102	Understanding the figure is only a placeholder. I suggest the new figure place the label of 'Invasive alien species' in Bold font or otherwise visually highlight	Thank you. This figure has been deleted in the second order draft.
Baguino, Nestor T.	No	1	4	102	4	117	I believe in Teilhard le Chardin's The Phenomenon of Man (Planet Earth became the Noosphere), hence IAS problem came when Biosphere became Noosphere. When Earth was only Biosphere, scientists documented many species extinctions and this process is embedded in the evolution of our planet from Biosphere to Noosphere. Our roots, as per Mitochondrial Eve was centered in Africa (this conclusion is from a US based study involving analysis of blood-based DNA taken from all human races worldwide) and the published popular version of the study said in one sentence conclusion "we are all Africans". Interestingly, earlier in prehistoric time, predecessors of Homo sapiens left Africa like Homo neanderthalensis into Europe and the Mediterranean region, Homo erectus into continental Asia up to the island of Java and Homo luzonensis in Luzon, Philippines. The latter is a recent discovery, where in Luzon (Cagayan and Kalina provinces, Luzon Island), hominid fossils were found together with savannah wild mammal fossils, like dwarf elephants and stegodons and rhinoceros, together they became extinct). After all predecessor hominids got extinct, Homo sapiens spread throughout the world and lately introduced many IAS worldwide and responsible for displacing natural forests to give space for villages, farms, trails and seaports finally, after the Industrial Revolution, into urban centers, built-up areas, industrial centers, airports, mining areas, logging areas, roads and titled lands as agroecosystems, subdivisions, etc. In the Philippines, landless human families, used logging and mining roads to reach former inaccessible natural forests and converted them into slash-and-burn agricultural farms, human shelters, combining all above, resulted to present Philippine deforestation and fragmentation of lowland rainforests into isolated small rainforest patches (please see time-series Philippine forest cover maps). Latest forest cover map of the Philippines show continuous forests are found above 1000 meters as green color, while deforested areas below 1000 m to sea level, white color. If what Merrill claimed as 85% of total plant species are in 0 to 1000 m above sea level, then by deductive reasoning, Philippines lost much of its lowland biodiversity. The remaining forest cover >1000 m asl, because they are cold adapted ecosystems, are far from being invaded by introduced alien tropical warm-seeking plant species. However, the Asian alder <i>Alnus japonica</i> , because temperate Asia is its origin, it spread wild in the Cordillera highlands, Luzon as IAS. Alien tree species from tropical countries can also spread into warm Philippine lowlands. If light demanding plant species, they would be expected to spread into agricultural areas including abandoned open grasslands. However, if shade-tolerant, they could spread into the many remaining rainforest patches. Said small fragmented forest patches are expected to be very	Thank you so much for your useful perspectives.
Plesnik, Jan	No	1	4	102	4	106	Species extinction risk - for wild plant and animal species is 12.5 % (IPBES 2019)	Thank you, this figure has been deleted in the second order draft.
Ranarajona, Hery Lisy Tiana	No	1	4	102	4	102	How do you calculate the percentage, the sources of the value of percentage should have to be mentioned?	Thank you, this figure has been deleted in the second order draft.
Copp, Gordon	No	1	4	108	4	108	Grammatically, it is unacceptable to begin a sentence with an acronym. For example, when starting a sentence with a species' scientific name, the Genus name must be spelled out. Following that logic, "IAS" should be spelled out.	Thank you for your comment, authors have spelt out all the acronyms (except for IPBES) in the second order draft
Girod, Christophe	No	1	4	108	4	108	One might add the following reference : Bellard C, Cassey P, Blackburn TM. Alien species as a driver of recent extinctions. <i>Biol Lett</i> . 2016;12(2):20150623. doi:10.1098/rsbl.2015.0623	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	4	108	4	110	I do not believe IAS are the major drivers of species extinctions. Human activities are the main drivers, through deforestation (for cattle or crops for cattle), overfishing, aquaculture, pollution, habitat destruction, the introduction of invasive species (intentional or unintentional liberation in the wild), overhunting, trade of exotic species, and other influences. Better to re-phrase this sentence.	Thanks for this suggested change. Authors have included additional evidence in the second order draft.
Setsaas, Trine Hay	No	1	4	108	4	109	New suggestion: they degrade habitats both at land and sea and have serious impacts on protected areas. I wish you could write ecosystems instead of protected areas, so to make it more relevant to a broader spectrum of sectors. But, I assume, this information is linked to a specific paper. If supported, it could be more	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Shimura, Junko	No	1	4	108	4	110	Need a reference to freshwater environment e.g. lake Victoria in Africa, St-Laurence River in US, Canada	Thank you for your comment

Zisenis, Marcus	No	1	4	108	4	109	The statement is wrong that IAS are 'major drivers of species extinctions globally', but the ecosystem changes directly and indirectly caused by man (see above, Fig. 1.7 on page 7). IAS as well as native species can be a severe problem on islands, but generally non-native species just can dominate on local and regional level like dominant native species. Anyhow, the static concept of nature does not reflect the real discontinuous development of ecosystems during succession, internal and external natural and unnatural (human) influences which determine also the species flow and composition. Furthermore, human land use has allowed to emerge new species and ecosystems which did not exist before in nature, but depend on human intervention such as on agricultural fields or	Thanks for this suggested change. Authors have included additional evidence in the second order draft.
Camacho, Rulo A.	No	1	4	109	4	109	Why the special emphasis on PA? IAS has impact on other significant sites that are not listed as PA	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	4	109	4	109	Question: Does the term "land" include biodiversity, soil and also freshwater? It is suggested to include a definition of "land". The IPBES glossary to date doesn't seem to include such a definition. However, the IPBES glossary does provide a definition of 'land degradation', which may be useful for defining the components of 'land'. In this context, you may also wish to analyse how other IPBES assessments used the term 'land' to ensure coherence in the use of terminologies within IPBES processes. You may also wish to analyse, how other science-policy interfaces (IPCC and UNCCD-SPI) or other biodiversity-related UN bodies define 'land' to also facilitate understanding across other relevant UN processes on this topic.	Thank you for your comment. Yes, it does. IPBES indeed follows the UNCCD definition (as introduced in the land degradation assessment). The assessment of invasive alien species also follows this definition.
Blackburn, Tim	No	1	4	110	4	110	Liu et al., 2020, although this study shows that most PAs don't have any of the aliens studied.	Thank you very much for this - we have returned to the paper and still feel it is a relevant reference in the context here. It will be considered in the second order draft
Blackburn, Tim	No	1	4	116	4	116	Insert "poorly" in front of "understood by decision-makers".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	4	116	4	116	It is suggested to include 'policy-'. The sentence would read: "... and understood by policy- and decision-makers ..."	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	4	117	4	117	Insert closing bracket.	Thank you for your comment, it has been addressed in the second order draft
Government of Germany	Yes	1	4	117	4	117	Is there no other reference other than the IPBES/6/INF/10 document that can be provided as well to back this statement?	Thanks for this suggested change. Authors have included it in the second order draft.
Dudgeon, David	No	1	4	444	5	467	Same as above; it is not just D. polymorpha that is a problem. Also, this is not a world-wide invader - its latitudinal limits are strictly temperate. Also I may have missed in but in (e.g.) line 466 it would be good to mention the devastating effects these invaders have had on North American unionid mussels (i.e. pearly mussel) mainly through competition for food.	Thank you, this box has been deleted in the second order draft.
Kudelska, Theresa	No	1	4	444	5	473	The CABI compendium contains some useful additional references which you may wish to review and consider including in this section of the chapter: https://www.cabi.org/isc/datasheet/85295	Thanks for this suggested change. Authors have included it in the second order draft.
Ranarijaona, Hery Lisy Tiana	No	1	5	109	5	121	Eichhornia crassipes should have to be an example mentioned in this part, as it is wellknown in the world than Acacia dealbata, and has the same invasion date, it will be easier to understand the explanation of the figure. Please read the references : (Barrett & Forno, 1982; Gopal, 1987, Center, 1994; Julien et al., 1996; Edwards and Musil, 1975, Ho Thanh Tham , 2012, Davies HRJ, 1959.....	Thank you for your comment
Dool, Serena	No	1	5	119	6	123	Comment regarding an event in the timeline: "1845-1849: Irish potato famine...". It is true that the fungus was the proximate 'cause' of the famine, but it was not the ultimate cause. For example, during the famine, vast quantities of other foodstuffs were exported and Ireland remained a net exporter during these years (See https://en.wikipedia.org/wiki/Great_Famine_(Ireland)#Food_exports_during_Famine). How about: "1845-1849: The Great Famine in Ireland, proximately caused by invasive pathogen"	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Lacerda De Matos, Ana Carolina	No	1	5	119	6	123	The size of the illustrations may make it difficult to understand this figure. I suggest increasing the size of the illustrations or placing the second part of the figure (which is on page 6) in a horizontal position, as they did on page 5.	Thank you for your comment, authors have taken your point into account when revising and finalizing the figure in the second order draft
Núñez Lendo, Carmela Isabel	No	1	5	119	6	123	Missing the trade of exotic species as pets - E.g. Trachemys scripta elegans vs. Emys orbicularis and Mauremys leprosa (European tortoises); Asian carps; parrots / Missing aquaculture impacts - E.g. Atlantic salmon (Salmo salar) brought into the Pacific for culture; Penaeus monodon (giant tiger shrimp) originally from Asia and now is cultured in many places (Hawaii, French Polynesia...)	Thanks for this suggested change. Authors have included it in the second order draft.
Rosa, Hugo Henrique Marques da	No	1	5	119	6	123	The timeline could show a very early event of introduction of an alien species as reported by "Vigne, J. D., Guilaine, J., Debut, K., Haye, L., & Gérard, P. (2004). Early taming of the cat in Cyprus. Science, 304(5668), 259-259." and could also show about the introduction of African grasses in the 18th to Brazil (Zenni, R. D., & Ziller, S. R. (2011). An overview of invasive plants in Brazil. Brazilian Journal of Botany, 34(3), 431-446."	Thanks for this suggested change. Authors have included it in the second order draft.
Shimura, Junko	No	1	5	119	6	123	Figure 1.2 Add CBD guidance (Guiding Principles annexed to decision VI/23 in 2002; Pet guidance annexed to decision XII/16 in 2014; Biological control guidance annexed to decision XIII/13 in 2016; unintentional introduction guidance annexed to decision 14/11 in 2018). Also add International Agreement for the Creation of an Office International des Epizooties in Paris in 1924.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	5	120	5	120	For the exponential graph, inset should say Numbers of established alien species I assume. Also need to be wary of skipping back and forth between alien species (undefined in this draft) and IAS - not the same thing!	Thank you very much for your feedback
Walton, Paul	No	1	5	120	5	121	Graph needs a short legend or explanation of what the y-axis represents	Thank you very much for your feedback
Yiu, Evonne	No	1	5	120	5	123	Very useful timeline! Which perhaps could also map it with economic developments / climate change trends or conventions.	Thank you very much for your feedback
Faulkner, Katelyn	No	1	5	475	12	628	Somewhere in this section (Section 1.4) on the invasion process it needs to be made clear that impacts can occur at any stage. This is not clear at the moment	Thank you, this is now clarified in the Invasion curve section in the second order draft.
Rosa, Hugo Henrique Marques da	No	1	5	475	7	502	The evolutionary process as proposed by Zenni et al 2017 could complement the item 1.4. Zenni, R. D., Dickie, I. A., Wingfield, M. J., Hirsch, H., Crous, C. J., Meyerson, L. A., ... & Erffmeier, A. (2017). Evolutionary dynamics of tree invasions: complementing the unified framework for biological invasions. AoB	Thank you for this suggestion, we have included it in the second order draft.
Blackburn, Tim	No	1	5	479	5	479	Delete first names from citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Copp, Gordon	No	1	5	479	5	479	M Williamson and Mark Williamson are one and the same person, so why the first initial and first name ? (see also the Ref. list entries for these two articles by Mark Williamson in 1996.	Thank you, citations and reference styles have been harmonized in the second order draft
Khuroo, Anzar Ahmad	No	1	5	479	5	479	Delete "M" and "Mark"	Thank you, citations and reference styles have been harmonized in the second order draft
Government of Germany	Yes	1	5	480			The conceptual model and the Fig. 1.6 are based on a different definition of the term invasive. When this is adopted throughout the assessment conflicting definitions should be explained. The concept of Blackburn et al. 2011 and of others mentioned here relates to establishment and spread - not to impact. Even if this is discussed chapter 4, it would be preferable to explain this here.	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	5	480		483	Not really; as shown in Fig. 1.6, impact is not part of the unified framework for biological invasions; this assessment therefore does not really follow this	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	1	5	481	5	481	Replace "and" with " "(comma).	Thank you, the sentence has been rephrased in the second order draft.
Government of Germany	Yes	1	5	482		482	Please specify whether human-induced climate change is included under "human-mediated invasions".	Thank you - the definition now provides clarity in the second order draft.
Khuroo, Anzar Ahmad	No	1	5	482	5	482	Delete "Pysak"	Thank you, citations and reference styles have been harmonized in the second order draft
Hallosserie, Agnès	No	1	5	612	6	627	Section 1.4.5 could introduce a bit more the various strategies and how they intervene in time along the invasion curve, building on Chapter 5 content. It seems key to highlight this point in the key messages of the assessment, since it impacts the cost-effectiveness of the measures.	Thanks for this suggested change. Authors have included it in the second order draft.
Linnamägi, Merike	No	1	6	122	6	122	Figure 1.2 European strategy on invasive alien species (2003, Piero Genovesi and Clare Shine) should be added https://www.cbd.int/doc/external/cop-09/berni-en.pdf . It is an important document adopted by Bern Convention in 2003, Bern Convention covers 51 states and it was a landmark strategy, covers larger area than some others stated (compared to for example 2017 Arctic IAS Strategy).	Thanks for this suggested change. Authors have included it in the second order draft.
Plesnik, Jan	No	1	6	122	6	123	Add: 2004 European Strategy on Invasive Alien Species - a really pan-European science-policy document elaborated within the Convention on the Conservation of Wildlife and Natural Habitats (Bern Convention)	Thanks for this suggested change. Authors have included it in the second order draft.
Ranarijaona, Hery Lisy Tiana	No	1	6	122	6	122	Ramsar convention on 1971 : wetland zone convention should have been mentioned because it would be a solution to reduce IAS in wetland zone.	Thank you - this is important but beyond the scope of this figure.
Blackburn, Tim	No	1	6	123	6	123	Since 1500AD. Many examples a long time prior to the start of this timeline!	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Díez, Pilar	No	1	6	123	6	123	Indicate that examples of IAS are in black while examples of controls are in green. There is also some grey text. What's the meaning of grey?	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	6	129	6	129	Delete semicolon	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Ethiopia	Yes	1	6	384	6	384	The word "Terminology" on left top corner of Fig. 1.6????	Thank you, this figure has been revised in the second order draft.
Josefson, Melanie	No	1	6	485	6	487	Fig. 1.6 is too complex and would benefit from simplification & being more straightforward; it could build on fig. 1.8 and add information that needs to be	Thank you, the figure has been revised in second order draft
Blackburn, Tim	No	1	6	487	6	487	Delete first name from citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Copp, Gordon	No	1	6	487	6	487	Again, why the first names and initials	Thank you, citations and reference styles have been harmonized in the second order draft
Blackburn, Tim	No	1	6	492	6	492	Replace "to facilitate" with "that obstruct"	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	6	494	6	494	Insert comma after "process".	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	6	495	6	496	I suggest removing this Figure from this assessment which targets policy makers, as it is likely to cause confusion.	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	1	6	498	6	498	Change "impact" into "impacts".	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	6	505	6 (actually page 41)	512	This is messy (from lines 505 to 507 still ok). I miss other barriers, as climate barriers (important for both plants and animals). Why a mountain or an ocean are only part of "geography" and are not included within "biogeography"? biogeography includes all, so better just talk about biogeography. Very weak the mention to biotic factors as only mention competitors, predators or parasites. What if the limits of distribution of certain species are the limits of their mutualistic species? Other possibility: the specie does not disperse just because the near ecosystem is not suitable for them (or their vectors) to thrive.	Thanks for this suggested change. Authors have included it in the second order draft.
Smith, Emily	No	1	7	1			Figure 1.2. Alter the figure name. 'Timeline of biological invasions....' as this doesn't describe the figure clearly. Suggestion to change to 'Timeline of key strategic events, advances in invasive species policy and examples of IAS introduction and control'.	Thank you for your comment, authors have implemented this change in the second order draft.
Government of Germany	Yes	1	7	124	8	191	Please ensure that this section considers all details of the objectives for this assessment as outlined in para 1, Annex III to decision IPBES-4/1. These include: the array of IAS that affect biodiversity and ecosystem services; the threat posed by such species, including on agrobiodiversity and food, human health and livelihood security; major pathways and drivers of introduction and spread of IAS; global status and trends; management interventions; awareness of IAS and their impacts; effectiveness of measures and associated policy options.	Thanks for this suggested change. Authors have included it in the second order draft.
Lacerda De Matos, Ana Carolina	No	1	7	124	8	191	Up to line 123 the text provides a timeline of the IAS. Thereafter, the main theme of the text becomes the objective of the IPBES IAS assessment. I suggest that this transition be made in a more subtle way, so that the reader do not be confused during the reading.	Thanks for this suggested change. Authors have included it in the second order draft.
Marchante, Elizabete	No	1	7	124	7	128	This sentence is very long - I suggest splitting it in two.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.

Blackburn, Tim	No	1	7	125	7	125	Benefits aren't posed, so some rewording needed here.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Walton, Paul	No	1	7	126	7	126	The text restricts policies and practices to the 'international level' only - suggest that policies and practices designed to tackle IAS need to operate at international, national and sub-national levels in order to succeed.	Thanks for this suggested change. Authors have included it in the second order draft.
Bliss, Cebuan	No	1	7	127	7	127	Suggest terms used with regards to management are carefully contemplated i.e. 'eradicate' would suggest manage is better	Thanks for this suggested change. Authors have included it in the second order draft.
Walton, Paul	No	1	7	127	7	127	Suggest this list should explicitly include the <i>voluntary sector</i> - non-governmental organisations play a critical role in developing and implementing IAS policy and practice, and are likely to be necessary delivery partners an agents of change in future.	Thanks for this suggested change. Authors have included it in the second order draft.
Feest, Alan	No	1	7	128	7	130	This sentence does not make sense.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Schaffner, Urs	No	1	7	128	7	129	Here and elsewhere, I think it would be fair to add some of the original papers that drew attention to these subjects	Thanks for this suggested change. Authors have included it in the second order draft.
Xue, Huajie	No	1	7	128	7	128	It is recommended to modify "control" to "decrease".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	7	129	7	129	Delete semicolon after the citation.	Thank you for your comment. We have updated it in the second order draft.
Blackburn, Tim	No	1	7	129	7	129	Really? This is about IAS and their control - these are by definition damaging species that shouldn't be in a place and that we want to deal with. If we allow value perceptions and cultural differences to cloud our judgements, then we will get nowhere...	Thank you - we have tried to retain the distinction and noted the request to consider benefits of some IAS in the second order draft.
Girod, Christophe	No	1	7	129	7	129	Typo: a ";" should be removed between 2017) and analysis	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Baguion, Nestor T.	No	1	7	132	7	137	Lines (132 to 137). For the term "biological invasion", I view it at three levels, (1) ecosystem (involves man-made ecosystems replacing natural ecosystems, for the Philippine example, time series forest cover map from 1900 to 1999), (2) species (alien species introduced then compete with native species, for the Philippine example, please see research outputs on Mahogany Swietenia macrophylla), (3) genetic (individuals from conspecific alien populations introduced into the host ecosystem then host population gene pools are contaminated with inferior genes (e.g. Eucalyptus deglupta ranges from New Guinea to Mindanao, Philippines. In the Philippines, Mindanao bark beetle coevolved with Eucalyptus deglupta, hence their commensal relationship, but Mindanao bark beetle kills New Guinea Eucalyptus deglupta by girdling. Since the two interbreed being one species, it is wrong to introduce New Guinea Eucalyptus deglupta in	Thank you for these interesting perspectives.
Castro-Diez, Pilar	No	1	7	132	7	170	The initial paragraph of Box 1.1 needs to explain more clearly the content of the box. In general, it is difficult to follow for readers not familiar with international policies.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	7	132			The heading of box 1 "International policy goals for IAS" is very general. It is therefore recommended to use a more inclusive approach, and analyse in depth other ongoing programmatic and institutionalised processes with specific IAS goals in this box as well. For this reason, please also analyse the goals of the IPPC, as there is a memorandum of cooperation between the CBD and the IPPC (https://www.ippc.int/es/partners/cbd/publications/2014/1/memorandum-of-cooperation-between-the-food-and-agriculture-organization-of-the-united-nations-and-the-secretariat-of-the-convention-on-biological-diversity-on-cooperation-between-the-secretariat-of-the-convention-on-biological-diversity-and-the-	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Josefsson, Melanie	No	1	7	132	7	160	Box 1.1 will need to be updated as the Post-2020 Global Biodiversity Framework Goal on IAS is developed in 2021.	Thanks for this suggested change. Authors have included it in the second order draft.
Setsaas, Trine Hay	No	1	7	132	7	160	Should/could it be considered to include international policy goals that also speak to the agricultural/fisheries sector? On the point of sector relevance and ownership/credibility of IPBES products to relevant (and important) sectors.	Thanks for this suggested change. Authors have included it in the second order draft.
Shimura, Junko	No	1	7	132	7	160	Add Article 8h of the CBD	Thanks for this suggested change. Authors have included it in the second order draft.
Peck, Harry	No	1	7	133	7	136	This is a reference to CBD and SDG targets rather than "goals." Perhaps the text should be consistent with this...?	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Ethiopia	Yes	1	7	147	7	147	Needs to be corrected as "Strategic Plan for Biodiversity 2011-2020 ...".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	7	147	7	147	Box 1.1, line 147: Please check whether it should read: 2011-2020 rather than 2011-2030. We propose inserting a more complete citation by referring to the Strategic Plan for Biodiversity 2011-2020 which frames the Aichi Targets.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Ethiopia	Yes	1	7	149	7	156	Since what is stated here is not yet approved by Parties to CBD, it should not be cited.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	7	499	7	499	Does this figure add anything? It's a very pared down version of the invasion process and emphasises the effects of other elements of human environmental change, which may not be the main drivers in many (most?) cases. Indeed, is there hard evidence that they are?	Thank you, the figure has been removed in the second order draft
Government of Germany	Yes	1	7	499			FIGURE 1.7: this schematic lists climate change only as enabler by "releasing abiotic constraints". Climate change destroying suitable habitat conditions and forcing species to shift their distributional range to now more suitable habitats should be included for a more balanced illustration (see IPCC AR5 WGII SPM: Paragraph A-1, Figures SPM.5 and SPM.6)	Thank you, the figure has been removed in the second order draft
Castro-Diez, Pilar	No	1	7	500	7	500	Figure with two legends.	Thank you, the figure has been removed in the second order draft
Schaffner, Urs	No	1	7	500	7	500	Fig.1.7: The statement in the legend should be toned down; the Figure just illustrates factors that facilitate establishment and spread by some IAS, certainly not by IAS in general.	Thanks for this suggested change. We have included it in the second order draft.
Yiu, Evonne	No	1	7	504	7	541	Is "transportation" necessarily only limited to IAS being transported by humans, or will you also consider the relocation of IAS through the species' own movement (for eg tropical fishes foraging northern seas) as part of this transportation process? What about those transported by other animals (for eg seeds from birds' droppings)? Also, what about marine plastics as a medium of transporting species and pathogens?	Thank you - this is included in the definition in the second order draft.
Blackburn, Tim	No	1	7	505	7	505	Delete first name from citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Castro-Diez, Pilar	No	1	7	505	7	505	Remove M from the citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Government of Germany	Yes	1	7	505	9	545	Climate change removes/changes barriers and opens invasion pathways by creating new corridors. If IAS are to include species relocated due to climate change (see comment #1), please rephrase this paragraph (including Box 1.3) accordingly.	Thanks for this suggested change. Authors have included it in the second order draft.
Walton, Paul	No	1	7	505	7	512	It would be helpful to indicate in this paragraph that the geographic barriers to dispersal, which IAS must cross to reach new territories, themselves serve to force evolution to proceed independently in different regions of the Earth and thus generate and maintain a high proportion of biodiversity - making antelope the plains grazers in Africa, yet kangaroos the same in Australia, and so on. In other words, this effect generates much of the global biotic heterogeneity that IAS erode and homogenise. The movement and release of organisms around the world by people effectively breaks down these natural barriers - this I find is a useful conceptual framework to present the IAS issue, one that serves to head-off accusations that action against IAS is essentially 'xenophobia in disguise'.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	7	514	7	5	Similar to Box 1.2, Box 1.3 is not cited and appears suddenly without previous introduction or mention, interrupting the flux of the reading. Table 1.2 within Box 1.3 repeats the information given at the beginning of the box. Try to merge categories and subcategories in a single item (either text or table).	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	7	514	8	541	How does the spread/ migration of alien species due to shifting climatic and vegetation zones (e.g. mild winters) fit into this categorization?	Thank you. This is discussed in the definition and through the assessment in the second order
Klotz, Stefan	No	1	8	11		14	Recent studies indicate that the rate of first records is steadily increasing and there is 11 no sign of saturation worldwide There are several publications from Europe but also from Latin America which show, at least for plants, that there are saturations regarding the immigration of species. Fuentes, N., Saldana, A., Kühn, I., Klotz, S. (2015): Climatic and socio-economic factors determine the level of invasion by alien plants in Chile	Thank very much for your comment- authors have elaborated on this point in Chapter 2 of the second order draft.
García Martínez, Margarita	No	1	8	78	8	79	Religion is another cause of deliberate release from IAS, not only economic, recreational, or aesthetic benefits. Please consult reference (Liu et al., 2013) (Ecological knowledge reduces religious release of invasive species).	Thank you for your comment.
García Martínez, Margarita	No	1	8	78	8	79	There should be more, and more current references to historical IAS releases (Reichenbach, 1994).	Thank you very much for this suggested change. Authors have included it in the second order
Government of Ethiopia	Yes	1	8	164	8	164	Needs to be corrected as (CBD, 2010). Decision X/2 has to be included.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft
Kudelska, Theresa	No	1	8	164	8	164	I note that the CBD is mentioned in the time line on page 6 and this section of Chapter 1. INNS policy within the UK and the EU is strongly influenced by the guiding principles of the Convention of Biological Diversity, it may be helpful to introduce the principles "Three-stage hierarchical approach" at this stage and mention its influence (i.e. it is strong driver in UK an EU INNS policy and legislation): 1. prevention of IAS introductions between and within state is generally far more cost-effective and environmentally desirable than measures taken after IAS introduction and establishment; 2. if an IAS has been introduced, early detection and rapid action are crucial to prevent its establishment: the preferred response is often to eradicate the organisms as soon as possible; 2. where eradication is not feasible or resources are not available, containment and long-term control measures should be implemented (CBD Guiding Principle 2).	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	8	166	8	168	Rephrase	Thanks for this suggested change. Authors have included it in the second order draft.
Feest, Alan	No	1	8	173	8	173	Since Ecosystem Services is now a compromised term, should it be used at all when the Convention uses NCP.	Thanks for this suggested change. Authors have included it in the second order draft.
Dunn, Christopher	No	1	8	174	8	177	text refers to the 'vital role of IPLCs. This is true. However, it is not just that biodiversity supports such communities, but that invasive species themselves present major risks to their ways of life, customs, practices, IEK/TEK, etc. This needs to be strengthened here and elsewhere throughout all the chapters	Thank you, this is further developed in the next sections of Chapter 1 and throughout the second order draft of this assessment
Walton, Paul	No	1	8	179	8	184	The sole emphasis in this paragraph - and indeed of much of the preceding text - is on the management of established IAS. Biosecurity (prevention) needs much more prominence, in line with the CBD Article 8 and other standard texts. If examples are needed, New Zealand stands as a key exemplar of a territory where effective biosecurity policies and practices have delivered a clear reduction in IAS introductions and hence positive ecological outcomes.	Thanks for this suggested change. Authors have included it in the second order draft.
Kudelska, Theresa	No	1	8	182	8	184	The overarching message is also to prevent biological invasions as well as avoiding the worst consequences of them (this is more in line with the CBD three-stage hierarchical approach (see above).	Thanks for this suggested change. Authors have included it in the second order draft.
Setsaas, Trine Hay	No	1	8	186	8	187	Could be rephrased to be more clear: The IPBES IAS assessment is cross-disciplinary, spanning environmental and social science as well as humanities.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
White, Michael	No	1	8	186	8	186	Replace 'weaved' with 'woven from'	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Setsaas, Trine Hay	No	1	8	189	8	191	Suggested rephrasing considering the goal of IPBES: this assessment will contribute to the identification of knowledge gaps and realization of international goals, reflecting the urgent	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.

Blackburn, Tim	No	1	8	197	8	197	Replace "over" with "more than".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Brooks, Thomas	No	1	8	200	8	200	Change "systems" to "biodiversity".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Castro-Diez, Pilar	No	1	8	519	8	519	Remove the initials P.E. from the citation, here and throughout all text.	Thank you, citations and reference styles have been harmonized in the second order draft.
Faulkner, Katelyn	No	1	8	524	8	526	To the best of my knowledge the guidelines developed by Harrower and colleagues have not been accepted/adopted by the CBD	Thank you very much for your comment. CBD has developed a terminology, described in the
Castro-Diez, Pilar	No	1	8	528	8	541	Please, indicate for every pathway which is intentional and which unintentional. Some parts of the text are in italics, but I don't understand why.	Thanks for this suggested change. Authors have included it in the second order draft.
Faulkner, Katelyn	No	1	8	530	8	532	In the definition for 'Escape' it needs to be made clear that this pertains to organisms that are intentionally imported and kept in captivity. As the definition stands organisms that are imported accidentally as contaminants of the organism kept in captivity could be classified as an escape.	Thank you - Authors are being consistent with the terminology published by CBD.
Faulkner, Katelyn	No	1	8	533	8	535	In the definition for 'Contaminant' consider including that the organism needs to have a natural association with the commodity. This is included in the definition provided in Harrower et al. (2018), but is not stipulated in the original definition provided by Hulme et al. (2008).	Thank you - Authors are being consistent with the terminology published by CBD.
Government of Germany	Yes	1	8	538	8	539	If IAS are to include species relocated due to climate change (see also previous comments) on this matter, the definition of "corridor" could be the most fitting mechanism of introduction to include this fact. Please consider rephrasing accordingly.	Thank you - Authors are being consistent with the terminology published by CBD.
Camacho, Rulo A.	No	1	8	540	8	541	This un-aided pathway of invasion seems to suggest that IAS are not solely introduced through anthropogenic factors, and therefore, I am having issues with the IAS definition	Thank you - Authors are being consistent with the terminology published by CBD.
García Martínez, Margarita	No	1	9	102	9	108	For me is not clear the linkage between figure 1.1 and the argument in line 108 "IAS are acknowledged as major drivers of species extinction globally (Figure 1.1.)". It should say "IAS are acknowledged as ONE of the major drivers of species extinction globally (Figure 1.1.)".	Thanks for this suggested change. Authors have included it in the second order draft.
Joshi, Chudamani	No	1	9	197	9	212	Line 43 to 57 and line 197 to 212 is exactly the same. Better to avoid text repetition	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	9	207	9	208	Delete "a" before GQL.	Thank you for your comment. Grammatical and editorial errors will be corrected in the second order draft. Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	9	212	9	212	We encourage the authors to include "policy-makers". The sentence would read: "... possible policies and support tools for policy and decision makers."	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	9	215	9	215	Insert "a" before standalone document.	Thank you for your comment, it has been addressed in the second order draft
Blackburn, Tim	No	1	9	215	9	215	Use "document" rather than "documents".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Takahashi, Yasuo	No	1	9	217	9	217	Text in the circles at the bottom of the figure is too small to read	Thank you very much for your comment. This figure has been revised in the second order
Lacerda De Matos, Ana Carolina	No	1	9	218	9	218	The words in the circles at the bottom of the figure are difficult to read. I suggest to make a correction in the quality of this image.	Thank you very much for your comment. This figure has been revised in the second order
Mestre, Mireia	No	1	9	218	9	218	Figure 1.3: Will be more clear if the Chapters are well ordered: Chapter one above of all and the others below.	Thank you very much for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	1	9	220	9	220	Use "have" rather than "has".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Copp, Gordon	No	1	9	220	9	220	Data and information' are two elements, so the plural form of the verb is required. Please change 'has' to 'have. Note	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Joshi, Chudamani	No	1	9	221	9	222	Gaps in existing knowledge 221 will be documented. This sentence need a revision	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Copp, Gordon	No	1	9	228	9	228	When making reference to a specific chapter, the word 'Chapter' should be in Sentence case, as is Figure 1.4 (line 221). This should be applied throughout the document if you wish the document to be consistent.	Thank you very much for your comment. We have checked consistency throughout in the second order draft.
Alaux, Christine	No	1	9	544	9	545	The table appears fuzzy so transcribe it	Thank you, this has been addressed in the second order draft
Courault Romain	No	1	9	545	9	549	Issues with pagination? (p. 9)	Thank you, this has been addressed in the second order draft
Taki, Hisatomo	No	1	9	545	9	545	This table is not clear and very hard to read.	Thank you, this has been addressed in the second order draft
Government of Germany	Yes	1	9	548	9	549	If IAS are to include species relocated due to climate change (see also previous comments), please rephrase to include the fact that natural distributional limits are shifting due to climate change.	Thank you - this is included in the definition in the second order draft.
Blackburn, Tim	No	1	9	549	9	549	Delete first name from citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Courault Romain	No	1	9	549	9	549	"A species may be moved to a location [...] into the wild in that location (M Williamson, 1996)": Reference to renew? Statement to check at this first stage of IAS? Counter examples: <i>Robinia pseudo-acacia</i> ; <i>Ailanthus altissima</i> ; at the same time used for urban beautification and IAS	Thanks for this suggested change. Authors have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	9	549	9	549	This sentence is not clear, maybe re-phrase it	Thanks for this suggested change. Authors have included it in the second order draft.
Josefsson, Melanie	No	1	10	119	11	122	Excellent figures!	Thank you very much for your feedback
Pan, Xubin	No	1	10	231	10	233	Part of the figure is not clear.	Thank you very much. This figure has been revised in the second order draft.
Takahashi, Yasuo	No	1	10	232	10	232	Some figure and text elements in figure 1.4 are not visible. Recommend to enlarge these elements, or simplify the figure.	Thank you very much. This figure has been revised in the second order draft.
Copp, Gordon	No	1	10	236	10	236	Replace 'is' with 'are'.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	10	241	10	241	Replace comma with hyphen.	Thank you for your comment. We have updated it in the second order draft.
Joshi, Chudamani	No	1	10	241	10	241	Abbreviations throughout the chapter for example IKL should be clarified	Thank you for your comment. Acronyms are clarified in the second order draft.
Joshi, Chudamani	No	1	10	242	10	242	Will be? Future tense used in many places, which gives a feeling of a proposal.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Ethiopia	Yes	1	10	247	10	247	Important to cite the figure "... and the One Health approach are also considered (Fig 1.3)".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Faulkner, Katelyn	No	1	10	550	10	551	This is only true for organisms kept in captivity, organisms that are accidentally introduced or are imported for release do not need to overcome this barrier	Thanks for this suggested change. Authors have included it in the second order draft.
Xuan, Liu	No	1	10	550	10	558	For the release in nature category, it is better to add the religious release of alien species worldwide especially in southeastern and eastern Asia (Liu et al. 2012). Ref. Liu, X., McGarriv, M. E. & Li, Y. The influence of traditional Buddhist wildlife release on biological invasions. Conservation Letters 5, 107-114 (2012).	Thanks for this suggested change. Authors have included it in the second order draft.
Courault Romain	No	1	10	551	10	553	"Introduction may be a deliberate act [...] economically [...] environmentally": I would add something on aesthetics in cities/urban beautification and landscape gardening (not only economical)	Thanks for this suggested change. Authors have included it in the second order draft.
Girod, Christophe	No	1	10	551	10 (p 44 of the pdf)	558	However, some introductions have also been made in the purpose of ornamental acclimation (e.g. <i>Pinguicula hirtiflora</i> or <i>Sarracenia purpurea</i> in France); one might also cite van Kleunen et al. (2018) : van Kleunen, M., Essl, F., Pergl, J., Brundu, G., Carboni, M., Dullinger, S., Early, R., González - Moreno, P., Groom, Q.J., Hulme, P.E., Kueffer, C., Kühn, I., Mágua, C., Maurel, N., Novoa, A., Parepa, M., Pyšek, P., Seebens, H., Tanner, R., Touza, J., Verbrugge, L., Weber, E., Dawson, W., Krefl, H., Weigelt, P., Winter, M., Klöner, G., Talluto, M.V. and Dehnen - Schmutz, K. (2018), The changing role of ornamental horticulture in alien plant invasions. Biol Rev, 93: 1421-1437. doi:10.1111/brv.12402	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	10	554	10	555	?? Do you mean resulted in a shift from deliberate to accidental? At the moment this sentence does not make logical sense.	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	10	561	10	561	Replace 'persistent' with 'self-sustaining'. In bioinvasion terminology, 'persistence' is used with species that persist without establishing a self-sustaining population. So, best to avoid any confusion.	Thanks for this suggested change. Authors have included it in the second order draft.
Courault Romain	No	1	10	561	10	561	"do not found": inappropriate verb	Thanks for this suggested change. Authors have included it in the second order draft.
Feest, Alan	No	1	10	561	10	577	Do not establish.	Thanks for this suggested change. Authors have included it in the second order draft.
Karimov, Bakhtiyor	No	1	10	561	10	578	For your information. There is very good experience in this regard. During 1960s scientists suggested that the ecological niche for herbivorous fishes in the Aral Sea basin was almost not occupied. As a result, Chinese herbivorous carps (silver, bighead and grass carps) were introduced. During this process two other related species the black carp and Amur shrikehead were accidentally introduced. All these species were successfully naturalized in the region, this introductions were also ecologically compatible and economically feasible (these species now have the share of more than 80% in local fish catches) (12. Thorpe, A.; Whitmarsh, D.; Drakeford, B.; Reid, C.; Karimov, B.; Timirkhanov, S.; Sanybekov, K.; Van Anrooy, R. Feasibility of restocking and culture-based fisheries in Central Asia. FAO Fisheries and Aquaculture Technical Paper, No. 565, Ankara, FAO, 2011, 120p.)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Shimura, Junko	No	1	10	561	10	577	The subsection, 1.4.3 Establishment, requires explanation on the probability of establishment based on the traits of a species. The following subsections after 1.4.3 tend to highlight non-biotic factors of biological invasions. This is critically important to consider preventive measures using risk based approach prior to decision of introductions/import of alien species, taking into account the existing international standards relevant to IAS (e.g. IPPC international standards for phytosanitary measures, OIE import risk analyses, Guidelines to assess risk of non-native animals becoming invasive).	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Walton, Paul	No	1	10	561	10	577	Some mention of the 'lag period' (mentioned on p11) between initial establishment and spread after this paragraph would be helpful.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	10	562	10	562	Delete first name from citation.	Thank you, citations and reference styles have been harmonized in the second order draft
Khuroo, Anzar Ahmad	No	1	10	562	10	562	Instead of "development", I suggest "process"	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	10	567	10	567	Combine two citation into one by using semicolon.	Thank you, citations and reference styles have been harmonized in the second order draft
Blackburn, Tim	No	1	10	567	10	567	Please rephrase "Relatedly"	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	10	567	10	567	Replace "IAS" with "alien species"	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	10	567	10	567	Please, harmonize the citation style. Multiple citations should be in the same parentheses.	Thank you, citations and reference styles have been harmonized in the second order draft
Blackburn, Tim	No	1	10	569	10	573	Delete from " Establishment success is" until "number of individuals introduced(Cassey et al., 2018; Lockwood et al., 2005)".	Thanks for this suggested change. Authors have included it in the second order draft.

Xuan, Liu	No	1	10	571	10	576	It should be stressed the dominant role of environmental conditions at the introduction location notably climatic suitability and the presence of other groups of alien species, which are recently identified as the primary determinants of successful establishment of alien birds establishment (Redding et al. 2019). Ref. Redding, D. W. et al. Location-level processes drive the establishment of alien bird populations worldwide. <i>Nature</i> 571, 103-106 (2019).	Thanks for this suggested change. Authors have included it in the second order draft.
Khuroo, Anzar Ahmad	No	1	10	574	10	574	Instead of "accidents", I suggest "constraints"	Thanks for this suggested change. Authors have included it in the second order draft.
Khuroo, Anzar Ahmad	No	1	10	576	10	577	I suggest to rephrase the sentence as "For this reason, process of establishment success operates at population level, rather than species"	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	10	577	10	577	In the end of the paragraph, add "In addition to propagule pressure, establishment success is determined by the interactions between traits of the species (e.g. ...) and features of the environment (e.g. ...) (Duncan et al. 2003)."	Thanks for this suggested change. Authors have included it in the second order draft.
Courault Romain	No	1	10	577	10	577	"For this reason [...] (Pigot et al., 2018) : (e.g. genetic pool VS epigenetics?)"	Thanks for this suggested change. Authors have included it in the second order draft.
Barrios Caballero, Yolanda	No	1	10	579	10	579	Consider using the term Dispersal instead of Spread. The blackburn diagram uses dispersal.	Thank you for the suggestion. Authors are aligning with the terms in the IPBES scoping
Copp, Gordon	No	1	10	580	10	580	Replace 'final stage' with 'next stage'. A species can establish and become widespread (but at low densities) without exerting an impact. So, for a species to be 'invasive', there must be an adverse impact, which represents the final stage.	Thanks for this suggested change. Authors have included it in the second order draft.
Asth, Matheus	No	1	10	592	10	593	Please consider removing the expression "characteristics of the invaded community" after "... including niche opportunities". It is repeated in the sentence.	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	11	254	12	319	There is inconsistency in terminology in this section with regard to invasive (IAS) and non-invasive species (i.e. introduced species, alien species without 'invasive' as an adjective). The title indicates IAS, but then 'alien species' is used (line 271) when referring to societal impacts. In the same section, 'alien species' is used in lines 274, 299, 307, 310, 312-313; and 'introduced species in line 295 in an 'invasion' context (i.e. 'benefiting from each other'). This lack of clarity as to what is invasive and what is not reinforces the false impression that ALL non-native species are invasive.	Thanks for this suggested change. Authors have included it in the second order draft.
Zisenis, Marcus	No	1	11	254	39	473	There is a comparison missing of the ecological impacts of non-native species to native species with a similar ecological niche. All species change ecosystems to a certain extent. It depends on if we value this change in time and space as positive or negative, irrespectively of the origin of species (e.g. Zisenis, M., 2012. EU DAISIE Research Project: Wanted—Death Penalty to Keep Native Species Competitive?. <i>Journal of Agricultural and Environmental Ethics</i> , 25(4), pp. 597-606.). In addition, ecosystems are not static (see above).	Thank you very much - we are considering this perspective in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	11	255	11	267	In many cases, IPLC see humans as an invasive alien species that causes damage to the environment. This does not fall within the scope of the assessment, but participants to the ILK dialogue workshop for the IAS assessment (29 Sept - 1 October 2020) recommend that these IPLC perspectives could be discussed. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. Perspectives of IAS, perceptions and values - in general, are now discussed in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	11	255	11	267	In many cases, IPLC see humans as an invasive alien species that causes damage to the environment. This does not fall within the scope of the assessment, but participants to the ILK dialogue workshop for the IAS assessment (29 Sept - 1 October 2020) recommend that these IPLC perspectives could be discussed. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. Perspectives of IAS, perceptions and values - in general, are now discussed in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	11	255	11	267	IPLC can see species such as introduced palm oil trees in plantations as invasive alien species, as they are new to the environment, they are increasing in abundance, and they are associated with habitat loss and other problems. However, as they are growing in plantations, the IPBES assessment may not consider them as IAS. These different perspectives on IAS could however be discussed, and it was noted that such land use changes can also facilitate new biological invasions in the same area. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. Perspectives of IAS, perceptions and values - in general, are now discussed in the second order draft
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Camacho, Rulo A.	No	1	11	255	11	269	I am having issues with this definition. What do you call IAS introduced by animals?	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	11	255	11	268	After section 1.3.1 I miss a section on the invasion process, as this is mentioned in the following paragraph (e.g. line 275), but not explained.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	256	11	256	Need this definition earlier.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Joshi, Chudamani	No	1	11	256	11	257	Definition of alienspecies need more discussion and clarity. This is not enough.	Thank you - a conceptual figure/table has been developed in the second order draft.
Taki, Hisatomo	No	1	11	256	11	267	Is it okay not to mention about livestock, crops and trees which are species transported 256 beyond their natural range by humans? They are included or	Thank you very much for this suggested change. Authors have included it in the second order
Joshi, Chudamani	No	1	11	257	11	257	Are all alien species transported by humans, how about mode of natural invasion for instance animal and bird migration, Hurricane, rivers	Thank you very much for this suggested change. Authors have included it in the second order
Feest, Alan	No	1	11	261	11	261	Should it be IAS?	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Girod, Christophe	No	1	11	261	11	261	typo: IAS instead of IAs	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Government of Germany	Yes	1	11	261	11	266	The given definition for IAS is indefinite: what kind of impact is meant - negative, positive, or both? And among impacts on the local ecosystem and species, impacts on biotopes and ecosystem services should be added, too.	Thank you - a conceptual figure/table has been developed in the second order draft.
Joshi, Chudamani	No	1	11	261	11	261	should be IAS	Thank you for your comment, we have spelled out all the acronyms (except for IPBES) in the second order draft.
Lopez-Alzina, Diana	No	1	11	261	11	266	May the definition include something about adaptation?	Thank you - a conceptual figure/table has been developed in the second order draft.
Smith, Emily	No	1	11	261	1	261	Typo 'IAS' instead of IAS	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Takahashi, Yasuo	No	1	11	261	11	261	IAS, not IAs.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Taki, Hisatomo	No	1	11	262	11	262	"Information's "I" is capital.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	263	11	266	Who wrote this definition?! It's horrible to have to be tied to it now...	Thank you for your comment. The definition of invasive alien species for this assessment was approved by IPBES member states and may not be changed.
Brooks, Thomas	No	1	11	263	11	266	This is similar to, but not identical to, the CBD definition. Strongly recommend sticking with the CBD definition verbatim, and citing it here. Introduction of a new definition will cause confusion and reduce policy relevance.	Thank you for your comment. The definition of invasive alien species for this assessment was approved by IPBES member states and may not be changed.
Copp, Gordon	No	1	11	263	11	263	For the same rationale (to achieve consistency) mentioned for the word 'Chapter' (here above), when making reference to a specific deliverable, the word 'Deliverable' should be in Sentence case.	Thank you for your comment. Grammatical and editorial errors have been corrected in the second order draft
Marchante, Elizabete	No	1	11	263	11	266	Same as comment in line 4	Thank you - a conceptual figure/table has been developed in the second order draft.
Smith, Emily	No	1	11	263	1	266	The same issue with the definition as stated above. The use of 'indirect' specifically. Could this be replaced with unintentionally or accidentally.	Thank you - a conceptual figure/table has been developed in the second order draft.
Walton, Paul	No	1	11	263	11	266	As in line 4 above: This definition here and in the Executive Summary includes the concept of 'indirect introductions'. This might lead to confusion - in terms of what is an indirect introduction? Might that mean a species moving to new areas owing to anthropogenic habitat change, or to climate change? This confusion was evident in a recent (2019) UK Parliamentary Inquiry into IAS. I suggest that IAS should be considered only 'those species moved through direct human agency' - though that of course can be deliberate or accidental. See additional note in line 1 above.	Thanks for this suggested change. Authors have included it in the second order draft.
Xuan, Liu	No	1	11	264	11	264	Need to define what is natural range of distribution using some well-known and recognised standard or references with high reputations.	Thank you - a conceptual figure/table has been developed in the second order draft.
Blackburn, Tim	No	1	11	266	11	266	Insert "IAS are a subset of alien species, but a subset which all alien species may potentially join" or something similar after (IPBES/6/INF/10, 2018).	Thank you - a conceptual figure/table has been developed in the second order draft.
Courault Romain	No	1	11	266	11	267	I would add some elements defining more accurately ecosystems, socio-ecosystems, and underlined the importance og geographical scales (biomes, ecoregions, ecoregions, soilscapes for instance)	Thank you - a conceptual figure/table has been developed in the second order draft.
Blackburn, Tim	No	1	11	267	11	267	Needs consistency in using "socio-ecological"	Thanks for this suggested change. Authors have included it in the second order draft.
Marchante, Elizabete	No	1	11	269	11	283	Again, care must be taken not to confuse alien and invasive alien species - e.g., when you write "Ecological impacts are defined as a measurable change to the properties of an ecosystem and its native organisms by an alien species (Ricciardi et al., 2013). An alien species can also exert societal impacts measured in terms of human health, cultural, and economic costs and benefits but such evaluations are strongly dependent on stakeholder perceptions (Garcia-Llorente et al., 2008; Pysek et al., 2010)" this is also true for an alien species that is (widely) planted by humans, even if it is not invasive - I suggest revising the text in general (not only here) to clarify this, since this lack of a clear distinction between alien and invasive alien is often the cause of misunderstandings and even	Thank you - a conceptual figure/table has been developed in the second order draft.
Mestre, Mireia	No	1	11	269	12	304	This section is really important as aim to explain what are the impacts of invasive species. Reading it, people should understand the relevance of the impacts of Invasive Alien Species. Unfortunately, what is written does not convince me at all: Includes a lot of information that is not important, and does not include a lot of information that is really important. For example, does not include impacts towards ecosystem services, biodiversity and resilience.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Yiu, Evonne	No	1	11	269	11	283	Are impacts brought about by IAS necessarily all negative? While it is almost undeniable that the impacts are negative in most cases, it may also be necessary to discuss or not rule out the possibility that there may be instances of positive impacts - be in ecological, social or economic - and so be verified through a literature search of positive cases if any. Even if there are such positive cases, you can make an argument that perhaps these positive impacts are short-term and	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	270	11	270	Replace "Ecological impacts are" with "An ecological impact is".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.

Caceres, Sarah	No	1	11	270	11	283	There could be more examples of the impacts of IAS on island context. Please consult reference (Russell et al. 2017; Bellard et al. 2017)	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Courault Romain	No	1	11	270	11	271	I would add the geographical dimension when dealing with "native organism" (e.g. spatially delimited)	Thank you - a conceptual figure/table has been developed in the second order draft.
Government of Ethiopia	Yes	1	11	270	11	270	Requires revising.	Thank you - a conceptual figure/table has been developed in the second order draft.
Mestre, Mireia	No	1	11	270	11	283	Impacts over Ecosystems Services are quite relevant. The words "Ecosystem Services" does not appear in this paragraph and should be included.	Thank you for your comment, authors referred to NCP (nature's contributions to people)
Smith, Emly	No	1	11	270	11	283	Include something in here about greater impacts in certain locations e.g. islands, freshwater systems	Thank you - a section on social and ecological complexities has been added in the second order draft.
Walton, Paul	No	1	11	270	11	283	Suggest it would be helpful to include an indication in this paragraph (or elsewhere in this section) that sensitivity to IAS impacts are widespread but vary across environments, with some being particularly susceptible to profound ecological impacts - for example, islands and insular freshwater ecosystems have witnessed disproportionately high proportions of the world's IAS-driven species and population extinctions.	Thank you, authors have developed a section on ecological complexity and scales in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	11	273	11	273	Often, IPLC do not consider a new species to be bad. Communities will often watch a species to see how it interacts with the environment, other species and their food security, livelihoods and culture before deciding if it is positive or negative. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you, this has been included in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	11	273	11	273	Often, IPLC do not consider a new species to be bad. Communities will often watch a species to see how it interacts with the environment, other species and their food security, livelihoods and culture before deciding if it is positive or negative. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you, authors have elaborated on perceptions of IAS in section 1.5.5 of the SOD in the second order draft.
Blackburn, Tim	No	1	11	273	11	273	Delete "but such evaluations are strongly dependent on stakeholder perceptions".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Kudelska, Theresa	No	1	11	273	8	273	I agree that the impact of IAS on culture landscape and wellbeing can be heavily dependant on stakeholder perceptions however is possible to assess the economic impacts of INNS without having to be overly dependant upon stakeholder perceptions. The analysis of impacts of INNS on the economy of GB is a good example and is not 'strongly dependant on stakeholder perceptions'. Williams, F.E. Eschen, R. Harris, A. Djeddour, D. H. Pratt, C.F. Shaw, R. S. Varia, S. Lamontagne-Godwin, J. D. Thomas, S.E. Murphy, S.T. 2010. The economic cost of invasive non-native species on Great Britain. CABI, Wallingford, UK.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Courault Romain	No	1	11	274	11	276	Some accurate example to illustrate this statement?	Thank you very much for your comment. Authors have added a reference to Chapter 4 in the second order draft: it provides a direct link to examples to illustrate this section.
Blackburn, Tim	No	1	11	276	11	276	Change to "Impacts can be direct or indirect," (comma in the end).	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	277	11	277	Replace "varying" with "and vary".	Thanks for this suggested change. Authors have included it in the second order draft.
Joshi, Chudamani	No	1	11	278	11	279	Table 1.1) text referred twice in line 278 and 279, one can be removed.	Thank you for your comment. The text has been revised accordingly in the second order draft.
Blackburn, Tim	No	1	11	280	11	282	Delete "recognising the importance of structured frameworks for assessing impacts to improve communication between scientists from different research disciplines and between scientists, managers, policy makers".	Thank you for this suggestion. Authors considered it in the second order draft
Blackburn, Tim	No	1	11	285	11	285	Replace "Previous IPBES assessments conclude" with "Previous IPBES assessments have concluded".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Courault Romain	No	1	11	285	11	286	"biotic uniqueness" within the whole sentence : maybe specifying ranges (thousand of kilometers? Meters?)	Thank you for this suggestion. Authors considered it in the second order draft
Government of Germany	Yes	1	11	285	11	293	Biotic homogenization is not only directed to IAS, every introduced alien species is part of this important impact.	Thanks for this suggested change. Authors have included it in the second order draft.
Rosa, Hugo Henrique Marques da	No	1	11	285	12	304	The images of this paper could help for a better visualization of species interact and the homogenization process Fricke, E. C., & Svenning, J. C. (2020). Accelerating homogenization of the global plant-fruitivore meta-network. Nature, 585(7823), 74-78.	Thank you for this suggestion. Authors considered it in the second order draft
Xuan, Liu	No	1	11	285	11	293	The relative importance of alien species invasions and native species extinctions in shaping biotic homogenization has also not been fully understood yet. In addition, the native species extinctions can be caused by the alien species invasions, but may also be driven by other factors such as habitat modifications.	Thank you for this comment.
Plesnik, Jan	No	1	11	287	11	289	Biotic homogenization also includes native species extinction.	Thank you for this comment.
Courault Romain	Yes	1	11	288	11	288	Reference (McKinney and Lockwood, 1999) : other reference, newer? I suggest that one: FINDERUP NIELSEN, Tora, SAND - JENSEN, Kaj, DORNELAS, Maria, et al. More is less: net gain in species richness, but biotic homogenization over 140 years. Ecology letters, 2019, vol. 22, no 10, p. 1650-1657, doi:	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Mestre, Mireia	No	1	11	289	11	293	(a) These sentences are confusing. Please elaborate. (b) The "dilution effect" needs citation. The "dilution effect" is not just an hypothesis and has been demonstrated several times. CITAS	Thank you for your comment - Sentence deleted in the second order draft.
Blackburn, Tim	No	1	11	290	11	290	Insert comma after "can be substantial".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	290	11	291	Rephrase as "often context specific, are acknowledged".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	291	11	291	Insert "are" before "still understudied".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	291	11	291	Insert comma after "hard to predict".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	11	291	11	293	Needs either to be deleted or the link to the rest of this paragraph needs to be more explicit.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Guha, Asi	No	1	11	291	11	293	Reference can be given here. In this specific line Ostfeld, R et. al. may be refered	Thank you for your comment - Sentence deleted in the second order draft.
Marchante, Elizabete	No	1	11	291	11	293	This sentence could be supported with a reference, eg. Keesing et al 2006, 10.1111/j.1461-0248.2006.00885.x	Thank you for your comment - Sentence deleted in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	11	291	11	293	A reference is missing and perhaps a footnote to explain the meaning of the "Dilution effect."	Thank you for your comment - Sentence deleted in the second order draft.
Tom Joe, Elphin	No	1	11	291	11	293	Reference to dilution effect may be considered from Keesing, F., Holt, R. D., & Ostfeld, R. S. (2006). Effects of species diversity on disease risk. Ecology Letters, 9(4), 485-498. https://doi.org/10.1111/j.1461-0248.2006.00885.x	Thank you for your comment - Sentence deleted in the second order draft.
Plesnik, Jan	No	1	11	292	11	293	Dilution effect is debated by a report from a workshop on biodiversity and pandemics (2020)	Thank you for your comment - Sentence deleted in the second order draft.
Xuan, Liu	No	1	11	591	11	602	For the spread stage, I think it is worth to address how to determine the time when the species begins to spread from feral populations, and how to actually evaluate the spread rate (speed), which is even more important than range expansion only.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	593	11	593	Invasibility instead of invisibility - beware autocorrect which will always try to change this!	Thanks for this suggested change. We have included it in the second order draft.
Castro-Diez, Pilar	No	1	11	593	11	593	"Invasibility" rather than "invisibility".	Thanks for this suggested change. We have included it in the second order draft.
Dupont, Lise	No	1	11	593	11	593	invisibility must be replaced by invasibility	Thanks for this suggested change. We have included it in the second order draft.
Khuroo, Anzar Ahmad	No	1	11	593	11	593	it is "invasibility"	Thanks for this suggested change. We have included it in the second order draft.
Schaffner, Urs	No	1	11	593	11	593	invisibility, not invisibility	Thanks for this suggested change. We have corrected it in the second order draft.
Castro-Diez, Pilar	No	1	11	594	11	594	I think it would be more correct to talk about "the invaded ecosystem" (rather than "invaded community") because the environmental conditions, mentioned below, is not a community property, but an ecosystem property.	Thanks for this suggested change. We have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	11	601	11	601	"for example by recruitment of natural enemies." -> Not clear for the reader	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	1	11	604	11	604	Do you mean IAS in this paragraph, or aliens?	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	1	11	605	11	605	Insert comma after "the IPBES assessments".	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	608	11	608	Define NCP.	Thanks for this suggested change. Authors have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	11	608	11	608	The acronym NCP has not been spelled for the first time in the text yet.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	609	11	609	Replace "main" with "primary".	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	11	612	12	627	The invasion phases described in fig. 1.8 are not the same as those described above (transport, introduction, establishment and spread) which may be misleading for the reader. I suggest re-draw the figure according to the phases described above. Besides, I would emphasized more the concept of "lag-phases" (which are not necessarily restricted to the establishment phase) in the paragraphs above. Being aware of lags over the invasion process is crucial for	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	11	612	11	614	Figure 1.8: This curve mistakenly combines 'Entry' (the arrival of a species in the risk-assessment area (e.g. country or region) and 'Introduction', which is the release or escape of the species from captivity in the risk-assessment area. Therefore, a second section 'Introduction' should be added between Entry and Establishment. Also, given that this is said to be 'The Invasion Curve', this applies to 'invasive' species, which means that the final phase of the invasion process (i.e. 'Impacts') should be the label given to the most right-hand section of the curve, replacing 'Widespread'. As it stands, this curve confuses Entry and Introduction, and it also gives the false impression that wide dispersal equates to 'impacts', which is not necessarily true.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	11	612	11	613	Question: Figure 1.8: Shouldn't the "invasion curve" actually start in the slot marked "entry" and not in the slot marked "Pre-entry"?	Thanks for this suggested change. Authors have included it in the second order draft.
Khuroo, Anzar Ahmad	No	1	11	614	11	614	Figure 1.8. First of all, why to use word "Spread", what is problem in using word "Dispersal". Secondly, Establishment and Spread (I suggest Dispersal) are processes, but "Widespread" is an outcome, and not a process. If the Reviewers fail to raise the queries in a published paper, that doesn't mean that we follow the	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	11	617	11	617	Is this IAS or aliens?	Thanks for this suggested change. Authors have included it in the second order draft.
Marchante, Elizabete	No	1	11	618	11	618	The invasion curve may have been started to be used by policymakers in 2009, but I think it has been developed much earlier, e.g., Cronk and Fuller 1995 already describe these stages even if they do not show a policy.	Thanks for this suggested change. Authors have included it in the second order draft.
Pan, Xubin	No	1	11	618	11	618	The citation is not accurate.	Thank you, citations and reference styles have been harmonized in the second order draft
Government of Germany	Yes	1	11	620	11	621	"Biological invasions often have a lag-phase during establishment." - it is suggested to add a literature source.	Thanks for this suggested change. Authors have included it in the second order draft.

Singh, Baljinder	No	1	12	124	12	128	It is vitally necessary to recognize the multi-layered, multi-tiered complexities inherent in this topic & I am glad to see that, to this end, the benefits of IAS are included here. I did a quick scan of the different chapters & found, in Chapter 3 (see comment on this chapter later), only a fleeting & somewhat confusing reference to honeybees that were introduced into North America in the 1600s by European settlers. Given the tremendous importance of this single group of human-introduced, alien insects to agriculture & to native ecosystems, it would be prudent to include some short notes on this specific IAS. Perhaps it should also be incorporated into Figure 1.2, which purports to summarize key events beginning in 1500. And, it might be necessary to make some mention of these bees in Box 1.4 (line 680-695, page 47) since these insects are both pollinators & technically, invasive organisms.	Thanks for this suggested change. Authors have tried to include a diverse range of examples in the second order draft.
Courault Romain	No	1	12	294	12	304	I'd add a short subpart on links between IAS and native species interactions within the frame of environmental/biotic changes (loss of biodiversity, and overall climate change)	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	12	295	12	295	Replace "introduced" with "alien".	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	12	295	12	304	This paragraph lacks a strong connection to the rest of this section (which is in alien impacts, not alien interactions). More clarity needed.	Yes, we have integrated it better in the second order draft.
Brooks, Thomas	No	1	12	295	12	295	The word "benefit" doesn't seem right here; perhaps "proliferate" would be better?	Thanks for this suggested change of wording. It is an improvement and we have adopted something similar in the second order draft.
Joshi, Chudamani	No	1	12	295	12	304	Soil erosion control by <i>Eupatorium adenophorum</i> in mountain environment for example is a positive impact of alien species. Some elaboration may better clarify.	Thank you, more examples are available in Chapter 4 (the choice of examples was based on a systematic literature review) in the second order draft.
Mestre, Mireia	No	1	12	295	12	304	This paragraph is included within the section entitled "What are the impacts", that is about the impacts of the Invasive Alien Species. Yet, this paragraph does not talk about impacts. This paragraph just focus on the interaction among introduced species, which is interesting, but should appear in another section.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Blackburn, Tim	No	1	12	299	12	300	The mutualistic interactions just mentioned are positive interactions - do you mean "positive" for native biodiversity here? Either way, needs to be clarified.	Thank you very much for your comment. It is stated that these are amongst alien species and benefiting alien species although native species may benefit too - Novel mutualistic interactions (pollination, seed dispersal and plant-microbial symbioses) amongst alien species have been shown to facilitate biological invasions
Schaffner, Urs	No	1	12	299	12	299	Rephrase, as the previous sentences emphasizes the positive interactions between IAS	Thanks for this suggested change. We have included it in the second order draft.
Willette, Demian	No	1	12	299	12	302	Please consider the following reference which specifically discusses the potential ecosystem services supported by an invasive marine plant. Viana, I. G., Siritwardane-de Zoysa, R., Willette, D. A., & Gillis, L. G. (2019). Exploring how non-native seagrass species could provide essential ecosystem services: a perspective on the highly invasive seagrass <i>Halophila stipulacea</i> in the Caribbean Sea. <i>Biological Invasions</i> , 21(5), 1461-1472.	Thanks for this suggested change. Authors have included it in the second order draft.
Xuan, Liu	No	1	12	299	12	302	The classic meltdown effect should be addressed here. In addition, the impacts of multiple invaders can be context-dependent based on the meta-analysis (Jackson 2015), and it usually needs long-term field studies to explore their impacts (Liu et al. 2018). Ref. Simberloff, D. & Von Holle, B. Positive interactions of nonindigenous species: invasional meltdown? <i>Biol Invasions</i> 1, 21-32 (1999). Jackson, M. C. Interactions among multiple invasive animals. <i>Ecology</i> 96, 2035-2041 (2015). Liu, X. et al. More invaders do not result in heavier impacts: The effects of non - native bullfrogs on native anurans are mitigated by high densities of non - native crayfish. <i>J Anim Ecol</i> 87, 850-862 (2018).	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	12	302	12	304	What is the point of this sentence here?	Thank you - we have improved the clarity in the second order draft.
Plesnik, Jan	No	1	12	303	12	304	The term "ecological network" should be explained because it has various meanings in ecology and conservation biology	Thank you - sentence deleted in the second order draft.
Castaño Arbolada, Nicolás	No	1	12	304	12	304	Add Reference (Pearson et al. 2018. Community Assembly Theory as a Framework for Biological Invasions. <i>Trends in Ecology & Evolution</i> 33 (5): 313-325. https://doi.org/10.1016/j.tree.2018.03.002	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Marchante, Elizabete	No	1	12	306	12	319	Suggest to cite Turbelin et al 2017, https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.12517 since it includes a global analysis of IAS numbers	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Blackburn, Tim	No	1	12	307	12	307	Rephrase "Patterns of alien species numbers" with "Patterns in the numbers of alien species".	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Courault Romain	No	1	12	307	12	307	"documented for particular regions" : which ones? Bioclimatic regions? Ecoregions? IPBES regions?	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Mestre, Mireia	No	1	12	307	12	309	This first sentence is not complete. Perhaps part of the sentence is missing.	Thank you - authors have added a missing word "and" in the second order draft
Takahashi, Yasuo	No	1	12	307	12	319	As the section title indicates, it would be good to indicate the total number of IAS identified across the world based on the numbers presented in Chapter 2 Table 2.1 (Page 25, line 785).	Thank you for your comment. Authors have addressed these points in the second order draft.
West, Vicky	No	1	12	307	12	308	Needs further clarification as to what is meant by "Patterns of alien species numbers have been documented for particular regions taxonomic groups"	Thank you, we have cross referenced this sentence to Chapter 2 for better clarity in the second order draft.
Blackburn, Tim	No	1	12	308	12	308	Insert "and" before "axonomic groups".	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Blackburn, Tim	No	1	12	308	12	308	Insert space between "groups" and "(Dawson)".	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Blackburn, Tim	No	1	12	309	12	310	What does this mean? With some exceptions, islands have fewer alien species than mainlands. How are you assessing "relative to size"? Simple division doesn't work because we don't expect SARs to have exponents of 1. So - the meaning of this sentence needs to be clarified.	Thank you - authors have rephrased in the second order draft.
Mestre, Mireia	No	1	12	309	12	309	Delete "Relative to their size" as is not relevant.	Thank you, authors have deleted this in the second order draft.
Blackburn, Tim	No	1	12	311	12	313	No - colonization pressure is the key determinant of alien species richness. GDP and population density may be determinants of colonization pressure (though some sort of analysis would be helpful here rather than just assuming it).	Thanks for this suggested change. Authors have included it in the second order draft.
Courault Romain	No	1	12	311	12	312	"gross domestic product per capita and production density": Is/are transportation hubs (for both goods, travellers) addable in this sentence? Possibly mentioned in Dawson et al. 2017?	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Walton, Paul	No	1	12	313	12	319	This text on propagule pressure misses the important element of the frequency or rate of introduction of individuals - thus in Jeschke JM and Starzer J (2018) <i>Invasion Biology Hypotheses and Evidence</i> , CABI, it is defined as follows: <i>Propagule pressure is a composite measure of introduction effort consisting of: (i) the number of individuals introduced per introduction event (propagule size); and (ii) the frequency of introduction events (propagule frequency or number)</i> . Suggest that is reflected in the text here. Moreover, suggest the current text is added to with following in italics: "...the more individuals released the greater probability of establishment and thereafter that the population will have sufficient genetic variation to adapt to local conditions and	Thanks for this suggested change. Authors have included it in the second order draft.
Courault Romain	No	1	12	316	12	316	"adapt to local conditions" : I'd put local/regional/continental, or only dealing/writing on abiotic condition (without mentioning particularly geographical and spatial distribution patterns)	Thank you very much. - The comment is not clear to authors.
Blackburn, Tim	No	1	12	317	12	319	See above. Move this sentence to line 311, then follow with the line there, ending "may be important in determining colonization pressure globally."	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Xuan, Liu	No	1	12	319	12	319	The effects of sampling bias in understanding alien species richness could be mentioned here. In addition, some nice techniques to account for sampling effort (e.g., Meyer et al. 2015) can also be provided here. Ref. Meyer, C., Krefl, H., Guralnick, R. & Jetz, W. Global priorities for an effective information basis of biodiversity distributions. <i>Nat Commun</i> 6, 8221 (2015).	Thank you for the suggestion - this issue is now included in Chapter 2 of the second order draft.
Walton, Paul	No	1	12	629	12		Suggest reference is included somewhere in section 1.5 (Complexity and Uncertainty) to the potential for evolutionary change in introduced populations - sometimes rapid change by virtue of newly established populations often being small and isolated from genetic introgression - as another source of unpredictability and complexity in invasions. Example reference - Adaptive evolution in invasive species Peter J. Prentis et al. <i>Trends in Plant Science</i> 13 (6)	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	12	632	12	632	The term "invasion science" is being used the first time. This might be ok, but it should be discussed in its relation to the term "invasion biology", which is not being used in this entire chapter.	Thanks for this suggested change. Authors have included it in the second order draft.
Guha, Asi	No	1	12	639	12	646	With respect to climate change, changes in biophysical factors can cause large scale shift in vegetation pattern. This may lead to loss of biodiversity and increased spread of IAS. This portion may men that issue.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Walton, Paul	No	1	12	643	12	643	Suggest adding-in 'For example' before 'The effects...'	Thanks for this suggested change. Authors have included it in the second order draft.
Verma, Madhu	No	1	12	651	12	654	May consider including a case or two where context-dependency goes beyond ecological parameters	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these in the second order draft.
Government of Germany	Yes	1	12	657	12	657	Kindly insert policy-makers. The sentence should read: "... complexity may be overwhelming for policy- and decision-makers, ..."	Thanks for this suggested change. Authors have included it in the second order draft.
Maclean, Kirsten	No	1	12	658	12	658	Suggest add in the following reference that talks to considering ways to build social resilience within social ecological systems to acknowledge and manage for such complexity. Maclean, K., Farboke, C., Mankad, A., Robinson, C. J., Curmeck, M., Collins, K., & McAllister, R. R. J. (2018). Building social resilience to biological invasions. A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>GeoForum</i> , 97, 95-105.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	12	660	13	695	The term "ecological networks" should not be used in this context because it may be misleading. The term is being used predominantly in nature conservation for features that enhance the connectivity between habitats in the landscape. It is suggested to use the term "ecological interactions" instead.	Thanks for this suggested change. Authors have included it in the second order draft.
Ranarijaona, Hery Lisy Tiara	No	1	12	660	13	695	This part of ecology should be to develop. Please read the reference Ricciardi A. 2012. Invasive species. Also, the reference : Gallien et Carboni. 2016. The community ecology of invasive species: where are we and what's next? <i>Ecography</i> 40: 335-352, 2017 doi: 10.1111/ecog.02446	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these in the second order draft.
Castro-Diez, Pilar	No	1	12	661	12	662	Here it may be relevant mentioning that the impacts of invaders are not necessarily linear to the abundance of the invader (as usually assumed, and that threshold or other type of responses have been often described.	Thanks for this suggested change. Authors have included it in the second order draft.
Marchante, Elizabete	No	1	12	661	13	669	I think this paragraph could fit better the previous section.	Thanks for this suggested change. Authors have included it in the second order draft.

Courault Romain	No	1	13	325	13	325	"Figure 1.5: Hotspot and coldspot regions for cross-taxon established alien species richness across eight taxonomic groups, accounting for area and sampling effort". I'd be more specific on how areas have been relativized, and how sampling effort were taken into account. Serious lack of datasets for regions/states having strong and difficult access condition and/or low findings for biodiversity research. I would emphasize on it.	Thank you - authors have increased the content in reporting such biases throughout the assessment in the second order draft.
Dunn, Christopher	No	1	13	325	13	328	Fig. 1.5 is good; however, it would be very useful if it (or another figure and added text) could show how these hotspots coincide with hotspots of cultural diversity and the concentration of IPLCs. I think a lot of people do not fully appreciate the link.	Thank you very much for your comment. The analysis on lands of IPLCs is now included in Chapter 2 of the second order draft.
Blackburn, Tim	No	1	13	327	13	327	This is heavily dominated by plants. Better would be maps of different major taxa and a richness-weighted summary map.	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Castro-Diez, Pilar	No	1	13	327	13	327	This figure has two legends and two different citation numbers.	Thank you, this has been corrected in the second order draft.
Government of Germany	Yes	1	13	327	13	328	Whereas "hotspot" is commonly used and understood, the term "coldspot" isn't. It is therefore suggested to explain the term coldspot (possibly in a footnote).	Thank you, this figure and its legend have been replaced in the second order draft.
White, Michael	No	1	13	327	13	328	Fig 1.5 make sure perspective of future map is good	Thank you, this figure and its legend have been replaced in the second order draft.
Walton, Paul	No	1	13	333	29	345	Table 1.1 illustrates well the breadth and depth of IAS impacts across the world. It seems light on island impacts, however. Island ecosystems have been the sites of a high proportion of IAS-driven population and species extinctions. Moreover, with the implementation of some proven, well-understood and relatively simple biosecurity measures such island impacts might be greatly lessened in future - thus island ecosystems seem worth highlighting more clearly in this	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.
Feest, Alan	No	1	13	667	13	669	The concept of relative biomass as a measure of ecosystem change and the change of ecosystem functioning.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these in the second order draft.
Marchante, Elizabete	No	1	13	671	13	678	Suggest to complete this paragraph including brief reference to the use of ecological networks to study IAS in the context of management, including biocontrol, impacts at multiple levels indirect effects), restoration, invasion meltdown, etc. Eg, Heleno et al 2012 (http://dx.doi.org/10.1098/rspb.2012.2112), Heleno et al 2010 (Ecological Applications, 20(5), 2010, pp. 1191-1203), Carvalho et al 2010 (Ecology, 91(4), 2010, pp. 1063-1074), López-Núñez et al 2015 (Ecology, 98(3), 2017, pp. 782-793), Dunn et al 2012 (doi: 10.1111/j.1365-2435.2012.02041.x), Feit et al 2019 (DOI: 10.1111/gcb.15032), Tylanakis et al 2008 (doi: 10.1111/j.1461-0248.2008.01250.x), Godoy 2019 (DOI: 10.1111/1365-2435.13343), Frost et al 2019 (https://doi.org/10.1016/j.tree.2019.04.012), Simberloff et al 1999 (Biol. Invasions, 1, 21-32), etc.	Thanks for this suggested change. Authors have included it in the second order draft.
Sharma, Gyan	No	1	13	692	13	695	This should include important reference from India pertaining to the same set of explanations. Reference: Sunny A, Diwakar S, Sharma GP (2015) Native insects and invasive plants encounters. <i>Arthropod-Plant Interactions</i> , 9, 323-331	Thanks for this suggested change. Authors have included it in the second order draft.
Verbrugge, Laura	No	1	13	697	16	784	One of the aims in the assessment (explained in the video) is to assess the level of awareness of the extent of IAS and their impacts. From the sections that I have read (in Chapters 1 (1.5), 4 and 5), I understand that public perceptions are discussed in each of these chapters separately without clear linkages or having a designated place in the assessment. They are also discussed quite generally without conducting a systematic literature review of public perceptions of IAS. Given the importance of public perceptions, values, and behaviour in all stages of invasion - I would strongly recommend to think about ways to make this a more substantive and comprehensive part of the assessment. This does not necessarily mean that it needs to be centralised in one place, but the literature could be reviewed in relevant parts of the assessment with a general reference to it in the first Chapter.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	13	698	14	712	An issue here is that people's value systems may drastically change from one generation to another. There are some interesting papers on this issue (e.g. Clavero, M. (2014) <i>Shifting Baselines and the Conservation of Non-Native Species</i> . <i>Conserv Biol</i> 28, 1434-1436).	Thanks for this suggested change. Authors have included it in the second order draft.
Maclean, Kirsten	No	1	13	701	13	701	Suggest adding in the following references that highlights the kinds of different attitudes there are to IAS, and how this 'may' lead to conflict - Maclean, K., Farbotko, C., Mankad, A., Robinson, C. J., Curnock, M., Collins, K., & McAllister, R. R. J. (2018). Building social resilience to biological invasions: A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>GeoForum</i> , 97, 95-105. doi: https://doi.org/10.1016/j.geoforum.2018.10.018 ; Curnock, M., Farbotko, C., Collins, K., Robinson, C. J., & Maclean, K. (2017). Engaging with risk (or not): shared responsibility for biosecurity surveillance and the role of community gardens. <i>Geographical Research</i> , n/a-n/a. doi:10.1111/1745-5871.12231; Farbotko, C., Maclean, K., & Robinson, C. (2016). Performing a plant biosecurity emergency: The generation of disease absence and presence in Northern Australia banana plantations. <i>Environment and Planning A: Economy and</i>	Thanks for this suggested change. Authors have included it in the second order draft.
Maclean, Kirsten	No	1	13	704	13	705	Suggest a citation for 'people's value systems' there is also another reference that is currently in review, anticipate it to be published in early 2021. The current citation is: Maclean, K., C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. <i>Journal of Cultural Geography</i> . and two for 'impacts of IAS' - Farbotko, C., Maclean, K., & Robinson, C. (2016). Performing a plant biosecurity emergency: The generation of disease absence and presence in Northern Australia banana plantations. <i>Environment and Planning A: Economy and Space</i> , 48(4), 771-788. doi:10.1177/0308518x15623275; Maclean, K., Farbotko, C., & Robinson, C. J. (2019). Who do growers trust? Engaging biosecurity knowledge to negotiate risk management in the north Queensland banana industry, Australia. <i>Journal of Rural Studies</i> .	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	13	704	13	705	Ana Sofia is a name, not a surname. Is this citation correct?	Thank you, citations and reference styles have been harmonized in the second order draft.
Kudelska, Theresa	No	1	13	705	13	705	Additional reference about perceptions of INNS - Starlinger, U. Kowarik, I. Rode, M. Schepker H. 2003. From desirable ornamental plant to pest to accepted addition to the flora? The perception of alien tree species through the centuries. <i>Biol Invasions</i> 5, 323-335.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	13	706	13	706	I guess this is not a valid citation (Jaric, resubmitted).	Thanks for this suggested change. Authors have included it in the second order draft.
Thompson, Ian	No	1	14	0	29		There is a strong emphasis on pests and weed invasive species. It would be useful to highlight more invasive diseases and their impacts on biodiversity. They have the capacity to quickly and even comprehensively change ecosystems. A few references follow. Impact of the invasive rust <i>Puccinia psidii</i> (myrtle rust) on native Myrtaceae in natural ecosystems in Australia. Angus J. Carnegie, Amrit Kathuria, Geoff S. Pegg, Peter Entwistle, Matthew Nagel & Fiona R. Giblin <i>Biological Invasions</i> volume 18, pages 127-144(2016) A rust of the Pimento tree in Jamaica, B.W.I. Macleachlan, J. D. Phytopathology, 1938 28 3 157-170 pp Genetic and cultural significance of indigenous pigs in Papua New Guinea and their phenotypic characteristics. Workneh Ayalew, Gariba Danbaro. Michael Dom. <i>Animal Genetic Resources Information</i> 48:37-46. April 2011 A systematic study towards evolutionary and epidemiological dynamics of currently predominant H5 highly pathogenic avian influenza viruses in Vietnam. Lam Thanh Nguyen, Simon M. Firestone, Mark A. Stevenson, Neil D. Young, Leslie D. Sims, Duc Huy Chu, Tien Ngoc Nguyen, Long Van Nguyen, Tung Thanh Le, Hung Van Nguyen, Hung Nam Nguyen, Tien Ngoc Tien, Tho Dang Nguyen, Bich Ngoc Tran, Keita Matsuno Masatoshi Okamoto, Hiroshi Kida & Yoshihiro Sakoda. <i>Scientific Reports</i> volume 9, Article number: 7723 (2019)	Thank you very much for your comment, authors have developed this theme throughout the second order draft of this assessment
Acosta-Michlik, Lilibeth	No	1	14	333	29	346	This is a very long table and distracts the flow of discussion in the chapter. I would suggest to move this to the Appendix to provide summary/highlights of the contents of this table in a smaller table or even graphics in the chapter. It would be very useful to use either a one page table or graphics to convey some form of analysis of the contents of this long table. The long table is just providing a list of literature reviewed, and the chapter should provide an assessment of the	Thank you - changes have been made in the second order draft.
Alaux, Christine	No	1	14	333	29	345	This summary table is interesting but too long to be placed in the middle of a report text. It would be preferable to present it in a few sentences and to make a reference towards the end of the report by adding an additional part.	Thank you, we have included a summary in the main chapter, and the complete table as supplementary materials in the second order draft.
Camacho, Rulco A.	No	1	14	333	345	29	Table 1.1, please repeat header rows.	Thank you. Header rows added. The table is now in supplementary material in the second
Castro-Diez, Pilar	No	1	14	333	14	340	Table 1.1 legend mentions "IPBES Units of Analysis around the world", however, in previous pages I haven't find an explanation of what these units are. What is the meaning of "CLA + fellows"? Supplementary Material 1.1 has not been cited before Suppl. Mat 1.2. Finally, it would be nice to find the full list of keywords used in the WOS search in Supplementary Material.	Thank you, units of analysis have been listed in the supplementary materials. The legend has been edited in the second order draft and the methodology is documented too.
Castro-Diez, Pilar	No	1	14	333	29	345	Table 1.1. It would be helpful adding a column with the gross taxonomic group of the invader (e.g. angiosperm/ gymnosperm, mammal, bird, insect... and so on). Regarding the units of analysis, I'd suggest order them in a latitudinal gradient, if possible. Finally, it would be helpful to show the units of analysis in a map. Examples are highly biased towards plants. What location is Southern Hemisphere country? (second row in page 19). Try to harmonize the degree of details across rows. Most rows refer to one or a few similar species, but last row of page 19 refers to "microorganisms, terrestrial plants, terrestrial invertebrates... etc), and impacts are equally unspecific. The same can be said about last row in page 20. Add more rows and repeat references if necessary to provide more specific examples. Also, the degree of detail to explain the impacts is highly heterogeneous.	Thank you - a summary will be included as a figure and the table will be in supplementary material in the second order draft.
Eggermont, Hilde	No	1	14	333	29	345	Table 1.1 is fairly complex; the case studies might need to be presented differently.	Thank you, we have included a summary in the main chapter, and the complete table as supplementary materials in the second order draft.
Giuseppe, Brundu	No	1	14	333	29	345	The ratio behind Table 1.1 is a little unclear to me. I would suggest to verify the selection of species, maybe using not only WoS/SCOPUS but also expert opinion. For example, at page 21, for the habitat (land use), the IAS <i>Parthenium hysterophorus</i> , <i>Ageratum conyzoides</i> , and <i>Lantana camara</i> are used as examples. However, none of the listed impacts is relevant for "Urban/Semi-Urban" habitats, a part from the last one "Negative impact on human health: ...". For example, in this type of Habitat and for Europe it would be more relevant to cite, e.g., <i>Ambrosia</i> and <i>Broussonetia papyrifera</i> in Pakistan.	Thanks for your comment. Methodology was applied for all sections and we cannot change it. Impacts that are not relevant for the unit of analysis were deleted in the second order draft.
Government of Germany	Yes	1	14	333	14	333	Ch 1 introduces IAS risks posed to marine, terrestrial and freshwater systems (see L45). Would it make sense to use the terms freshwater, brackish and marine instead of "aquatic environments" in the title of Table 1.1 as well? Any possibilities that support alignment in the use of terms will facilitate reading.	Thank you, we have deleted the table from the main text and are now relying on the IPBES units of analysis to assess risks to marine, terrestrial and freshwater ecosystems in the second
Josefsson, Melanie	No	1	14	333	29	346	Table 1.1: One needs to include more examples of effects of IAS on the social and cultural values of people. Include especially examples of IAS on indigenous peoples and local communities.	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.
Josefsson, Melanie	No	1	14	333	29	345	Table 1.1: could include the more indirect impacts on cultural and social aspects (as it is, the economic value is overrepresented).	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.
Marchante, Elizabete	No	1	14	333	29	346	Table 1.1 - I understand that the methodology used led to only one reference by species, but for many of the referred species there are many more studies (sometimes reviews) reporting different impacts - I suggest including a few more references for each species to illustrate the diversity of impacts they promote. E.g., for <i>Acacia longifolia</i> only chemical impacts on ecosystem are mentioned, but impacts at vegetation, ecological networks and other levels have been reported - Marchante et al 2015, DOI 10.1007/s11258-015-0530-4; Le Maire et al 2011, DOI: 10.1111/j.1472-4642.2011.00816.x; Lopez-Nunez et al 2017, https://doi.org/10.1002/cey.1701 ; Rascher et al 2011, https://link.springer.com/article/10.1007/s10021-011-9453-7 ; Rascher et al 2012.	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	14	333	29	345	A picture above the name of the organism will help the reading of the table / <i>Procambarus clarkii</i> (red swamp crayfish) also competes with the native crayfish (Spain) / Missing <i>Pterois</i> (a genus of venomous marine fish, commonly known as lionfish) native to the Indo-Pacific. It is a huge problem in the Caribbean / Missing <i>Miconia calvescens</i> , an invasive plant in French Polynesia.	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.

Volpedo, Alejandra	No	1	14	333	29	336	Table 1.1. there is an imbalance between examples of the northern hemisphere and the southern hemisphere for example in South America there are 4 examples and from the USA, Europe there are more than three times as many. I think there should be a balance.	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally in the second order draft.
Kudelska, Theresa	No	1	14	335	14	340	The description of how the table was derived is not very clear. What is 'ISI WOS'? Is it the name of the search engine? If so please state this. Is WOS an acronym? Also what was the participatory process? If the list of keywords was developed using professional judgement then please state this alternatively if a more systematic approach to selecting the key words was utilised then please mention this.	Thank you - changes have been made in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	14	342	14	342	The acronym GBIF has not been spelled for the first time in the text yet.	Thank you. The acronym has been spelled out in the second order draft.
Dunn, Christopher	No	1	14	344	14	344	TABLE 1.1. I don't think, from my years in Hawaii, that <i>Cenchrus setaceus</i> is necessarily the best or more illustrative example that could be used. There are so many devastating examples, so I understand one has to be selective. Also, please be consistent in the spelling of Hawaii. It has an "okina" between the "I"s.	Thank you. Corrected in the second order draft.
Government of Bulgaria	Yes	1	14	344	29	345	As a proposal to include <i>Rapana venosa</i> in the table Table 1.1. The importance of <i>Rapana</i> , the Japanese Snail has increased and has helped to off-set the decline in mussel and clam landings in the Black Sea (BS TDA, 2007). The Japanese snail <i>Rapana venosa</i> is a habitat generalist and exploits practically every available prey. It has occupied an empty ecological niche in the Black Sea and has exerted significant predatory pressure on the indigenous malacofauna (BS TDA, 2007).	Thank you - changes have been made in the second order draft.
Government of Ethiopia	Yes	1	14	344	14	344	Species which are highly impacting tropical areas (e.g. <i>Prosopis juliflora</i> , <i>Eichhornia crassipes</i> , <i>Parthenium hysterophorus</i> and <i>Lantana camara</i>) should be included in table 1.1 under 'Exotic taxa' and 'Tropical and sub tropical dry and humid areas' (Unit of analysis).	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally.
Government of Germany	Yes	1	14	344	29	345	Please consider adding a column in the table on positive impacts / human utilization to be better in line with the following examples which are more descriptive	Thank you for your comment. The purpose of this table is to show the detrimental impact only.
Khuroo, Anzar Ahmad	No	1	14	344	29	345	It is important to follow correct scientific nomenclature, in particular a uniform globally acceptable. For instance, in Table 1.1., the scientific name <i>Cenchrus setaceus</i> is "Unresolved" as The Plant List (see weblink http://www.thepflantlist.org/tp1.1/record/kew-462634) and "Ambiguous" as per the recently available World Flora Online (see weblink http://www.worldfloraonline.org/taxon/wfo-0000917303). The name <i>Cenchrus ciliaris</i> is correct name and not " <i>Cenchrus ciliare</i> " as written, and both generic and specific epithet is to be italicised. "(garden lupin)") need to be unitalicised. I suggest for the scientific name, the AUTHOR be also provided. The reason for this can be explained by the scientific name " <i>Centaurea solstitialis</i> ". The name " <i>Centaurea solstitialis</i> L." is accepted name (see weblink http://www.worldfloraonline.org/taxon/wfo-000035974), but the same name with another author " <i>Centaurea solstitialis</i> Asso" is an Ambiguous name. (see Weblink http://www.worldfloraonline.org/taxon/wfo-0000087409). I suggest the use of World Flora Online for scientific nomenclature of Plants and Catalogue of Life for Animals. Unitalicize "Jap weed". For common names, I suggest to follow uniform pattern: e.g. "Common water hyacinth" and "zebra mussels", why "C" as capital and "z" as small. So it is better to be uniform. Also it should be "zebra mussel".	Thanks for this suggested change. Authors have included it in the second order draft.
Linnamägi, Merike	No	1	14	344	14	344	Table 1.1 header row, should be clearer that location means range where it is alien.	Thank you - information was added in the second order draft.
Pourkazemi, Mohammad	No	1	14	344	14	344	<i>Mnemiopsis leidyi</i> not only in the Black Sea but also in the Caspian Sea had a great negative impact on small pelagic fisheries as well as all planktonic form in the basin. Please add the Caspian Sea in the box. (References: Aboulghasem Roohi and Seydeh Ameneh Sajadi 2011. <i>Mnemiopsis leidyi</i> Invasion and Biodiversity Changes in the Caspian Sea, Chapter book in Ecosystem Biodiversity. https://www.researchgate.net/publication/221921405 <i>Mnemiopsis leidyi</i> Invasion and Biodiversity Changes in the Caspian Sea	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally.
Taki, Hisatomo	No	1	14	344	29	345	In the table, names of "Location" are inconsistent. Most are countries but others are not.	Thank you - changes have been made in the second order draft.
Girod, Christophe	No	1	14	706	14 (p 48 of the pdf)	707	Jaric's paper has been published : Front Ecol Environ 2020; 18(6): 345– 353.	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	14	706	14	707	Please update the information about this manuscript. Is already published?	Thanks for this suggested change. Authors have updated it in the second order draft.
Plesnik, Jan	No	1	14	706	14	707	Replace citation Jaric et al. by Front Ecol Environ 2020; doi:10.1002/fee.2195.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	14	714	15	716	Table 1.3. I miss more information on the legend of this table. E.g. I don't understand the 3rd row (Effects (Potential and realised) (Positive and negative)). Why some words are in bold?	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	14	714	14	714	Table 1.3: Maybe replace in the Table 'Individual' by 'Species' by 'Invasive species'.	Thanks for this suggested change.
Verbrugge, Laura	No	1	14	714	14	714	This table has been modified from an existing study but it remains unclear how or why this was done. In general, the assessment as a whole seems to lack a review of studies on public perception of IAS impacts and IAS management.	Thank you. Please note that the table is taken from a CBD decision. It is essential to keep it as it stands.
Asth, Matheus	No	1	14	715	14	715	Please consider adding "Medical use" and "Use as fuel" as underlying factors that drive perceptions of IAS in sociocultural contexts.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	14	715	14	715	Replace "gender" with "sex".	Thanks for this suggested change. Authors have included it in the second order draft.
Ranarijaona, Hery Lisy Tiana	No	1	14	715	14	715	The part about effect positive and negative should be to develop. Please read the reference: Barbara Sladonja, Danijela Poljuha and Mirela Uzelac, 2018, Non-Native Invasive Species as Ecosystem Service Providers. DOI: 10.5772/intechopen.75057	Thanks for this suggested change. Authors have included it in the second order draft.
Asth, Matheus	No	1	15	344	15	344	Consider replacing the <i>Cenchrus ciliare</i> species name in Table 1.1. for <i>Cenchrus ciliaris</i> L.	Thank you. Name is changed in the second order draft.
Barrios Caballero, Yolanda	No	1	15	344	15	344	Correct scientific name is <i>Cenchrus ciliaris</i> (not <i>ciliare</i>). This species is used for cattle production and is considered to have "saved" the cattle industry in the north of the country. While it is a huge problem as an invasive species that is widely spread and affecting native plant communities in the country, it has had positive impacts on the animal production sectors.	Thank you. Name is changed in the second order draft.
Barrios Caballero, Yolanda	No	1	15	344	15	344	https://www.researchgate.net/publication/321303984 Importancia del pasto buffel <i>Pennisetum ciliare</i> L. en el Estado de Tamaulipas Mexico	Thanks for your comment. According to the methodology: only information from the cited article can be used.
Barrios Caballero, Yolanda	No	1	15	344	15	344	<i>Homalidiscia vitripennis</i> is native to the USA and Mexico, does not appear to be present in South America. Would be better to have an exotic species as an example https://www.cabi.org/isc/datasheet/27561 .	Thank you. There was a mistake in the species name; changes have been made in the second order draft according to information into the cited article.
Government of Ethiopia	Yes	1	15	344	15	344	<i>Cenchrus ciliaris</i> not ' <i>Cenchrus ciliare</i> '.	Thanks for this suggestion. Changed in the second order draft.
Castro-Diez, Pilar	No	1	15	717	16	784	Boxes 1.5 and 1.6 should be better integrated (and cited) in the main text. This comment may be extended to all text boxes in the chapter.	Thanks for this suggested change. Authors have included it in the second order draft.
Karimov, Bakhtiyor	No	1	15	717	15	740	My suggestion is to change the name of this paragraph to: "Human Values and the Asian Carp in North America and Central Asia" based on above stated. If needed I can provide additional info.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	15	719	15	721	Consider re-wording the sentence. I find it quite misleading.	Thanks for this suggested change. Authors have included it in the second order draft.
Josefsson, Melanie	No	1	15	719	15	721	Doubtful of the value statement in these lines, please explain what is meant and give references. "Human values and politics play a role in all scientific enterprises, yet they may play an outsized role in the assessment of IAS i fonly because species are usually only designated as invasive if they threaten human systems". This statement goes against the CBD definition of IAS and the work of the CBD with IAS. Please include more references in this BOX 1.5 example and include the effects on human health, recreational fishing and the major infrastructure developments that have been made to unsuccessfully spread to the	Thanks for this suggested change. Authors have included it in the second order draft.
Tom Joe, Elphin	No	1	15	719	15	721	Kindly substantiate this with a reference.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	15	742	15	742	What is "critical Invasion Science"? After reading the box I still don't fully comprehend the message.	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	15	742	15	742	Box 1.6: I suggest to rewrite this box to move away from the view of what is critical (and thus apparently different from some sort of non-critical) invasion science; rather, I suggest to focus on the important messages included in the text and explore them in more detail. For example, the question is not just whether IAS management creates winners and losers, the question is how IAS management changes the frequency and composition of winners and losers compared to 'business-as-usual' and considering time (e.g. whether certain stakeholder groups become vulnerable during a certain transition phase).	Thanks for this suggested change.
Verbrugge, Laura	No	1	15	742	16	784	I am not sure about the rationale for using Boxes in the text - but you may consider making the text in Box 1.6 part of the regular text, as I believe it is more than an example.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	15	745	15	745	Vaz et al. 2017	Thank you, citations and reference styles have been harmonized in the second order draft.
Maclean, Kirsten	No	1	15	747	15	748	There are so many more references that could be added here (social science, humanities researchers critically evaluating biological 'invasions'). There is not space here to include all these references. However, if the authors of this section would consider it, they can look at the reference lists in the following papers (Maclean et al. 2018; Maclean et al. 2019; Maclean et al. in review) to see how many there are. These authors would likely not describe themselves as 'invasion scientists' but they certainly have much to say and light to shed on this topic. The following refs would also be useful to include as citations here in particular with relation to enabling management.... Maclean, K., Farbotko, C., Mankad, A., Robinson, C. J., Currock, M., Collins, K., & McAllister, R. R. J. (2018). Building social resilience to biological invasions. A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>GeoForum</i> , 97, 95-105. doi: https://doi.org/10.1016/j.geoforum.2018.10.018 ; Currock, M., Farbotko, C., Collins, K., Robinson, C. J., & Maclean, K. (2017). Engaging with risk (or not): shared responsibility for biosecurity surveillance and the role of community gardens. <i>Geographical Research</i> , n/a/n/a. doi:10.1111/1745-5871.12231; Maclean, K., C. J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. <i>Journal of Cultural Geography</i> ; McAllister, R. R. J., Robinson, C. J., Brown, A., Maclean, K., Perry, S., & Liu, S. (2017). Balancing collaboration with coordination: Contesting eradication in the Australian plant pest and disease biosecurity system. <i>International Journal of the Commons</i> , 11(1), 330-354. doi: https://doi.org/10.18352/ijc.701 ; McAllister, R. R. J., Robinson, C. J., Maclean, K., Guerrero, A. M., Collins, K., Taylor, B. M., & De Barro, P. J. (2015). From local to central: a network analysis of who manages plant pest and disease outbreaks across scales. <i>Ecology and Society</i> , 20(1). doi:10.5751/ES-07469-200167; Maclean, K., Farbotko, C., & Robinson, C. J. (2019). Who do growers trust? Engaging biosecurity knowledges to negotiate risk management in the north Queensland banana industry, Australia. <i>Journal of Rural Studies</i> , 67, 101-110. doi: https://doi.org/10.1016/j.jrurstud.2019.02.026 ; Mankad, A. (2016). Psychological influences on biosecurity control and farmer decision-making: A review.	Thanks for this suggested change. Authors have included it in the second order draft.
Kudelska, Theresa	No	1	15	748	15	749	The text says 'This focus on what has been called an 'ABC framework' (for attitudes, behaviour, and choice) tends to be privileged in efforts by natural science to reach out to social science for interdisciplinary work'. I am not sure what this means is there a more simple way to say this?	Thanks for this suggested change. Authors have included it in the second order draft.
Papadopoulou, Paraskevi	No	1	16	254	16	254	1.3. What are invasive alien species (IAS)? Add abbreviation (similarly on the table of contents).	Thank you for your comment, we have spelled out all the acronyms (except for IPBES) in the second order draft.

Government of Australia	Yes	1	16	255	16	267	The definition of IAS is very important. As described in this section, 'the term alien (non-native, exotic, introduced) species refers to species transported beyond their natural range by humans'. Does this include species that have been transported beyond their natural range within a particular jurisdiction (e.g. within Australia)? Species like the Crown of Thorns seastar and Black Spined Urchin (<i>Centrostephanus rodgersii</i>) are both native in Australia but behave invasively when they increase in number and/or spread to other areas beyond their natural range (such as the Black Spined Urchin spreading down the east coast of Australia with a strengthening of the East Australian Current with climate change). At least one state in Australia treats IAS and these sorts of species (what might be better described as overabundant native species) differently, even though the impacts and management issues may be similar.	Thanks for this suggested change. Authors have included it in the second order draft.
Klotz, Stefan	No	1	16	269	18		Estimating the real impact of alien species on various ecosystem services is particularly problematic because 1. negative factors are overrepresented in the literature If no effects are found, they are not published. 2. the benefits of alien species are usually not considered in the ecological literature. 3 Negative impacts of native species on other native species are not discussed. Native pests are not compared with alien species in the general assessment of economic	Thank you - a conceptual figure/table has been developed in the second order draft.
Dupont, Lise	No	1	16	344			Example taxa : <i>Lumbricus terrestris</i> . In the cited reference (Bohlen et al. 2004), two other well-known invasive earthworms are mentioned : <i>Dendrobaena octaedra</i> and <i>Lumbricus rubellus</i> . They should be added to the table.	Thank you. Two more species were added in the second order draft.
Verbrugge, Laura	No	1	16	770	16	775	A recent paper in the journal Biological Invasions on social imaginaries to understand and manage biological invasions in southern Patagonia would be a fitting example here: https://link.springer.com/article/10.1007/s10530-020-02325-2	Thanks for this suggested change. Authors have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	16	781	16	782	A footnote describing the concept/meaning of "South Africa's 'Working for Water' program" is missing	Thanks for this suggested change. Authors have included it in the second order draft.
García Martínez, Margarita	No	1	17	295	17	302	Page 295 says "There are many ways in which introduced species may benefit from interacting with one another" - and it is mentioned the way they do. Below (line 299) says "Less attention has been given to positive interactions between aliens species compared to negative interaction but it is acknowledged that positive interactions are also important in determining..... It is not congruent because at the beginning of the paragraph it is said. It should say: "Less attention has been given to "negative interactions"...../ Also, it would be great if an example of negative interaction was shown in the paragraph of which, there is less	Thank you for your comment - first sentence has been altered in the second order draft.
Catford, Jane	No	1	17	299	17	300	Really? Is much attention actually given to negative interactions among alien species? This statement seems unsupported and no citations given (the two at the end of the sentence don't appear to be applicable). I wonder if this is meant to refer to negative interactions between alien and NATIVE species (e.g. biotic resistance) rather than negative interactions between alien and alien species.	Thanks for this suggested change. Authors have included it in the second order draft.
Catford, Jane	No	1	17	314	17	315	This statement comes across as too strong and definitive, and the Lockwood paper does not actually demonstrate this - but rather proposes it, if I recall correctly. This may be the case in some systems, but certainly not all. This statement needs to be revised to be more cautious - e.g. along the lines of later statements about establishment in this chapter (e.g. L565-567). Also worth citing Simberloff 2009 Annual Reviews here too.	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Papadopoulou, Paraskevi	No	1	17	322	17	322	Adding a world map with photographs of species linking to locations would indeed be a good idea.	Thanks for this suggested change of wording. It is an improvement and authors have adopted something similar in the second order draft.
Government of Ethiopia	Yes	1	17	344	17	344	Better to put as " Chemical impact on ecosystem: has caused losses of soil moisture reserves".	Thank you. Corrected in the second order draft.
Government of Ethiopia	Yes	1	17	344	17	344	The correct common name for <i>Centaurea solstitialis</i> is (Yellow star thistle) not (Barnaby star thistle).	Thank you. Corrected in the second order draft.
Wedegärtnér, Ronja Elisabeth Magdalene	No	1	17	344	17	344	Example "Tundra and High Mountain habitats- Pinus mugo" - this species is native in this area. From the original article of Dullinger et al. 2003: "Under natural conditions Picea abies or Larix decidua forests together with prostrate Pinus mugo shrubland dominate from 1400 m a.s.l. up to the treeline (1800 - 1900 m)". I am not sure if it is the intention to show native range-expanding species in the table as well.	Thank you - This species is non-native for high mountain grasslands according to the article. "Pinus mugo is the most important invader of abandoned subalpine pastures in the area and the predominant woody plant at the current timberline." Please check https://bioone.org/journals/arctic-antarctic-and-alpine-research/volume-35/issue-4/1523-0430_2003_035_0434_POSIH_2.0.CO_2/Patterns-of-Shrub-Invasion-into-High-Mountain-
Lacerda De Matos, Ana Carolina	No	1	17	785	18	831	I suggest this part of the text be at the beginning of the chapter.	Thank you, some of the text has been deleted but we think that the definition of important invasion concepts should come first.
Dupont, Lise	No	1	17	788			ILK (Indigenous and local knowledge) should be defined here since this is the first time this acronym is encountered in the text.	Thank you for your comment. Acronyms are defined in the second order draft (except for
Lacerda De Matos, Ana Carolina	No	1	17	788	17	788	There should be an explanation in this line of the acronym ILK.	Thank you very much for your comment. The list of acronym is available in the
Mestre, Mireia	No	1	17	788	17	788	About ILK: I recommend to use "indigenous and local knowledge" as much as possible. ILK is confusing for a general public.	Thank you for your comment. Acronyms are defined in the second order draft (except for
Castro-Diez, Pilar	No	1	17	789	19	832	In this section there is relevant information on IPBES reports (specifically, lines 789-832) that would be more suited to the first section of the chapter. Moving this section to the beginning would help readers not familiar with IPBES reports to understand the context and the aims of this report.	Thank you, a summary of the findings from previous IPBES assessments has been included in an earlier section of this chapter
Setsaas, Trine Hav	No	1	17	791	17	795	Consider using all IPBES assessment's titles perhaps? If not, lower case on all, see use of capital G in global assessment.	Thank you, your point has been addressed in the second order draft
Castro-Diez, Pilar	No	1	17	793	17	794	I'm not sure if "(2022)" refers to a IPBES report that has not been published yet. In such a case, I would suggest to remove it. Also, in Lines 794-5, please specify the topic of regional assessments and the Global assessment.	Thank you, agreed.
Mestre, Mireia	No	1	17	793	17	794	I do not understand how it is possible that the IPBES IAS assessment builds upon IPBES assessments from 2022.	Thank you. This assessment will ensure consistency with the values and sustainable use assessments once they are published.
Josefsson, Melanie	No	1	17	797	19	833	The difference between fig. 1.9 and fig. 1.10 should be clarified & requires some explanation on what it means for the assessment.	Thank you, your point has been addressed in the second order draft
Romero, José	No	1	17	797	19	833	It is very good to have references to the IPBES conceptual framework from the very start of the assessment. Consistency is key, namely in terms of graphical representation. There should be systematic link with IPBES concepts throughout the assessment. There is a need to provide an interface for policy-makers.	Thank you for your comment. Authors have addressed these points through the revisions.
Shimura, Junko	No	1	17	798	17	807	Add industry in trade, transport and users of beneficial alien species as the stakeholders influencing introduction and spread of invasive alien species. Some change of behavior of the above stakeholders to promote safe trade and transport is critical based on the analyses of costs in the environment and benefits for IPLCs (Indigenous Peoples and Local Community) should be defined here since this is the first time this acronym is encountered in the text.	Thank you for your comment. This is taken up by Chapter 6.
Dupont, Lise	No	1	17	801			IPLCs (Indigenous Peoples and Local Community) should be defined here since this is the first time this acronym is encountered in the text.	Thank you, the acronyms have been spelled out across the chapters (except for IPBES) in the second order draft
Mestre, Mireia	No	1	17	801	17	801	About IPLCs: I recommend to use "Indigenous Peoples and Local Communities" as much as possible. IPLCs is confusing for a general public.	Thank you, the acronyms have been spelled out across the chapters (except for IPBES) in the second order draft
Mestre, Mireia	No	1	17	806	17	806	About GQL: I recommend to use "Quality of life" as much as possible. GQL is confusing for a general public.	Thank you, the acronyms have been spelled out across the chapters (except for IPBES) in the second order draft
Alaux, Christine	No	1	17	808	17	809	The characters of the schema and its legend are too small so difficult to read	Thank you, the figure has been deleted in the second order draft
Mestre, Mireia	No	1	17	808	17	808	What do the numbers accompanying the arrows mean?	Thank you, the figure has been removed in the second order draft
Walton, Paul	No	1	17	818	17	820	This is a general point about the whole of Chapter 1, with the specified sentence as an example. It is surprising that the word 'biosecurity' appears only once in the entire chapter (towards the end in the section about micro-organisms). This seems out-of-kilter with the CBD, and a host of other strategies in relation to IAS, which consistently and explicitly emphasise prevention as the most cost-effective and ecologically preferable approach to tackling IAS. This does not appear simply to be a linguistic matter: the sentence beginning line 818, for example, says: "Society, through its institutions and governance, can respond to IAS direct management (i.e. control) which is driven by how people perceive and act in response to this threat. The implication seems to be that control is the only possible human response to IAS - when in fact prevention (biosecurity) is another, and perhaps an even more important one. If, as may be the case, the assumption is that the term control in this context includes prevention/biosecurity, then there is a significant linguistic issue, as in many key IAS texts that equivalence is not assumed. NOTE: in a recent UK webinar Prof Helen Roy helpfully clarified that in this assessment the word management is indeed taken to include prevention. This is not sufficiently clear and explicit in the text, however, and I would still make the point above: for many in the field, common terminology takes management to signify action to tackle established IAS, whereas prevention is a distinct action from this. If, as seems likely, readers will not automatically grasp the particular and divergent semantic norm adopted in this chapter, there is a risk that the importance of prevention will be underplayed. I	Thank you for your comment. Terminology has been clarified throughout the assessment, and hopefully Figure 1.6 in the second order draft addresses your concerns.
Asth, Mathews	No	1	18	344	18	344	Consider including the species <i>Prosopis juliflora</i> with <i>Prosopis glandulosa</i> in Table 1.1. (Unit of Analysis: "Tropical and subtropical savannas and grasslands"). Impacts: (i) decline in richness and diversity of local species due to increased mortality and reduced growth of native species; (ii) reduction of herbaceous biomass and abundance of herbivorous invertebrates; and (iii) reduction of groundwater availability . References: (i) Nascimento, C. E., Tabarelli, M., da Silva, C. A. D., Leal, I. R., de Souza Tavares, W., Serrão, J. E., & Zanuncio, J. C. (2014). The introduced tree <i>Prosopis juliflora</i> is a serious threat to native species of the Brazilian Caatinga vegetation. <i>Science of the Total Environment</i> , 481(1), 108–113. https://doi.org/10.1016/j.scitotenv.2014.02.019 ; (ii) Linders, T. E. W., Schaffner, U., Eschen, R., Abebe, A., Choge, S. K., Nigatu, L., et al. (2019). Direct and indirect effects of invasive species: Biodiversity loss is a major mechanism by which an invasive tree affects ecosystem functioning. <i>Journal of Ecology</i> , 107(6), 2660–2672. https://doi.org/10.1111/1365-2745.13268 ; (iii) Dziki, S., Schachtschneider, K., Naiken, V., Gush, M., Moses, G., & Le Maitre, D. C. (2013). Water relations and the effects of clearing invasive <i>Prosopis</i> trees on groundwater in an arid environment in the Northern Cape, South Africa. <i>Journal of Arid Environments</i> , 90, 103–113.	Thank you. Name is changed in the second order draft.
Government of Australia	Yes	1	18	344			In table remove "due to impacts on fire regimes in the internationally recognised for their biodiversity and cultural significance, the World Heritage site" and replace with "due to impacts on fire regimes in the World Heritage site (Kakadu National Park)" internationally recognised for its biodiversity and cultural	Thanks for this suggested change. We have included it in the second order draft.
Government of Australia	Yes	1	18	344			In table remove "Kakadu National Park."	Thanks for this suggested change. We have included it in the second order draft.
Government of Australia	Yes	1	18	344			In the table, remove "impact on Australian land mammal fauna" replace with "impact on Australian land mammal fauna, birds and reptiles"	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	1	18	813	18	814	Please provide a reference for further reading on the "five most important anthropogenic drivers of biodiversity change" (optimally using the IPBES Global Assessment (IPBES, 2019)).	Thank you for your comment. Authors have added a reference in the second order draft.
Asth, Mathews	No	1	18	816	18	818	There should be examples of how changes produced by IAS affect the Nature's Contributions to People (NCP)	Thank you for your comment. More examples are available in Chapter 4 (Impacts)
Government of Germany	Yes	1	18	818	18	823	If IAS are to include species relocated due to climate change (see previous comments); this paragraph focuses on societies opportunities to deal with IAS when they have already occurred (adapt, strengthen resilience). Please consider also including efforts to minimize direct drivers like climate change in the first place.	Thank you for your comment. This assessment will consider species introduced directly or indirectly by people into places out of their natural range of distribution (see definition)
Mestre, Mireia	No	1	18	823	18	823	Please check this sentence: "There are also direct effects of IAS on GQL that are not mediated by changes in nature, but that affect human health (e.g. parasites and contagious emergent diseases)". I recommend to rewrite this sentence, because someone can think that you say that emergent diseases (produced by IAS) are not related to changes in nature. Remember that zoonosis are mostly originated by nature destruction.	Thanks for this suggested change. Authors have included it in the second order draft.

Walton, Paul	No	1	18	828	18	130	Whilst the diagram of the IPBES Conceptual Framework (Fig.1.9) includes 'Intrinsic Values' prominently in the 'Nature' box, it is removed in Fig.1.10, the conceptual framework adapted to the IAS assessment. The text here and elsewhere posits benefits to humanity as the sole aim and goal of responses to IAS threats: in these lines we have a statement that this Assessment's core aim is to: understand how the threat posed by IAS can be reduced and NCP [Nature's Contributions to People] can be maintained in order to improve GQL [Good Quality of Life]. It might be a philosophical question - but none the less perhaps an important one; many readers will, as indicated in the conceptual framework, see intrinsic value in nature, and the protection and enhancement of biodiversity as an ethical imperative quite apart from and beyond its critical utilitarian benefits to humanity. Some reference to that might reflect the Conceptual Framework.	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Miréia	No	1	18	831	18	831	This figure is closely related to the one in page 17. Please use the same colors, sizes, font.	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Miréia	No	1	18	838	18	839	the meaning of x and y axis do not match with the figure. Please change in this sentence the meaning of the x axis for the meaning of the y axis.	Thank you very much for your comment. The text has been modified accordingly in the second order draft.
Government of Australia	Yes	1	19	344			In table remove "Kakadu National Park."	Thanks for this suggested change. We have included it in the second order draft.
Government of Ethiopia	Yes	1	19	344	19	344	' <i>Bubalus bubali</i> ' not ' <i>Bubalus bubalus</i> '	Thank you. Corrected in the second order draft
Asth, Matheus	No	1	19	836	19	838	The axes cited in the text are not in accordance with Figure 1.11. Suggestion: "Quality of evidence assessed (x-axis). Level of agreement of experts using their judgment (y-axis)"	Thank you very much for your comment. The text has been modified accordingly in the second order draft.
Mestre, Miréia	No	1	19	850	19	850	But is important not only the number, but also the quality, right? (see line 838). It may be that there are strong evidences (high quality), but not multiple independent studies or a meta-analysis (high)	Thank you for your comment. agreed.
Government of Australia	Yes	1	20	344			In table change <i>Canis lupus dingo</i> (Dingo) to <i>Canis familiaris</i> (Wild dog)	Thanks for this suggested change. We have included it in the second order draft.
Linnamägi, Merike	No	1	20	344	20		Table 1.1 last row on the page. <i>Persicaria acuminata</i> is incorrect name here, that is not Japanese knotweed, it is a Latin-America plant. Cited paper uses <i>Polygonum cuspidatum</i> (which is correct name based on plant index database, syn <i>Fallopia japonica</i> , <i>Reynoutria japonica</i>)	Thank you. Corrected in the second order draft.
Plesnik, Jan	No	1	20	344	20		<i>Canis lupus dingo</i> : the term "ecosystem engineer" is better than "ecosystem architect".	Thank you. Corrected in the second order draft.
Ranarijaona, Hery Lisy Tiana	No	1	20	344	20	344	You should add in the wetland zone in the table: the case of <i>Eichhornia crassipes</i> in Ravelobe lake at the Ankarafantsika National Park in Madagascar, please read the reference : Evaluation de la prolifération de la Jacinthe d'eau du lac Ravelobe Ankarafantsika et plan de restauration Ranarijaona Hery Lisy Tiana, Zainabo Félicie, Andriamanantena Ainazo Herilala et Andrianasatra Georges Simon https://doi.org/10.4000/vertigo.13522	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally
White, Michael	No	1	20	344	20	345	Table 1.1 is <i>dingo</i> indigenous to Australia or introduced?	Thanks for the comment. - This species was introduced
Government of Germany	Yes	1	20	856	20	856	Please check the wording: In the source you are referring to (IPBES/6/INF/17), the explanation of "inconclusive" is: "- existing as or based on a suggestion or speculation; no or limited evidence".	Thank you very much for your comment. The text has been modified accordingly in the second order draft.
Mestre, Miréia	No	1	20	858	25	1045	Arguments of this section are vague	Thank you for your comment. This section has been rewritten in the second order draft
Castro-Diez, Pilar	No	1	20	859	20	861	I miss a more comprehensive introduction to this section. You are talking of cross-cutting themes and common themes, but ... on what? On IAS? On all IPBES reports? After reading section 1.7.1, I'm still not sure of what is this about (the use of so many acronyms -ILK, GQL, IPLCs...) does not help). Finally, given that section 1.7.1. is titled "cross-cutting themes", the reader wanders whether the rest of the sections are "common themes" (I don't understand the basis for this division). Last comment: I've just found the final section "1.8 Common themes". Thus, there is a problem with the numbering (i.e. 1.7 should be "Cross-cutting themes").	Thank you for your comment. This section has been rewritten in the second order draft
Mestre, Miréia	No	1	20	859	20	863	Is this comment necessary?	Thank you for your comment. This section has been rewritten in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	20	876	23	994	Invasive alien species are a serious issue for many IPLC, with impacts on environment, food security, culture, spirituality, language, knowledge transmission, livelihoods, health, well-being and economies. More information in IPBES (2020) Andreve, J.L., Batzin Chojoi, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Reggala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October 2020.	Thank you for your comment. agreed.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	1	20	876	23	994	Invasive alien species are a serious issue for many IPLC, with impacts on environment, food security, culture, spirituality, language, knowledge transmission, livelihoods, health, well-being and economies. More information in IPBES (2020) Andreve, J.L., Batzin Chojoi, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Reggala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October 2020.	Thank you for your comment. agreed.
Castro-Diez, Pilar	No	1	20	876	23	994	Section 1.7.2. I find this section disproportionately long. I understand the importance of ILK on the issue of IAS. But after reading this section, I don't understand the point, i.e. was ILK incorporated to this report? How can scientists/managers incorporate this knowledge to their activities?	Thank you, authors have tried to bring clarity in the introduction to this section in the second order draft. In response to your comment
Government of Germany	Yes	1	20	876	23	994	The authors are encouraged to critically check the wording used in the paragraphs and to take on an inclusive, solution-oriented approach in their discussions on how IAS are perceived in different knowledge holder communities. The statements should be accompanied by references or other types of evidence for	Thank you, authors have revised the text accordingly in the second order draft.
Maric, Filip	No	1	20	876	23	994	Unfortunately, in this rather tokenistic mention of ILK, the present IPBES assessment remains complicit in the very processes it seeks to address here. Specifically, if the notion of IAS is clearly identified as being Western and not corresponding to ILK conceptions, it needs to be questioned on what grounds it continues to be used as the dominant conception and framing of this entire assessment. This kind of domination of IPLCs and their ILK is at the very heart of historical colonial domination of Western elites of others and cannot be perpetuated in this manner by an ultimately still Western-perspectives-led group like the IPBES and assessment like the present one if we are to achieve the aspired to transformative change (see chapter six). Simply acknowledging that integrating ILK ('IPLC perspectives') can be prove challenging and there is lack of political for doing so seems the wrong approach here. It seems to me that precisely showing this will and acting on it is the IPBES unique opportunity and responsibility and this must include changing its very own language.	Thank you for your comment. IPBES has adopted mechanisms to take into account ILK and indigenous peoples and local communities in the assessment process (please refer to this webpage: https://ipbes.net/indigenous-local-knowledge) Experts have assessed the available knowledge, including ILK where possible, throughout the second order draft.
Schaffner, Urs	No	1	20	877		944	I find the paragraphs on IPLCs difficult to read. I agree that IPLCs generally have a 'holistic' approach to the environment, but the text repeatedly implies the general existence of seeming opposites, e.g. between 'western science' and IPLCs. Several sentences suggest generalization where there is none; sometimes inserting a 'can' or 'may' would already help. For example, the statement "Indigenous Peoples and Local Community (IPLC) perspectives on IAS differ from broad scale national regimes and many scientific perspectives in at least three ways..." should be replaced by "Indigenous Peoples and Local Community (IPLC) perspectives on IAS can differ from broad scale national regimes and many scientific perspectives in at least three ways. Also, there are clear cases where IPLC use non-neutral words to refer to weeds, and some 'western scientists' use neutral words. Maybe it is true that "in some cases environmental change is not the fault of specific novel organisms but may be related with Euro-American land management ideologies, including invasive species eradication programmes that violate indigenous understandings and approaches; however, one could easily also state that 'Euro-American land ideologies have led to the introduction of IAS and that some IPLCs tried to eradicate them/stop their spread but were not heard. As a general recommendation I suggest to more clearly state that the text includes examples to illustrate that attitudes, behaviour and choice of IPLCs MAY (but does not have to) differ considerably from those of other actors/members of the society. The key is to empower ILRC in decision processes so that the diversity of their knowledge and perspectives is fully considered. In the work I am involved, the ILRCs decided on how to deal with a species that has recently established on their land, and they were keen to integrate knowledge and perceptions of ILRCs who have already some experience with this species as well as scientific evidence, i.e. they integrated different sources of knowledge and perceptions of 'risk' here as well. The following reference, yet to be published (anticipate early 2021) speaks directly to this issues and suggests ways to overcome it, with Indigenous Australians involved in biosecurity risk management. Maclean, K. C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. Journal of Cultural Geography another reference that would be useful to cite here is: Muller, S., Power, E. R., Suchet-Pearson, S., Wright, S., & Lloyd, K. (2009). "Quarantine Matters!": Quotidian Relationships around Quarantine in Australia's Northern Borderlands. Environment and Planning A, 41(4).	Thank you, we have revised this section, taking your comment into account, in the second order draft.
Maclean, Kirsten	No	1	20	880	20	880	Knowledge and perceptions of ILRCs who have already some experience with this species as well as scientific evidence, i.e. they integrated different sources of knowledge and perceptions of 'risk' here as well. The following reference, yet to be published (anticipate early 2021) speaks directly to this issues and suggests ways to overcome it, with Indigenous Australians involved in biosecurity risk management. Maclean, K. C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. Journal of Cultural Geography another reference that would be useful to cite here is: Muller, S., Power, E. R., Suchet-Pearson, S., Wright, S., & Lloyd, K. (2009). "Quarantine Matters!": Quotidian Relationships around Quarantine in Australia's Northern Borderlands. Environment and Planning A, 41(4).	Thank you, this has been added in Chapter 1 in the second order draft
Copo, Gordon	No	1	20	883	20	883	Datum=singular, data=plural, so please replace 'this data' with 'these data'.	Thank you, grammatical and editorial errors have been corrected in the second order draft
Dunn, Christopher	No	1	20	883	20	883	"this data" should be "these data"	Thank you, grammatical and editorial errors have been corrected in the second order draft
Government of Germany	Yes	1	20	884	20	885	Sentence is incomplete.	Thanks for this suggested change. Authors have included remaining sentence it in the second order draft.
Dunn, Christopher	No	1	20	885	29	885	this sentence seems to be incomplete. Missing a word or phrase	Thanks for this suggested change. We have corrected it in the second order draft.
Sharma, Gyan	No	1	21	344	21	344	Table 1.1: Section of Urban/Semi-urban: Should include also include species e.g. <i>Hyptis suaveolens</i> from India. As this species is also impacting Native flora. Reference: Sharma GP, Raizada Purima and A. S. Raghubanshi (2009) <i>Hyptis suaveolens</i> Poit: an emerging invader of Vindhyan plateau, India. Weed Biology and Management Vol 9 (3) 185-191.	Thank you for the comment. The literature review was made with specific algorithm and applied for all units equally
Mestre, Miréia	No	1	21	864	21	922	Remove "all" from "all IPCCs"	Thank you for your comment. This section has been rewritten in the second order draft
Dunn, Christopher	No	1	21	893	21	924	IPLC perspectives are a lot broader and more complex than presented here. The impacts of IAS on traditional practices, livelihoods, etc. deserve more attention. It is disappointing that the only literature reference is a "western science" one. There should be references to documents prepared by IPLCs, for example the "Local Biodiversity Outcomes 2" report.	Thank you, we have rewritten this section, based on a literature review on indigenous peoples and local communities and invasive alien species (including perceptions) in the second order draft.
Maclean, Kirsten	No	1	21	893	21	895	as per comment above, also consider including of 'risk' here. Relevant refs: Maclean, K. C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. Journal of Cultural Geography another reference that would be useful to cite here is: Muller, S., Power, E. R., Suchet-Pearson, S., Wright, S., & Lloyd, K. (2009). "Quarantine Matters!": Quotidian Relationships around Quarantine in Australia's Northern Borderlands. Environment and Planning A, 41(4), 780-795.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	21	897	21	897	It is not clear what is meant by "western regimes"? Kindly explain. It may be appropriate to just speak about "science" because the way science works is based on a long process which evolved in various regions. The standards used in science are applied and continuously developed further in all regions worldwide.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	21	897	21	898	Please provide references here to support the statement how "western regimes generally consider IAS".	Thanks for this suggested change. Authors have included it in the second order draft.
Maclean, Kirsten	No	1	21	905	21	905	consider adding in text "however, not all members of a given society regard IAS this way, for example some Indigenous groups may consider certain introduced species in multiple ways, including eg. as a pest, a new food source, and a new species in the landscape that needs to be managed (see Robinson CJ, Smyth D. & PJ. W. (2005). Bush tucker, bush pets, and bush threats: co-management of feral animals in Australia's Kakadu National Park. Conservation	Thank you, authors have developed a section that addresses this theme in the second order draft

Maclean, Kirsten	No	1	21	911	21	921	There is much in the published literature about this belief, and certainly Indigenous peoples from different parts of the world conceive these relationships in different, albeit potentially similar ways. The authors might consider expanding the text here to take this into account. For example, Indigenous Australians talk about 'caring for country' as a cultural and spiritual obligation, and the term 'healthy people, healthy country' reflects the fact that is the country is 'sick' then so too are the people who may feel responsible for not caring after the country to ensure it is not 'sick'. Indigenous peoples in north America, no doubt have other ways to describe the relationship with their territories and estates. The authors might consider extending their review to include these approaches. e.g. see Burgess, C. P., Johnston, F. H., Bowman, D. M. J. S., & Whitehead, P. J. (2005). Healthy Country: Healthy People? Exploring the health benefits of Indigenous natural resource management. <i>Australian and New Zealand Journal of Public Health</i> , 29(2), 117-122. doi:10.1111/j.1467-842X.2005.tb00060.x ; Maclean, K., Ross, H., Cuthill, M., & Rist, P. (2013). Healthy country, healthy people: An Australian Aboriginal organisation's adaptive governance to enhance its social-ecological system. <i>GeoForum</i> , 45, 94-105. doi:http://dx.doi.org/10.1016/j.geoforum.2012.10.005 but there are many many others.	Thank you, this section has been updated accordingly in the second order draft.
Reggala, Maria Elena	No	1	21	911			Add: "Indigenous peoples have developed and maintained a sensitive perception to what the ordinary, modern eye cannot see. Living in close association with nature has sharpened their senses to natural phenomena, sign and energies that sent to them by the world around them. When out walking in the forest, they perceive not only the physical world of flora and fauna, but also the unseen spirits who live there, as a natural part of their world. The people show their respect for the invisible spirits by asking their permission to walk through their dwelling places, by inviting them to partake of food, by offering sacrificial	Thank you, we have added more content from the ILK dialogue workshop organized in support of the assessment to cover these aspects.
Brooks, Thomas	No	1	21	924	21	924	The clause "including those species that Western science considers as harmful, invasive, and alien" is problematic in several ways, above all in suggesting that ILK perspectives are monolithic, not diverse, which is directly refuted by Ch 4 (L184-186). Suggest simply deleting this clause. If retained, it needs to be rephrased accordingly. Moreover, the term "Western science" is unhelpful and divisive, so recommend deleting "Western" either way.	Thank you, this section has been updated accordingly in the second order draft.
Dunn, Christopher	No	1	22	344	22		The entry with <i>Juglans nigra</i> is confusing. This is a native tree to North America, but the entry makes it seem as if it is an IAS in that region.	Thank you. The name was deleted in the second order draft.
Abdul Wahid Arimiyaw	No	1	22	926	22	938	It is very good that this assessment is considering the input of ILP. However, there is the need to specify at what level this is being considered. ILP are geographically specific and therefore there is a bit of confusion in generalizing their contributions. A holistic methodological approach can be adopted or created to aid in the congregation of the ILP knowledges across geographical regions.	Thank you for your insights, authors have refined the approach and revised the text in the second order draft, taking your suggestion onboard.
Dunn, Christopher	No	1	22	926	22	942	This is a fairly good review. It would be useful to include some examples of what is meant by "culturally enriching," "reformulations of cultural practices," and of how views "vary."	Thank you for your positive comment.
Schaffner, Urs	No	1	22	934	22	936	The statement that "IPLCs adapt - change their diets, and livelihood strategies to accommodate IAS, providing resilience ultimately beneficial to their culture's long-term survival" should be clarified. There is no doubt that IPLCs adapt to IAS, just like they adapt to climate change. Whether this is ultimately beneficial to their culture's long-term survival depends on whether adaptation leads to stabilization of the social-ecological system or not. Adapting to an increased frequency of drought events is possible up to a certain extent, but if the frequency continues to increase the system is likely to collapse. By the way, adaptation by IPLC to IAS may also include abandonment of their culture (e.g. pastoralism).	Thank you, we have revised this section to emphasize that adaptation is often not a choice.
Mestre, Mireia	No	1	22	938	22	938	What are the "CBD Guiding principles"? The definition from IPBES also include interactions with humans, right?	Thanks for this suggested change. Included in footnote in the second order draft.
Maclean, Kirsten	No	1	22	949	22	949	Authors may like to also include discussion about how Indigenous groups may speak about 'riskmanagement' in this context. A further example from Australia can be found in: vercome it, with Indigenous Australians involved in biosecurity risk management. Maclean, K., C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. <i>Journal of Cultural Geography</i> that is likely to be published in early 2021.	Thank you, this paper has been added to the second order draft
White, Michael	No	1	22	954	22	958	Relevant for Covid-19 a wake-up call for humanity to look after our planet	Thank you for your comment.
Government of Ethiopia	Yes	1	23	344	23	344	Important to give some examples of notorious acacia spp. of Australian origin.	Thank you. Added in the second order draft
Hughes, Kevin	No	1	23	344	23	344	The example of <i>Ulva intestinalis</i> may not be entirely appropriate, as the alien status of this species has been questioned. See the footnote to McCarthy et al. 2019, which reads 'The status of <i>U. intestinalis</i> in the Antarctic region is uncertain. Clayton et al. suggested <i>U. intestinalis</i> may have been anthropogenically introduced, but subsequent publications have not mentioned potential non - native status of the species in the South Shetland Islands, and it appears to be considered native to sub - Antarctic islands.	Thank you. The species was deleted from the table in the second order draft.
Hughes, Kevin	No	1	23	344	23	344	AH McCarthy, I.S. Peak, KA Hughes, DC Aldridge. 2019. Antarctica: The final frontier for marine biological invasions. <i>Global change biology</i> 25 (7)	Thank you. The species was deleted from the table in the second order draft.
Government of Germany	Yes	1	23	974	23	974	The non-native status of <i>Hyas araneus</i> in Antarctica has also been questioned. See: Griffiths, H. J., Whittle, R. J., Roberts, S. J., Belcher, M., & Linse, K. (2013). Antarctic crabs: Invasion or endurance? <i>PLoS ONE</i> , 8(7), e66981. https://doi.org/10.1371/journal.pone.0066981	Thank you. The species was deleted from the table in the second order draft.
Mestre, Mireia	No	1	23	982	23	982	Clarification required: What is meant by "conventional systems"?	Thanks for this suggested change. Authors have included it in the second order draft.
Bliss, Cebuan	No	1	23	996	24	1045	What is NCP? Please use complete words here and elsewhere	Thank you for your comment. Acronyms will spell out in the second order draft (except for
Copp, Gordon	No	1	24	344	24		Suggest some acknowledgement of GQL for non-humans	Thank you, authors are following the definitions from the IPBES Conceptual Framework.
Government of Australia	Yes	1	24	344	24	345	Top of page, 1st row (i.e. 'Undaria pinnatifida'), the word 'kelp' needs to lose a 'p'; 3rd row (<i>Sargassum muticum</i>), I suggest 'Jap' be replaced by 'Japanese'; 4th row (same story on page 27, 3rd row), 'gibel' carp should be in all lower case, consistent with the other common names, e.g. rainbow trout. Speaking of 'rainbow trout', the parentheses around that common name should be regular text (i.e. not italics).	Thank you. Corrected in the second order draft.
Government of Ethiopia	Yes	1	24	344	24	344	Table 1.1 lists Atlantic salmon as an IAS in Australia. It is not listed as an IAS in any Australian jurisdiction.	Thanks for this suggested change. We have included it in the second order draft.
Government of Ethiopia	Yes	1	24	344	24	344	'Japanese wireweed' not 'Jap weed'.	Thank you. Corrected in the second order draft
Núñez Lendo, Carmela Isabel	No	1	24	344	24	345	Better to use the common name 'Asian Kelp' instead of 'Japanese kelp' .	Thanks for your comment. GBIF backbone was applied to define common and scientific names of the species in the second order draft
Government of Germany	Yes	1	24	1011	24	1012	"Negative impacts on economic sectors: proliferate on the aquaculture facilities (pillars, ropes and oysters) and thus reduce available light, water circulation and nutrient supplies to the detriment of oyster growth. I" -> I needs to be removed or the continuation of the text is missing	Thank you. Corrected in the second order draft.
Marchante, Elizabeth	No	1	24	1011	24	1012	Kindly provide some more insight, incl. reference on this recent study, or at least include a reference for further reading.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	24	1014	24	1015	Suggest to include a reference, since "one recent study" is mentioned.	Thanks for this suggested change. Authors have included it in the second order draft.
Willette, Demian	No	1	24	1014	24	1019	Question: Shouldn't this statement be moved up into the executive summary?	Thanks for this suggested change. Authors have included it in the second order draft.
Verma, Madhu	No	1	24	1015	24	1017	I feel this discussion on trade-offs among different constituents of well-being may benefit from a mention of the distinct weighing of trade-offs considered by urban dwelling populations and rural dwelling populations. Trade-offs may be perceived differently by these two groups, and even by an individual who transitions from rural to urban living.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	24	1030	24	1030	Are there any studies to substantiate this? Kindly quote them.	Thanks for this suggested change. Authors have included it in the second order draft.
Pandey, Vimal	No	1	24	1030	25	1045	In table 1.4 Constituents of human well-being and examples of their subcategories, please add in sub-category "Health" in the example of "infectious disease" the word "Absence" or any other positive notion, since all other examples are also phrased in a positive way.	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	25	344	25	346	A number of researches have done on invasive species based polluted/degraded land restoration, must be included in this section. Because it also help in land remediation and to obtain other ecosystem services at the same time. Please see references (10. Vimal Chandra Pandey# (2012). Invasive species based efficient green technology for phytoremediation of fly ash deposits. <i>Journal of Geochemical Exploration</i> 123: 13-18; 55. Vimal Chandra Pandey, Nayan Sahu, D.P. Singh, 2020. Physiological profiling of invasive plant species for ecological restoration of fly ash deposits. <i>Urban Forestry and Urban Greening</i> , 54.	Thank you, land restoration is explored in Chapter 5 and 6 in the second order draft
Dudgeon, David	No	1	25	344	25	344	Top of page, 1st row, ' <i>Salvelinus fontinalis</i> ' should be in italics. And, 'cyprinids' should be in all lower case.	Thank you. Corrected in the second order draft.
Dudgeon, David	No	1	25	344	25	344	I am unaware that <i>Craspedacusta</i> has any known impacts as an invasive	Thank you. Corrected in the second order draft.
Government of Ethiopia	Yes	1	25	344	25	344	The quagga mussel (<i>Dreissena bugensis</i>) needs to be mentioned here, alongside the Zebra mussel	Thank you. This species added in the second order draft.
Government of Ethiopia	Yes	1	25	344	25	344	' <i>Craspedacusta sowerbyi</i> ' not ' <i>Craspedacusta sowerbyi</i> '.	Thank you. Corrected in the second order draft
Government of Ethiopia	Yes	1	25	344	25	344	Good to check whether <i>Myxobolus cerebralis</i> is a disease causing agent or a disease by itself.	Thanks for this suggestion. Authors have checked and included it in the second order draft.
Linnamägi, Merike	No	1	25	344	25		Table 1.1 last row on the page.	Thank you. Corrected in the second order draft.
Linnamägi, Merike	No	1	25	344	25		States "Various alien species of plants and animals...", the very first example given is neither plant nor animal, it is oomycota which is a parasite. Needs to be rephrased (possibly just "various alien species").	Thank you. Corrected in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	25	344	25	345	Text "Transmission of diseases: host of parasites", all examples are of parasites themselves not hosts, could be phrased as "parasitic infections" or something	Thank you. Corrected in the second order draft.
Sharma, Gyan	No	1	25	344	26	344	Check spelling - Competition: competes with native species for place, food, light / Check also "Competition: competes with native species" for place, food, light	Thank you. Corrected in the second order draft.
Schaffner, Urs	No	1	25	1035		1039	Table 1.1: Section of Inland surface waters and water bodies/freshwater- Should also include species e.g. <i>Alternanthera philoxeroides</i> from Inland waters in India. As this species has negative impact on well-being and sustainable development along the Wular lake, India. Reference: Masoodi, A, Sengupta A, Khan F and Sharma GP (2013) Predicting the spread of alligator weed (<i>Alternanthera philoxeroides</i>) in Wular lake, India: A mathematical approach. <i>Ecological</i>	Thanks for your comment. Methodology was applied for all sections and we cannot add other articles in the table
Castro-Diez, Pilar	No	1	25	1039	25	1039	Rephrase, very difficult to read	Thanks for this suggested change. We have corrected it in the second order draft.
Kudelska, Theresa	No	1	25	1042	25	1044	I miss an earlier definition of NCP. I've been wondering about the difference between ecosystem services and NCP until this line.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	25	1047	27	1109	Within the context of NCP as well as considering the ecosystem services IAS provide (benefit) then the counter to this could be the impact that IAS have on ecosystem services through disease transmission etc, it is recommended that you alter the text to reflect this. There is a significant focus in this chapter on the role IAS have as vectors and sources of pathogens but IAS also act as vectors for parasites and cause direct physical injury, exacerbate existing medical conditions and cause allergic reactions; it may be helpful just to mention some or all of these impacts in this section even if you do not go in to any depth about them as it will give a fuller picture of the potential impact they can have on human health.	Thank you for your suggestion - authors have improved the clarity of the definition.
Pan, Xubin	No	1	25	1047	25	1047	In further discussions on zoonosis you may wish to also consider using the findings of the IPBES workshop on 'biodiversity and pandemics' (July 2020). In this context, you may also find the following publication useful: Johnson, C. K., P. L. Hitchens, T. S. Evans, T. Goldstein, K. Thomas, A. Clements, et al., 2015. Spillover and pandemic properties of zoonotic viruses with high host plasticity. <i>Scientific reports</i> 5: 14830.	Thanks for this suggested change. Authors have included it in the second order draft.
							Does the "Zoonosis" belong to the "Microbes"?	Thanks for this suggested change. Authors have included it in the second order draft.

Walton, Paul	No	1	25	1047	25	1109	Section on Zoonoses and Microbes - suggest more explicit inclusion of plant diseases is considered here. It's clear that there are plant health regimes in place across much of the world and that these may be in many contexts considered separate from structures and governance for IAS. However, my impression is that many of these plant health protocols focus on the agriculture, horticulture and commercial forestry industries, rather than wild plants and the habitats that they construct. Given IAS-related zoonoses affecting human populations are within scope of the assessment, in the light of issues such as Chalarra impacts on ash Fraxinus in Europe, it is perhaps sensible to include plant diseases - perhaps to some explicitly limited extent - also?	Thanks for this suggested change. Authors have included it in the second order draft.
Verma, Madhu	No	1	25	1048	27	1109	Vector borne diseases have relationship with temperature and precipitation pattern. Warming of climate will impact spread of vector borne diseases like	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	25	1053	25	1056	The placement of parenthesis is not correct. Difficult to read.	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	25	1056	25	1056	Why is Philip Hulme's first name given here and in the reference list? He is the same author on all of the Hulme et al. papers.	Thank you, citations and reference styles have been harmonized in the second order draft
Kudelska, Theresa	No	1	25	1056	25	1056	Potential additional reference relating to INNS acting as vectors for diseases etc: Rabitsch, W. Essl, F. & Schindler, S. 2017. The rise of Non-native vectors and reservoirs of human diseases. Impacts of Biological Invasion on Ecosystems Services. Invading Nature – Springer Series in Invasion Ecology 12. Pp.263	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	25	1057	25	1057	Correct the parenthesis and brackets.	Thank you for your comment, this has been corrected in the second order draft
Government of Bulgaria	Yes	1	25	1058	25	1061	In EU Parasites (including pathogenic bacteria, fungi and viruses) usually are considered in Aquatic Animal Health Directive (2006/88/EC; EU, 2006)	Thanks for this information.
Rüegg, Simon	No	1	25	1061	25	1068	The framing of EID is currently debated among experts. Particularly, the argument that 60% of EID are zoonoses is misleading. Zoonoses in the strictest sense of the term are diseases shared by animals and people. Classic examples are brucellosis and Qfever, where contact between (domestic) animals and humans must occur regularly for the disease to be transmitted. In the case of SARS-CoV2 it is likely that there was a singular event responsible for the spillover from bats into an intermediate species allowing for amplification of the strain. Since it circulates among people worldwide, the transmission from animals to people is rather irrelevant (not absent). Lessons to learn from COVID are thus very different from lessons to learn from e.g. brucellosis. The likelihood of spillover events depends much more on the drivers of biodiversity loss identified in other assessments than a mere zoonosis. I suggest Haider et al 2020 Frontiers in Public Health	Thanks for this information.
Mestre, Mireia	No	1	25	1065	25	1065	Please define zoonotic diseases. General public normally does not know the meaning of zoonosis	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	25	1067	25	1067	What "Disability Life Adjusted Years" mean? please rephrase this sentence.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	25	1071	26	1073	Question: Shouldn't this statement be moved up into the executive summary? In any case, it is important to insert references to support this statement.	Thank you for your comment, this point is further developed by Chapter 6 in the second order
Mestre, Mireia	No	1	25	1074	25	1074	Here and elsewhere: please use "Emerging Infectious Diseases" instead of "EID"	Thanks for this suggested change. Authors have included it in the second order draft.
Dudgeon, David	No	1	26	344	26	344	There are lots of places other than North America where water hyacinth is invasive (e.g. Lake Naivasha and Lake Victoria in Africa) and mentioned these localities would make this summary seem a bit less temperate focused.	Thanks for your comment. According to the methodology: only information from the cited article can be used
Mc Kay, Fernando	No	1	26	344	26	345	Table 1.1 Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently reircumscribe to include Eichhornia species (Marco O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commeliniales) sheds light on the necessity of its reircumscription and synopsis of Pontederia L. Phytol Keys 108: 25–83. doi:10.3897/phytokeys.108.27652	Thanks for your comment. GBIF backbone was applied to define common and scientific names of the species in the second order draft.
Castro-Diez, Pilar	No	1	26	1077	26	1081	Where is "box X"? What's the meaning of "(6-8)" and "(6)"? Looks like copy-pasted references.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Mestre, Mireia	No	1	26	1077	26	1077	I guess "Box X" will appear with the new version.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Mestre, Mireia	No	1	26	1077	26	1081	Interesting, but what "6-8" and "6" mean?	Thank you - this was pace holder text which we have now drafted in the second order draft.
Alaux, Christine	No	1	26	1081	26	1082	Fuzzy figure and illegible characters	Thank you - this was pace holder text which we have now drafted in the second order draft.
Josefsson, Melanie	No	1	26	1083	26	1083	Figure 1:12 is unreadable. Please simplify.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Government of Germany	Yes	1	26	1087	26	1087	Please provide a reference to the number in this statement.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Mestre, Mireia	No	1	26	1087	26	1090	All this information appears above. All this information needs to be more elaborated and include references.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Mestre, Mireia	No	1	26	1087	26	1087	This information is repeated above, at line 1065 (here it says 2/3 and above says 60%).	Thank you - this was pace holder text which we have now drafted in the second order draft.
Scalera, Riccardo	No	1	26	1087	26	1090	The example of zoonosis is formulated in a way that sound a bit generic and could be strengthened by adding a specific reference to a typical alien species, such as the American mink (Neovison vison), for example in relation to the current spread of Covid-19, as the species seems able to transmit the virus to humans and so increase the development of new strains, see USDA report here https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Denmark%20to%20Cull%20One%20Million%20Mink%20Due%20to%20Coronavirus%20The%20Hague%20Denmark%2010-06-2020	Thank you - this was pace holder text which we have now drafted in the second order draft.
Yiu, Evonne	No	1	26	1087	26	1090	I find these lines quite baseless to assume that Covid-19, even if originated from bats, then being transmitted to another animal then to human, would necessarily mean that bats are IAS or that the other animal is an IAS. They could be endemic species living in the wild, but humans transported them to the cities for consumption (and they may not have been spreading in the natural environment of the cities but kept captive). So it does not make sense to use this example and assume that they are IAS. Although I do agree IAS can be vectors of disease. Rather I will think a case where animals become a vector of disease/zoonosis because humans' destruction of their natural habitat due to development, as a result closing up the distance between humans and animals and increasing the risk of zoonosis. In such a case, the animals themselves are not invasive, rather, humans are the invasive species!	Thank you - this was pace holder text which we have now drafted in the second order draft.
Government of Germany	Yes	1	26	1090	26	1092	It is suggested to separate the last sentence of the paragraph "IAS can be vectors for disease" from the paragraph starting in line 1087 dealing with COVID-19, in order to avoid the impression that the bats or any other hosts are IAS. Instead, please merge this sentence with the following paragraph starting in line 1092 on the role of IAS in disease transmission.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Abdul Wahid Arimiyyaw	No	1	26	1092	26	1093	Throughout the GH 1, documents, there are some inconsistencies in the citation of authors works. For instance (Philip E. 1092 Hulme, 2014) as indicated in the quoted line 1092 -1093 can be correctly cited by just indicating the authors surname and the year of publication. I suggest these citation inconsis should be looked at please. Thank you.	Thank you, citations and reference styles have been harmonized in the second order draft
Dudgeon, David	No	1	27	344	27	344	See comment above: note zebra mussel should be singular.	Thank you. Corrected in the second order draft.
Government of Ethiopia	Yes	1	27	344	27	344	"Mediterranean mussel" not "Galician mussel"	Thank you. Corrected in the second order draft
Mestre, Mireia	No	1	27	1095	27	1105	First sentence says 6 reasons, but there are only 4.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Castro-Diez, Pilar	No	1	27	1097	27	1097	"May be" rather than "maybe".	Thank you - this was pace holder text which we have now drafted in the second order draft.
Schaffner, Urs	No	1	27	1097	27	1097	"May be" instead of "maybe"	Thanks for this suggested change. We have corrected it in the second order draft.
Abdul Wahid Arimiyyaw	No	1	27	1107	27	1109	For a good interdisciplinary approach to GQL, there is the need to incorporate Alternative or Traditional medicinal health care into national health care policies. This assessment can advocate for this incorporation to promote GQL for all.	Thank you for your comment.
Mestre, Mireia	No	1	27	1109	27	1109	Here and elsewhere: please use "Good Quality of Life" instead of "GQL"	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	27	1112	27	1116	It is suggested to explain the One Health approach in more detail, comprising relevant organizations (FAO-OIE-WHO Tripartite Alliance), its genesis and objectives.	Thank you for your comment, the text has been revised, and the One Health approach is further discussed in Chapter 6 in the second order draft
Mestre, Mireia	No	1	27	1112	27	1112	Here and elsewhere: please use "Convention Biological Diversity" instead of CBD.	Thanks for this suggested change. Authors have included it in the second order draft.
Schaffner, Urs	No	1	27	1113	27	1114	Usually "One Health" also includes plant health	Thank you, we have revised this section in the second order draft.
Mestre, Mireia	No	1	27	1119	27	1122	Please rephrase. The problem is in this part: "but present a visual representation (Fig 1.13) below which".	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	28	344	28	346	The late T. Oruz has an accent missing from his name (including in the reference list).	Thank you. Corrected in the second order draft.
White, Michael	No	1	28	344	28	345	Table 1.1 Deep sea, mention Palestine not just Israel	Thanks for your comment. The information presented in this table is extracted from the papers.
Mestre, Mireia	No	1	28	1126	28	1126	This figure is messy. It is not clear what are the links, why are they linked, what are the causes, the consequences and what parts correspond to CBDs, human health or ecosystems. The only obvious part is the IAS in the middle.	Thanks for this suggested change. Authors have included it in the second order draft.
Castano Arboleda, Nicolás	No	1	28	1146	28	1146	Add reference (van Kleunen et al. 2015. Global exchange and accumulation of non-native plants. Nature 525. doi:10.1038/nature14910)	Thanks for this suggested change. Authors have included it in the second order draft.
Peterson, Garry	No	1	28	1201	28	1132	This text on models and scenarios should be consistent with text in other chapters without being repetitive. Introduction should explain more about how scenarios tie together different chapters and state of knowledge and gaps.	Thanks for this suggested change. Authors have included it in the second order draft.
Copp, Gordon	No	1	29	344	29	346	3rd row (Sargassum muticum), I suggest 'Jap' be replaced by 'Japanese'	Thank you. Corrected in the second order draft.
Government of Australia	Yes	1	29	344	29	344	In table remove "Tasmania"	Thanks for this suggested change. We have included it in the second order draft.
Alaux, Christine	No	1	29	346	1	347	Numbering of pages to review: we go from page 29 to page 1	Thank you, this has been fixed in the second order draft
Ash, Mathews	No	1	29	346	29	346	The page number has been reset after the Table 1.1.	Thank you, this has been fixed in the second order draft
Setsaas, Trine Hay	No	1	29	346	1	347	The page numbering appears to be wrong following box 1.2. What should be page 30 is now page 5, if not mistaken.	Thank you, this has been fixed in the second order draft
Government of Bulgaria	Yes	1	29	1167	29	1167	Non-Indigenous Species (NIS) in the context of the Common Implementation Strategy of the Marine Strategy Framework Directive - Descriptor 2 and this can be included in the text.	Thank you, this has been added in the second order draft
Acosta-Michlik, Lilibeth	No	1	29	1168	29	1186	This paragraph dedicated to explain the scenarios and models in the different chapters of the assessment is very useful. Dedicating a section for scenarios and models in each chapter is also very convenient for the readers. I suggest to do it also for chapter 3, which in this FOD did not put a placeholder for the section on scenarios and model. However, while there is a dedicated section in the chapter, it is not clear from the FOD chapters whether this section will contain analysis of scenarios and models which were assessed in the earlier sections. The FOD chapters mostly contains a literature review of scenarios and models, and	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	29	1168	29	1186	It is weird this new presentation of chapters in the context of "scenarios and modelling", when the chapters were already introduced in pages 8-9.	Thanks for this suggested change. Authors have included it in the second order draft.
Castro-Diez, Pilar	No	1	29	1188	30	1201	This paragraph apparently explains the searching methodology used across chapters. But it appears "out of the blue". I'm having problems to follow this section (1.7). I still don't understand what do you mean by "cross-cutting theme".	Thanks for this suggested change. Authors have included it in the second order draft.
Taki, Hisotomo	No	1	30	346	30	346	From here, page numbers are odds.	Thank you, this has been fixed in the second order draft
Klotz, Stefan	No	1	30	347	38	347	The main problem of the different interpretations of GBIF data is the data quality. This is far from being sufficient today, as the entry of data is not representative. Several countries are over-represented, others are completely missing. The current use leads to misinterpretations. In the past, mostly rare species were mapped. Attention to invasive species has come very late. Therefore the current increase in data is not necessarily a sign of faster invasion processes. The Acacia dealbata map is a typical example of erratic data.	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mireia	No	1	30	347	30	347	Why the title of Box 1.2 refers only to the genus Acacia if it includes many other examples?	Thank you. Corrected in the second order draft.

Takahashi, Yasuo	No	1	30	347	34	473	Could you clarify why these IAS were selected as examples presented in the Box? Furthermore, it is suggested that reporting items (e.g., native range, introduction, establishment and spread, etc) should be consistent across different species. For example, socio-economic benefits of <i>Sargassum muticum</i> was described, while those of <i>Acacia</i> were not mentioned. In reality, some invasive alien <i>Acacia</i> have high socio-economic importance in some African countries.	Thank you, this box has been deleted in the second order draft.
Castaño Arboleda, Nicolás	No	1	30	1203	31	1257	I miss an allusion to the governmental decisions that have led to the large amount of IAS.	Thanks for this suggested change. Authors have included it in the second order draft.
Willette, Demian	No	1	30	1217	31	1260	Notably the term 'anthropocene' is only mentioned in the final paragraphs of Chapter 1. As the opening chapter of the IAS assessment, I would have expected to encounter this term earlier, as well as a brief definition when first mentioned. Could this be added?	Thanks for this suggested change. Authors have included it in the second order draft.
Lope-Alzina, Diana	No	1	30	1227	11	1232	Adaptation importance is here mentioned; something from here could be included in the IAS definition previously cited.	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mircea	No	1	30	1227	30	1227	IAS can not cause benefits, because if they cause benefits, they are not IAS, they are just AS. This report is to alert about IAS and thus stating that they cause benefits is contradictory to the objectives of this report and the definition of IAS.	Thanks for this suggested change. Authors have considered this aspect throughout the assessment in the second order draft
Mestre, Mircea	No	1	30	1229	30	1229	Fascinating is not a word for a report. Better use it for press or novels	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mircea	No	1	30	1234	31	1243	Yes, but the development of technology (specially the consume of technology) is one of the main factors enhancing global change, habitat loss etc. Please do not say that technology is part of the solution, because it is clearly part of the problem.	Thanks for this suggested change. Authors have considered this aspect throughout the assessment in the second order draft
Guha, Asi	No	1	31	1245	31	1251	Small island nations are endangered due to rise in sea level owing to climate change. Whether that has an impact on spread of IAS can be an interesting topic	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mircea	No	1	31	1245	31	1251	Other developing states that are not islands face similar problems. <There are biogeographical barriers beyond seawater (for example mountains)	Thanks for this suggested change. Authors have included it in the second order draft.
Walton, Paul	No	1	31	1245	31	1251	Islands are a welcome Common Theme - and agree that SIDS are a key element of the islands and IAS problem. But so too are islands that are in themselves not distinct 'states'. Suggest that biogeographical realities may be better reflected in taking islands per se as the Common Theme, rather than the narrower, politically defined SIDS unit. Further suggest that freshwater habitats exhibit comparable insular characteristics and are subject to analogous (though different) IAS vulnerabilities and pressures. A Freshwater Common Theme would seem a helpful inclusion.	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Germany	Yes	1	31	1248	31	1251	Since there are different categories of protected areas with different types of management or intervention intensity, even in protected areas many types of uses are allowed. Thus, the mentioned examples of illegal wildlife trade and illegal fishing are just two of the potential pathways for the intended/unintended introduction of IAS. Thus, it is strongly recommended to insert at least 'e.g.' after "accidental invasions".	Thanks for this suggested change. Authors have included it in the second order draft.
Mestre, Mircea	No	1	31	1248	31	1248	naming protected areas is interesting, but it is not correct to cite them here and in this way (linked only to SIDS). It is also not appropriate to talk about the possible threats that protected areas face (e.g. problems as illegal fishing) as if they were intrinsic problems.	Thanks for this suggested change. Authors have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	1	31	1248	31	1251	This sentence is not clear, and it doesn't make sense. How MPAs avoid IAS, and which is the link to pouching? Pouching is not promoted because of MPAs, it happens because there is not enforcement to protect the MPAs. Fisherman/Pouchers will go to both the protected and unprotected marine areas.	Thanks for this suggested change. Authors have included it in the second order draft.
Josefsson, Melanie	No	1	31	1255	25	1256	What is meant by "evidence based biosecurity policy-making" and how can it be used in a situation where evidence is often lacking?	Thank you, the text has been revised in the second order draft
Singh, Baljinder	No	1	38	444	39	473	In addition to the well-characterized negative impacts of the zebra mussel, <i>Dreissena polymorpha</i> , perhaps a short mention of the modest, but, to some, significant, benefits, involving water clarity, and correspondingly, positive impacts, to salmon fisheries, might also be in order. The following NPR article might be useful: https://www.npr.org/templates/story/story.php?storyId=87843464	Thank you, this box has been deleted in the second order draft.
Copp, Gordon	No	1	38	1558	38	1558	Why is Philip Hulme's first name given here in the reference? He is the same author on all three of the Hulme et al. articles.	Thank you, citations and reference styles have been harmonized in the second order draft
Volpedo, Alejandra	No	1	41	504	43	546	Item 1.4.1 should be deepened and related to the development of global transport (shiplanes and cross-country trade routes).	Thank you - the section is edited in the second order draft.
Kühn, Ingolf	No	1	41	516	42	517	I think the first definition was rather Hulme PE, Bacher S, Kenis M, Klotz S, Kühn I, Minchin D, Nentwig W, Olenin S, Panov V, Pergl J, Pyšek P, Roques A, Sol D, Solarz W, Vilà M (2008) Grasping at the routes of biological invasions: a framework for integrating pathways into policy. <i>Journal of Applied Ecology</i> 45: 403-414. doi: 10.1111/j.1365-2664.2007.01442.x.	Thanks for this suggested change. Authors have included it in the second order draft.
Catford, Jane	No	1	44	561	44	577	This section seems too brief and does not cover all key factors that affect establishment (and literature cited seems a little bird-heavy). I suggest that key conceptual frameworks and invasion theories are relied upon more heavily here. In particular, it seems important to mention important concepts of species invasiveness and ecosystem invasibility, and also acknowledge that invasion hypotheses are essentially underpinned by 3 factors: propagule pressure, abiotic characteristics and biotic characteristics (the latter of which includes invaders and recipient communities) - all of which need to be amenable, if not favourable, for invaders to establish successfully. selection of references: Alpert, P., Bone, E. & Holzapfel, C. (2000) Invasiveness, invasibility, and the role of environmental stress in the spread of non-native plants. <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 3, 52-66. Catford, J. A., Jansson, R. & Nilsson, C. (2009) Reducing redundancy in invasion ecology by integrating hypotheses into a single theoretical framework. <i>Diversity & Distributions</i> , 15, 22-40. Enders, M., Havemann, F., Ruland, F., Bernard-Verdier, M., Catford, J. A., Gómez-Aparicio, L., Haider, S., Heger, T., Kueffer, C., Kühn, I., Meyerson, L. A., Musseau, C., Novoa, A., Ricciardi, A., Sagouis, A., Schitto, C., Strayer, D. L., Vilà, M., Essl, F., Hulme, P. E., van Kleunen, M., Kumschick, S., Lockwood, J. L., Mabey, A. L., McGeoch, M. A., Palma, E., Pyšek, P., Saul, W.-C., Yannelli, F. A. & Jeschke, J. M. (2020) A conceptual map of invasion biology: Integrating hypotheses into a consensus network. <i>Global Ecology and Biogeography</i> , 29, 978-991. Lonsdale, W. M. (1999) Global patterns of plant invasions and the concept of invasibility. <i>Ecology</i> , 80, 1522-1536.	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	44	569	44	576	All this is nicely summarized in the MAFIA framework: Pyšek P, Bacher S, Kühn I, Novoa A, Catford J, Hulme P, Pergl J, Richardson D, Wilson JR, Blackburn T (2020) Macroecological Framework for Invasive Aliens (MAFIA): disentangling large-scale context-dependence in biological invasions NEOBOTIA, in press. DOI: 10.3897/neobiota.62.52787	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	44	585	44	585	NOT Spatial autocorrelation is the consequence, not the reason. The reason are dispersal processes, which are distance related, and resulting dispersal barriers. Even spatially clustered (or autocorrelated) environmental factors might lead to this pattern, but the way it is written in the text is incorrect.	Thank you. Deleted "due to spatial autocorrelation" in the second order draft.
Catford, Jane	No	1	44	590	45	591	This statement is misleading as currently written, as it sounds as though invasiveness = dispersal and reproductive capacity. More generally, I think more can be made of species invasiveness (based on my skim read of all of chapters 106, the concept seemed barely touched upon, despite its prominence in invasion science as a concept). In addition to many of the seminal papers on this, here are some recent references that interrogate the concept of invasiveness further, highlighting that we use the concept in many different ways and that different traits are likely to be associated with these different dimensions of invasiveness [this is an active area of research, and - based on papers currently under review across a few journals that I am aware of - further work (from different research groups and regions of the world) in this area will be published in the next year]. Carboni, M., Münkeniller, T., Lavergne, S., Choler, P., Borgy, B., Violle, C., Essl, F., Roquet, C., Munoz, F., DivGrass, C. & Thuiller, W. (2016) What it takes to invade grassland ecosystems: traits, introduction history and filtering processes. <i>Ecology Letters</i> , 19, 219-229. Catford, J. A., Baumgartner, J. B., Vesik, P. A., White, M., Buckley, Y. M. & McCarthy, M. A. (2016) Disentangling the four demographic dimensions of species invasiveness. <i>Journal of Ecology</i> , 104, 1745-1758. Colautti, R. I. & MacIsaac, H. J. (2004) A neutral terminology to define 'invasive' species. <i>Diversity and Distributions</i> , 10, 134-141. Palma, E., Vesik, P. A., Baumgartner, J. B., White, M. & Catford, J. A. (minor revision) Functional traits reflect multiple ways to be invasive. <i>Ecology</i> . van Kleunen, M., Bossdorf, O. & Dawson, W. (2018) The Ecology and Evolution of Alien Plants. <i>Annual Review of Ecology, Evolution, and Systematics</i> , 49, null.	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	45	592	45	592	What exactly do you mean by "niche opportunities"? The term "niche" in relation to invasions is one of the most misapplied concepts. Niche is an attribute of species (i.e. the n-dimensional hypervolume that encompasses species requirements; Hutchinson GE (1957) Concluding remarks. <i>Cold Spring Harbor Symposium on Quantitative Biology</i> 22: 427.). It is therefore not an attribute of a landscape and hence "empty niches" or similar do not exist. There are, however, unused (or surplus) resources to be employed. I assume that here you mean that a species has the opportunity to use so far unused resources. "Niche"	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	1	45	593	45	596	Suggest that invasion theory frameworks are used/ relied on more heavily here, e.g. Catford, J. A., Jansson, R. & Nilsson, C. (2009) Reducing redundancy in invasion ecology by integrating hypotheses into a single theoretical framework. <i>Diversity & Distributions</i> , 15, 22-40. Enders, M., Havemann, F., Ruland, F., Bernard-Verdier, M., Catford, J. A., Gómez-Aparicio, L., Haider, S., Heger, T., Kueffer, C., Kühn, I., Meyerson, L. A., Musseau, C., Novoa, A., Ricciardi, A., Sagouis, A., Schitto, C., Strayer, D. L., Vilà, M., Essl, F., Hulme, P. E., van Kleunen, M., Kumschick, S., Lockwood, J. L., Mabey, A. L., McGeoch, M. A., Palma, E., Pyšek, P., Saul, W.-C., Yannelli, F. A. & Jeschke, J. M. (2020) A conceptual map of invasion biology: Integrating hypotheses into a consensus network. <i>Global Ecology and Biogeography</i> , 29, 978-991.	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	1	45	604	45	606	Suggest that this seminal paper is referred to: MacDougall, A. S. & Turkington, R. (2005) Are invasive species the drivers or passengers of change in degraded ecosystems? <i>Ecology</i> , 86, 42-55.	Thanks for this suggested change. Authors have included it in the second order draft.
Catford, Jane	No	1	45	639	45	646	Might be helpful to explicitly refer to transformers and ecological engineers here, with incorporation of a couple more examples. E.g. Richardson, D. M., Pyšek, P., Rejmánek, M., Barbour, M. G., Panetta, F. D. & West, C. J. (2000) Naturalization and invasion of alien plants: concepts and definitions. <i>Diversity and Distributions</i> , 6, 93-107.	Thanks for this suggested change. Authors have included it in the second order draft.
Catford, Jane	No	1	45	648	45	649	See recent paper proposing conceptual framework for context dependence: Pyšek, P., Bacher, S., Kühn, I., Novoa, A., Catford, J. A., Hulme, P. E., Pergl, J., Richardson, D. M., Wilson, J. R. U. & Blackburn, T. M. (2020) Macroecological Framework for Invasive Aliens (MAFIA): disentangling large-scale context dependence in biological invasions. <i>NeoBiota</i> , 62, 407-461.	Thanks for this suggested change. Authors have included it in the second order draft.
Singh, Baljinder	No	1	46	631	46	658	I wholly concur on the inherent complexities at play here, at the ecological, social, & socioeconomic & socio-political levels. Consider including the following reference here: "Don't judge species on their origins": https://doi.org/10.1038/474153a . The sad reality of scientists abandoning their work on Asian carp (Box 1.5, page 49) is a potent reminder of the formidable challenges we all face in effectively & efficiently communicating what are essentially chaotic complexities to the general public.	Thank you for your comment. Authors have expanded the definition text in the second order draft.
Kühn, Ingolf	No	1	47	661	47	662	I think the first ones formalized this were Parker IM, Simberloff D, Lonsdale WM, Goodell K, Wonham M, Kareiva P, Williamson MH, Von Holle B, Moyle PB, Golubov J (1999) Impact: toward a framework for understanding the ecological effects of invaders. <i>Biological Invasions</i> 1: 3-19.	Thanks for this suggested change. Authors have included it in the second order draft.
Zisis, Marcus	No	1	47	680	47	695	The box on pollinators is unclear. What shall particularly be the negative impacts of non-native species which are serve as food for pollinators, for instance, Canada Goldenrod (<i>Solidago canadensis</i>) in Europe?	Thanks for this suggested change. Authors have included it in the second order draft.

Kühn, Ingolf	No	1	48	666	48	669	Leung et al. (2012) built a nice framework that allows to quantify uncertainty across the steps of the invasion process: Leung B, Roura-Pascal N, Bacher S, Heikkilä J, Brotons L, Burgman MA, Dehnen-Schmutz K, Essl F, Hulme PE, Richardson DM, Sol D, Vilà M (2012) TEASing apart alien species risk assessments: a framework for best practices. <i>Ecology Letters</i> 15: 1475-1493. doi: 10.1111/ele.12003.	Thanks for this suggested change. Authors have included it in the second order draft.
Kühn, Ingolf	No	1	48	705	49	707	And the relationship between traits, impacts and impacted socio-economic sectors: Milanović M, Knapp S, Pyšek P, Kühn I (2020) Linking traits of invasive plants with ecosystem services and disservices. <i>Ecosystem Services</i> 42: 101072. doi: 10.1016/j.ecoser.2020.101072.	Thanks for this suggested change. Authors have included it in the second order draft.
Blackburn, Tim	No	1	48	1956	48	1956	Only list initial of author's first name.	Thank you, citations and reference styles have been harmonized in the second order draft
Volpedo, Alejandra	No	1	51	808	51	808	The figure corresponding to item 1.6.1 is not of good quality so it cannot be read.	Thank you, the figure has been deleted
García Martínez, Margarita	No	1	52	823	52	824	The text says: "There are also direct effects of IAS on GQL that are not mediated by changes in nature, but that affect human health (e.g. parasites and contagious emergent diseases)". 1) There is not a reference to defend this argument. On the other hand 2) I consider this argument is not totally true. There are effects of IAS on GQL that (affect human health) that are derived from changes or negative effects on nature. (WHO publication. 2005. Ecosistemas y bienestar humano: Síntesis sobre salud. Un informe de la Evaluación de los Ecosistemas del Milenio (EM) / Equipo de autores principales: Carlos Corvalán, Simon Hales y Anthony McMichael; equipo extendido de autores: Colin Butler [et al.]; revisores: José Sarukhán [et al.], p. 9 Fig. SDM1 and page 12. I would change the paragraph as "There are also direct effects of IAS on GQL that could be mediated or not by changes in nature, but that affect human health (e.g.	Thanks for this suggested change. Authors have included it in the second order draft.
García Martínez, Margarita	No	1	53	832	53	832	Figure 1.10 To consider with the autor, the part in which says "Direct Impacts on health?". I would remove the question marks, and maybe add "Direct and Indirect Impacts on health".	Thank you for your comment. Authors have revised these figures in the second order draft
García Martínez, Margarita	No	1	53	832	53	832	Figure 1.10 the source is from Diaz et al. 2015, not Figure 1.9.	Thank you for your comment, agreed.
Singh, Balinder	No	1	57	1008	58	1011	It seems that a relevant item of literature has been inadvertently omitted where the sentence reads "at least one recent study".	Thanks for this suggested change. Authors have included it in the second order draft.
Volpedo, Alejandra	No	1	60	1083	60	1083	The figure 1.12 is not of good quality so it cannot be read.	Thank you - this was pace holder text which we have now drafted in the second order draft.
Kühn, Ingolf	No	1	63	1156	63	1166	Though frequently applied, species distribution models (or more general, correlative, regression based models) ignore one basic assumption that is usually not fulfilled by alien (invasive) species, i.e. being in equilibrium with the environmental conditions. Hence such models are inherently bad in transferability, i.e. in making predictions. Capinha C, Essl F, Seebens H, Pereira HM, Kühn I (2018) Models of alien species richness show moderate predictive accuracy and poor transferability. <i>NEOBOTA</i> 38: 77-96. doi: 10.3897/neobota.38.23518. Liu C, Wolter C, Xian W, Jeschke JM (2020) Species distribution models have limited spatial transferability for invasive species. <i>Ecol Lett.</i> doi: 10.1111/ele.13577. Moreover, it seems important not only which species or algorithm used, but also which environmental data source (e.g. which specific database on climate) was used, independent of the chosen predictor variables: Datta A, Schweiger O, Kühn I (2020) Origin of climatic data can determine the transferability of species distribution models. <i>NEOBOTA</i> 59: 61-76. doi:	Thanks for this suggested change. Authors have included it in the second order draft.
Takahashi, Yasuo	No	1	117	604	117	610	The reference to Figure 1.7 should be inserted in a para between the lines 604 and 610 which explains "interactions between IAS and other drivers"	Thanks for this suggested change. Authors have included it in the second order draft.
Takahashi, Yasuo	No	1	127	651	127	658	These sentences probably require a citation. I would recommend inserting: (L652-) "human culture, incorporating behavior, people's uses of IAS, government policies ...". The following paper provides evidences for this insertion: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy.</i> https://doi.org/10.1016/j.envsci.2020.06.014	Thanks for this suggested change. Authors have included it in the second order draft.
Takahashi, Yasuo	No	1	137	702	137	703	Recommend to add another citation to the sentence "indeed, perceptions are becoming an increasingly important theme ...". The following paper is explicit about the possible conflicts over IAS control when stakeholders hold different values against IAS: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy.</i>	Thanks for this suggested change. Authors have included it in the second order draft.
Albert, Arnaud	No	1	16 (11)	261	16 (11)	261	Please indicate "economic impacts" in "health, social, or cultural impacts on human communities". Money is the world's rule, in order to concern more decision-makers.	Thanks for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Albert, Arnaud	No	1	16 (11)	263	16 (11)	266	This definition is a bit embarrassing. All alien species having spread and impacts should be considered as invasive alien species, whatever the type of impacts. In this definition, only ecological impacts (on biodiversity) are taken in account, whereas spreading alien species with only/mainly impacts on economy or health should also be taken in account, to get inter-disciplinarity between environment, agriculture and health ministries for instance. Otherwise, Covid-19, with low impacts on local ecosystems and species, won't be an invasive alien microorganism, thus an IAS to a large extent.	Thank you for your comment. The definition of invasive alien species for this assessment was approved by IPBES member states and may not be changed.
Albert, Arnaud	No	1	16 (11)	273	16 (11)	273	Perceptions? Yes there are, but there also are some facts with real societal impacts. Some animal species seem to be kind for citizens but with real ecological problems. Why create this scepticism? Be also factual. But furthermore, one of the problem of this topic is the balance/trade-off between negative/detrimental facts and positive/beneficial facts.	Thank you for your comment, authors have revised the section and added a paragraph on societal and ecological complexities in the second order draft.
Takahashi, Yasuo	No	1	187	816	187	816	Recommend insertion before "As IAS modify nature. ...": "In reality IAS is an inseparable part of nature. They originate from native species in their native ranges. A number of IAS provide food, materials and other NCP to people. However, for clarity of the assessment framework, the assessment locates IAS within the Direct Drivers component of the IPBES Conceptual Framework.	Thank you, this has been clarified in an earlier section conceptualizing the different drivers
Takahashi, Yasuo	No	1	217	891	217	891	Suggest insertion: economics including trade.	Thanks for this suggested change. Authors have included it in the second order draft.
Takahashi, Yasuo	No	1	217	894	217	895	Cannot figure out what exactly is meant by "the place of IAS in society". Is that the values of IAS in society?	Thanks for this suggested change. Authors have included it in the second order draft.
Takahashi, Yasuo	No	1	247	1017	247	1019	Overall text under section 1.7.3 lacks citations. The following paper can be cited to provide the basis for the statement "communities will not necessarily be united ...": Shackleton et al. 2019. The human and social dimensions of invasion science and management. <i>J. Environ. Manage.</i> 229, 1-9. https://doi.org/10.1016/j.jenvman.2018.08.041 ; Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy.</i> https://doi.org/10.1016/j.envsci.2020.06.014 .	Thanks for this suggested change. Authors have included it in the second order draft.
Albert, Arnaud	No	1	6 (1)	8	6 (1)	9	There should be a precision on "human well-being": on human health but also on human activities, with economic impacts such as for instance crop losses and management costs.	Thank you very much for your comment.
Albert, Arnaud	No	1	6 (1)	11	6 (1)	11	First records of what? Records of occurrences/introductions in the environment of alien species? References to the two papers of Seebens et al. with past rate (No saturation in the accumulation of alien species worldwide, 2017) and future rate (Projecting the continental accumulation of alien species through to 2050).	Thank you very much for your comment- authors have rephrased to clarify this point in the second order draft.
Takahashi, Yasuo	No	1	67	493	67	493	Perhaps Figure 1.7 doesn't have to be referred to in this paragraph, as the paragraph does not sufficiently explain Figure 1.7. Instead, the reference to Figure 1.7 could be inserted in a para between the lines 604 and 610 which explains "interactions between IAS and other drivers"	Thank you, the figure has been removed in the second order draft
Takahashi, Yasuo	No	1	77	499	77	499	Recommend to integrate Fig 1.7 into Fig. 1.6	Thank you, the figure has been removed in the second order draft
Takahashi, Yasuo	No	1	77	514	97	545	Box 1.3 is not referred to in text. The contents of Box 1.3 may generate confusion, as the terminologies and explanation on 'pathways' in Box 1.3 are not consistent with the 'unified framework for biological invasion'. Explanation in text may be needed if the box remains here.	Thanks for this suggested change. Authors have included it in the second order draft.
Albert, Arnaud	No	1	8 (3)	74	8 (3)	76	There should be a precision on "human well-being": on human health but also on human activities, with economic impacts such as for instance crop losses and management costs.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Albert, Arnaud	No	1	8 (3)	88	8 (3)	89	First records of what? Records of occurrences/introductions in the environment of alien species? References to the two papers of Seebens et al. with past rate (No saturation in the accumulation of alien species worldwide, 2017) and future rate (Projecting the continental accumulation of alien species through to 2050).	Thank you very much for this suggested change of wording. It is an improvement and authors have adopted it in the second order draft.
Albert, Arnaud	No	1	8 (3)	91	8 (3)	92	Please explain more how climate change could increase both introduction and spread of IAS.	Thank you very much for this suggested change. Authors have included it in the second order draft.
Albert, Arnaud	No	1	9 (4)	108	9 (4)	108	Global or local extinctions globally?	Thank you for your comment
Albert, Arnaud	No	1	9 (4)	115	9 (4)	116	Poorly quantified and understood by decision-makers? What about the CBD in 1992, MEA in 2005 and Aichi in 2011 (your figure 1.2 as an evidence)? It also depends on the continents, regions and countries. In the European Union, with an european regulation, several national strategies and several legal acts, I am not so sure that this sentence is appropriate. But yes there sometimes is a gap between texts/policies and actions/measurements, between wishes and means, that's a part of the problem. And for sure this IPBES IAS assessment will be useful to make the point.	Thanks for this suggested change. Authors have included it in the second order draft.
Dupont, Lise	No	1	Box 1.2	386		412	The review of Hendrix et al. 2008 <i>Annu. Rev. Ecol. Syst.</i> 39: 593-613 should be added as reference for invasive earthworms. Rather than focusing on the genus <i>Lumbricus</i> (which is too restrictive because several species of invasive earthworms cited in the table p16 do not belong to the genus <i>Lumbricus</i>), you should rather focus on the Lumbricidae family.	Thank you, this box has been deleted in the second order draft.
Dupont, Lise	No	1	Box 1.2	393			I am surprised by this native range (western half of the Pyrenees) and would like to see a reference. I would instead indicate only Europe.	Thank you, this box has been deleted in the second order draft.
Dupont, Lise	No	1	Box 1.2	394			Earthworms are transported via the soil and this is the first time I read that they can be introduced by zoos. I did not find the mention to the zoo in the references of Bohlen 2004 and Salmarsch 2016. The reference for this claim should be added.	Thank you, this box has been deleted in the second order draft.
Marchante, Elizabete	No	1	Box 1.2 (page 1)	347	Box 1.2 (page 3)	412	Text and figures need to be revised as they are incomplete and sometimes incorrect - e.g., considering that there is vast literature and even and special issues about <i>Acacia</i> spp., the references used (not specifically on acacias) are not the most complete and comprehensive; there are numerous <i>Acacia</i> species invasive and if the title says "genus <i>Acacia</i> ", the native range is much broader than only "Southeast Australia", the impacts are incomplete (missing egg allergies, impacts on plant communities, on ecological webs, control costs, etc. etc); the captions are incomplete (missing countries) - I understand this chapter is not about impacts, but if <i>Acacias</i> (and others) are used to illustrate, info could be more complete.	Thank you, this box has been deleted in the second order draft.
Smith, Emily	No	1	Box 1.3 (p7)	515	Box 1.3 (p7)	526	Maybe it would be good to add in a definition of 'vectors' too, to help distinguish the difference between pathways and vectors.	Thanks for this suggested change. Authors have included it in the second order draft.
Marchante, Elizabete	No	1	Box 1.3 (page 7)	514	Box 1.3 (page 7)	514	This box (and others) could be referred to in the text, relating to the stages	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Portugal	Yes	1		125		125	The phrase "(...) but also to consider benefits where relevant (...)" should be rewritten. Considering that invasive alien species (IAS) can establish themselves in a new environment, reproduce and spread aggressively they will always have a negative impact on biological diversity found outside their (IAS) native geographical range. This point should be clearly separated from the fact that certain invasive alien species are used by humankind for food, raw material, etc. Presumably the benefits referred to in this phrase correspond to human-related benefits. Consequently, the phrase should be substituted by "(...) but also to consider human-perceived benefits where relevant (...)".	Thank you for this suggestion - authors have considered this throughout in the second order draft.
Government of Portugal	Yes	1		276		278	In the sentence "Impacts can be direct or indirect and may be detrimental or beneficial varying in magnitude through time and across space (Ricciardi et al., 2013; Table 1.1)," once again the point should be made that IAS impact biodiversity negatively and that societal impacts can be either negative or positive.	Thanks for this suggested change. We have included it in the second order draft.
Government of Portugal	Yes	1		404		404	The introduction of IAS outside their natural range is always negative for biodiversity as they will be 'biological polluting agents' of native communities, occupy physical space and use resources that will no longer be available to native species, among other impacts. In light of the above and what is written in lines 398 to 403 how can positive environmental impacts be attributed to this IAS? The phrase "Positive environmental impacts" should be substituted by something along the lines of "Human-perceived environmental benefits".	Thank you, this has been revised and further discussed in Chapter 1 in the second order draft

Rüegg, Simon	No	1			1112		The authors might find a manuscript useful that articulates the links between the one health approach and sustainability:	Thanks for this suggested change. Authors have included it in the second order draft.
Government of Portugal	Yes	1			1178	1179	How can IAS have positive impacts on nature if they are one of the five main direct drivers of biodiversity loss?	Thanks for this suggested change. We have included it in the second order draft.
Ahimbisbiwe, Imran	No	2	0	0	0	0	Chapter 2 is not necessary since the treaty is at the implementation stage. The report should avoid lengthy descriptions of historical origins of IAS and rather give well thought out policy options for their control and/ or eradication. Details of taxonomy and origins come into play when addressing a specific alien species in specified place and time.	Thank you very much for your comment. We are following the assessment structure laid out in the scoping document (which was approved by the IPBES member states). Please find copy of the scoping document approved by IPBES member states using the link below; https://ipbes.net/sites/default/files/ipbes-6-inf-10_en.pdf
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	2	0	0	0	0	Chapter 2 on status and trends contains text in section 2.2 on indigenous peoples' cultural values and spiritual relationships with wetlands. It was recommended that this should be extended to all environments, including coastal and marine, which include very culturally important places.	Thank you for your comment. We included now two boxes related to the topic of indigenous people, one about invasive alien species found on land managed by indigenous people and another one on good quality of life in the second order draft. Please note that chapter 2 does not address cultural values as it focuses on the trends and status of alien species.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	2	0	0	0	0	Chapter 2 on status and trends contains text in section 2.2 on indigenous peoples' cultural values and spiritual relationships with wetlands. It was recommended that this should be extended to all environments, including coastal and marine, which include very culturally important places.	Thank you for your comment. We included now two boxes related to the topic of indigenous people, one about invasive alien species found on land managed by indigenous people and another one on good quality of life in the second order draft. Please note that chapter 2 does not address cultural values as it focuses on the trends and status of alien species.
Blackburn, Tim	No	2	0	0	0	0	You did not define or even mention "naturalized" in chapter 1, so this either needs to be added to definitions there, or changed to "established" (or in most places it's used, just "alien" here for consistency (first used in Line 4).	Thank you very much for your comment. This term is defined in the glossary in the second order draft.
Dannune, João	No	2	0	0	0	0	At the case of reserves, guide for adoption of cleaning protocols of materials, equipments, clothing to minimize risk with sufficient precocity to allow its immediate eliminations. The use of cargo has a permanent cost of UCs, which can be based on to users of the activity to not be burden public authorities (in the case of tourism). Promoting responsibility can be passed on the judge who connect these focus, provide they receive training to determine and the locating of natural outbreaks of biological invasive so that they can be eliminated before established or that the invasives worsens and becomes different and costly. This strategy is called Early Detection and Rapid Restore (DORR). When a new species is introduced, its chances of establishment a invasion are initially threaten by local environmental conditions, the preference of predators, pathological ad invasives, competitions with other species and other factors. The more time that was passed since the introduction without a species being detected, there are few opportunities, for effective intervention leading to an eradication ad higher cost involved.DPRR include the formation of a network of collaborative for the detection of individual of species invasive exotic species in UC's, for their identification and for eradication, contaminant or control actions. An early detection and rapid responses paradigm includes ongoing training for servers, service measures and guides authoritorial to work in the UC to than parameter measures for introduction of propagules and species, and also assist monitoring for early detection. The involvement of researchers in DPRR is crucial, as they circulate in remote area and lither visited and know many species. The definition	Thank you, invasive alien species management and policies are addressed in Chapter 5 and 6
Dannune, João	No	2	0	0	0	0	Identify areas of creation and cultivation of exotic species in and around the UE, and encourage replacement of these by native species. When species substitutions is not feasible, articulate and synthesize these responsible for strategies to prevent spread of propagules given the area of producer or creator. Restricted visited access to areas of high environmental fragility, especially where there are endangered species, endemic species an particular small	Thank you, invasive alien species management and policies are addressed in Chapter 5 and 6
Government of Germany	Yes	2	0	0	0	0	General remark: references related to marine ecosystems are partly more detailed compared to references addressing terrestrial ecosystems.	Thank you for your comment, authors have revised and harmonized references in the second order draft
Government of Germany	Yes	2	0	0	0	0	General comment: Very impressive document! Great work!	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Heger, Tina	No	2	0	0	0	0	In some cases, there is contradiction among different sources of information (see e.g. my comment to line 1153-1155). I suggest that this needs to be given some room. In the introductory chapter, the IPBES scheme for dealing with uncertainty is introduced - but I did not see any reference in this report that is similar to that in the IPBES global assessment (well established, established but incomplete, etc). I suggest introducing such terminology in this report as well, and utilizing it to account for inconsistent data. Also, using this terminology, the information collected in the sections on data and knowledge gaps could be fed into the condensed presentation of results in the executive summary.	Thank you for your comment. The information presented in this chapter are going from a broad range of sources, which are often not consistent among each other. This is reflected in the sometimes deviating numbers of alien species. But we emphasized the issue of heterogeneity in the data now throughout the chapter, included ranges of numbers where possible and added a new section of data in the introduction to present our approach and discuss it. Confidence have been added to the executive summary in the second order draft.
Papadopoulou, Paraskevi	No	2	0	0	0	0	Overall a well written chapter. Some editing is necessary.	Thank you for your comment, we have edited the second order draft. The positive feedback is greatly appreciated by the chapter authors.
Romero, José	No	2	0	0	0	0	Could you please comment on the difference of quality of the various datasets and how this impacts on the conclusions of the report? How did authors tackle this difficulty?	Thank you for your comment. Throughout the chapter all figures and tables are based on the same underlying master database, which is built upon available global databases of alien species occurrences. Where possible we present ranges of recorded species numbers. We included a new section in the introduction, where we present the original data sources, the generation of the master database and discuss the issues of heterogeneous data.
Faulkner, Katelyn	No	2	0				Pathways of introduction are discussed in chapter 2, but introduction pathway status or trends are not presented and discussed anywhere in the document (e.g. trends across taxonomic groups, regions or over time). Presenting such results is important as managing introduction pathways is likely to be the most efficient and cost-effective management strategy, and as the management of pathways makes up much of the discussion in chapter 5. Global analyses have been done, for example: Saul, W.-C., Roy, H. E., Booy, O., Carnevali, L., Chen, H.-J., Genovesi, P., ... Jeschke, J. M. (2017). Assessing patterns in introduction pathways of alien species by linking major invasion databases. <i>Journal of Applied Ecology</i> , 54(2), 657–669.	Thank you for your comment, we have now introduced this topic in the second order draft
Faulkner, Katelyn	No	2	0				The chapter is very detailed and provides many examples. Unfortunately I feel that the main take home messages are getting lost in the detail. Most, if not all of the key messages that are detailed on page 1 come from a few recent, excellent global analyses. These studies are discussed near the beginning of the chapter, but most of the information in the chapter actually doesn't contribute to the key messages. My suggestion is to focus on demonstrating the main points, and give important examples in boxes.	Thank you, we have revised the main text and the executive summary, taking your comment into account in the second order draft
Faulkner, Katelyn	No	2	0				There is a lot of repetition of information, possibly due to the structure of the chapter. For example, temporal changes to pathways for birds is discussed on lines 114-118, on lines 152-154, and for a third time on lines 196-398. I would consider re-structuring the chapter so that the repetition is avoided. Global trends are looked at for each taxonomic group. Then each taxonomic group is looked at again for different continents, and then again for IPBES units of analysis. The IPBES units of analysis are looked at in detail, and again for each continent.	Thank you, we have added a section to introduce and provide rationale for the structure in the second order draft
Feest, Alan	No	2	1	0	0	0	Intern!!! This chapter is littered with grammatical mistakes (too many to list).	Thank you very much, grammatical mistakes have been corrected in the second order draft.
Blackburn, Tim	No	2	1	2	1	2	Add "of" after "introduction".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	2	1	2	of is missing: 'introductions of alien species...'	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	2	1	28	So far the order of these topics 1 to 9 seems random. Topics seem to cover: (a) global patterns (points 1, 2, 5, 7), (b) potential causes (points 3, 6), and (c) availability of data (4, 8, 9). Maybe re-arrange to follow these groups?	Thank you. We are introducing the structure of the chapter in more detail to explain why we have organized the structure in the way that we have.
Jeschke, Jonathan	No	2	1	2	1	2	Add "of", so that it is "introductions of alien species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Lawson Handley, Lori	No	2	1	2			There are a number of typos, missing words and grammatical errors throughout. I will not list them all but note that the manuscript will require careful proof reading and editing. Examples in the first 4 lines are: "introductions of alien species", and "become naturalized"	Thank you, grammatical mistakes have been corrected in the second order draft.
Pisanu, Benoit	No	2	1	2	1	3	A matter of style in the "Executive Summary and Key Messages": "1. Over the past 200 years, introductions alien species have increased globally, of which nearly 37% occurred between 1970 – 2014." Could precise "Since the 1800s" rather than "Over the past 200 years" Besides some exceptions (Vascular plants and Mammals, and some IPBES sub-regions), the global exponential form of the worldwide increase in IAS introductions could be also better highlighted by writing that a sharp increase occurred since the middle of the 20th century - with the >1970s period accounting	Thank you, the executive summary has been revised in the second order draft
Rebello, Alanna	No	2	1	2			Missing "of" after introductions.	Thank you, grammatical mistakes have been corrected in the second order draft.
Singheiser, Martin	No	2	1	2	1	3	Does this account for alien species introduced by active/passive pathways of human activity (e.g. transportation, trade) or does this also account for naturally invading/migrating alien species (e.g. birds). Should be clarified, since also natural invasion processes may come into account considering IAS.	Thank you, the introduction has been revised in the second order draft.
Blackburn, Tim	No	2	1	4	1	4	Use "become" rather than "becomes".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	4	1	5	Re-reading the summary after having read the entire chapter: I don't think this number of 1.5 new alien species every day has been introduced in the text anywhere (excuse me in case I missed it). There needs to be a referenced explanation on how this estimate was made.	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	1	4	1	4	Change "becomes" to "become".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	1	4	1	5	This statement clearly identifies the need for up-to-date biodiversity census	Thank you for your comment
Pisanu, Benoit	No	2	1	4	1	5	This point do not add much to the Key message of the summary. Looking at Figure 2,17 - i found striking that approx. 3/4th of the 14 Units of Analysis investigated shows a regular and constant increase in number of IAS since the beginning of the 20th century - with only several exceptions indicating a slowdown (Tropical areas, Tundras, Cultivated areas and Temperate grasslands)	Thank you, the executive summary has been revised in the second order draft
Blackburn, Tim	No	2	1	7	1	8	Change to "inter-taxonomic" from "intern-taxonomic".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	7	1	7	inter-taxonomic' instead of 'intern-'	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	1	7	1	7	Change "intern-" to "inter-" (end of the line).	Thanks for this suggested change. We have included it in the second order draft.
Rebello, Alanna	No	2	1	7			Typo "intern-" -lose the n.	Thanks for this suggested change. We have included it in the second order draft.
Jeschke, Jonathan	No	2	1	10	1	10	Add comma after "uneven".	Thank you for this suggested change, but it is more convenient for us to maintain it in the second order draft.

White, Michael	No	2	1	10	1	10	Replace "is" with "are" data is the plural of datum	Thank you for your comment, this is no longer a problem in the second order draft
Blackburn, Tim	No	2	1	11	1	11	Delete "by" after "invaded".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	11	1	11	delete 'by'	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	1	11	1	11	Delete "by".	Thanks for this suggested change. We have included it in the second order draft.
Rebello, Alanna	No	2	1	11			Remove "by" = "invaded by than others".	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	1	13	1	13	Change to "patterns" from "pattern".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	1	13	1	13	Delete "a common".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Csccserits, Anikó	No	2	1	15	1	16	I think, according to Fig 2.2 there are also some animal groups, which shows no saturation, not only this. Highlight also some animal groups, too.	Thank you for your comment. Saturation requires an annual rate of new introduction of zero, which is only reached, at least approximately, by mammals.
Blackburn, Tim	No	2	1	16	1	16	Insert comma after "saturation".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	1	17	1	17	Replace "Naturalized" with "Established alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	1	17	1	19	Not sure where this conclusion has been introduced and explained anywhere in the main text? I don't think so, but sorry if I missed it. It is important to provide references for this in somewhere in the main text.	Thank you. This appears later in the report.
Blackburn, Tim	No	2	1	20	1	20	Insert comma after "group".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	1	21	1	21	Insert comma after "Africa".	Thank you, we have revised the executive summary in the second order draft
Jeschke, Jonathan	No	2	1	21	1	21	Add "of" after "exception".	Thank you, we have revised the executive summary in the second order draft
Rebello, Alanna	No	2	1	21			Add "of" before Africa.	Thank you, we have revised the executive summary in the second order draft
Dudgeon, David	No	2	1	23		26	There is something wrong with the wording in this sentence.	Thank you, we have revised the executive summary in the second order draft
Blackburn, Tim	No	2	1	24	1	24	Insert "had" after "studies".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	1	24	1	24	Insert comma after "system".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Feest, Alan	No	2	1	24		25	64+13+12 do not = 100 so what were the remainder?	Thank you for your comment. These represent studies with an exclusive focus on the respective realm. We clarified this now in the second order draft.
Heger, Tina	No	2	1	24	1	24	add 'have': 'finding that 64% of all studies have an explicit focus...'	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	1	24	1	24	Add "have" after "studies".	Thanks for this suggested change. We have included it in the second order draft.
Rebello, Alanna	No	2	1	24		24	Add "had" before "an".	Thanks for this suggested change. We have included it in the second order draft.
Pisanu, Benoit	No	2	1	27	1	28	Also perhaps remind here that spatially explicit patterns of IAspecies-abundances relationships are crucially lacking... But see Seebens, H, Bacher, S, Blackburn, TM, et al. Projecting the continental accumulation of alien species through to 2050. Glob Change Biol. 2020; 00: 1– 13. https://doi.org/10.1111/gcb.15333	Thank you for your comment. Due to the lack of consistent data, we do not refer to changes in abundance consistently in the chapter, but we mention it as a lack of knowledge in the executive summary and in the global section (2.2) of the second order draft. Please note that
Government of Germany	Yes	2	1	30	1	30	It is suggested to incorporate something like "paths of introduction" in the heading or subheading.	Thank you for your comment. We would like to keep the first header as "Introduction", where we also - among others - address pathways.
Government of Germany	Yes	2	1	30	1	31	Please consider adding a distinction between definitions of invasive alien species, naturalized alien species and alien species. All these terms are used throughout the chapter creating uncertainty towards what the report is about. Impact from land use change can introduce species that are kept dominant by human activities (farmers growing wheat), but would not necessarily have a major impact as invasive species left on their own. It is not clear whether such are considered IAS.	Thank you very much for your comment. These terms are defined in Chapter 1
Blackburn, Tim	No	2	1	33	1	33	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Jeschke, Jonathan	No	2	1	33	1	33	Delete "Petr" (this is the first name of this paper's lead author; the last name should be sufficient).	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Pisanu, Benoit	No	2	1	34	1	35	Proposition to insist on biological ability to disperse "Species have been introduced by humans to regions far outside their own ability to move from their original ranges"	Thank you for your comment. The section has been revised in the second order draft, and we do not have this sentence anymore. Note that the definitions of terms are provided in chapter 1.
Blackburn, Tim	No	2	1	35	1	35	Replace "over the last several millennia" with "for at least 20,000 years (Grayson 2001)".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Pisanu, Benoit	No	2	1	37	1	38	The previous sentence deals with antic intentional crop trading. A small sentence could be added here about unintentional introductions long before the beginning of antiquity (i.e., < 4 000 BC); see e.g., Vigne, J. D., Zazzo, A., Cucchi, T., Carrère, I., Briois, F., & Guilaine, J. (2014). The transportation of mammals to Cyprus sheds light on early voyaging and boats in the Mediterranean Sea. Eurasian Prehistory, 10(1-2), 157-176. Cucchi, T., Vigne, J., Auffray, J., Croft, P., & Peltenburg, E. (2002). Passive transport of the house mouse (Mus musculus domesticus) to Cyprus at the Early Pre-ceramic Neolithic (late 9th and 8th millennia cal. BC). Comptes Rendus Palevol, 1(4), 235-241. Rephrase as "the onset of major increases in alien species introductions varied".	Thank you, the introduction has been revised in the second order draft.
Blackburn, Tim	No	2	1	48	1	48		Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Jeschke, Jonathan	No	2	1	48	1	49	This sentence is hard to read. A possibility to fix it would be to delete "increases".	Thank you for your comment. We rephrased this sentence to improve readability in the
Wood, Louise	No	2	1	48	1	48	Grammatical change - "the onset of major increases in alien species introductions".	Thank you for your comment. We rephrased this sentence to improve readability in the
Jeschke, Jonathan	No	2	1	49	1	53	The previous sentence focuses on taxonomic differences, but in this sentence the focus is on patterns across taxa. I thus think it should be reformulated. For example, you could start this sentence with "Nonetheless, ..."	Thank you for your comment. The sentence has been rephrased second order draft.
Rebello, Alanna	No	2	1	50	1	52	This sentence is very long and confusing. Perhaps split it into two, and make more clear what is being said (especially the last 2 lines).	Thank you, this has been rephrased in the second order draft.
Blackburn, Tim	No	2	1	51	1	52	Delete "in the last 50 years".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Lawson Handley, Lori	No	2	1	51	1	52	"in the last 50 years" is not needed	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Csccserits, Anikó	No	2	1	57	1	57	I suggest to use also this reference: Hulme, P. E. (2009). Trade, transport and trouble: managing invasive species pathways in an era of globalization. Journal of applied ecology, 46(1), 10-18., especially Fig 3 of this reference is useful, too.	Thank you for your comment. We added this citation in the second order draft.
Government of Germany	Yes	2	1	57	1	57	It is suggested to consider the following reference as well: Liu, X., et al. (2019). "Risks of biological invasion on the belt and road." Current Biology 29(3): 499-	Thank you for your comment. We added this citation in the second order draft.
Pisanu, Benoit	No	2	1	59	1	62	This sentence deals with anthropogenic disturbances associated to increased vulnerability to invasion. It lacks here at least one sentence on the role of climate change: e.g.,	Thank you for your comment. We added this citation in the second order draft.
Government of Germany	Yes	2	1	61	1	61	It is suggested to consider the following reference as well: Wan, J.-Z., et al. (2019). "Effects of ecoregional vulnerability on habitat suitability of invasive alien plants: an assessment using 13 species on a global scale." Environmental earth sciences 78(5): 180.	Thank you for your comment. We added this citation in the second order draft.
Government of Germany	Yes	2	1	64	1	66	To embed ch 2 in the overall narrative of this assessment, it is suggested to insert cross-references to other chapters where possible, and to briefly outline the relationship between ch2 and the other chapters (see for instance: ch 3 L75-84).	Thank you, for your comment. We have increased the cross-references to other chapters in the second order draft.
Faulkner, Katelyn	No	2	1	67	1	67	The word 'status' is used here and throughout the document to describe alien species richness and distribution. This term is often used in the literature to mean something else i.e. whether a species is native or alien and if alien the stage of invasion. Perhaps another term could be used to avoid confusion.	Thank you very much for your comment. We are following the instructions from the scoping document (approved by the IPBES member states).
Heger, Tina	No	2	1	67	1	68	Units of Analysis is not yet in the glossary.	Thank you, the units of analysis are defined in Chapter 1.
Kudelska, Theresa	No	2	2	34	2	34	Potential additional reference in relation to increased spread of INNS in relation to international trade :Seebens, H, Essl, F, Dawson, W, Fuentes, N, Moser, D, Pergl, J, Pysek, P, van Kleunen, M, Weber, E, Winter, M, & Blasius, B. 2015. Global trade will accelerate plant invasions in emerging economies under climate change. Glob Chang Biol, 21, 4128-40.	Thank you, the suggested reference is added in the second order draft.
Shin, Thant	No	2	2	34	2	35	The term several millennia seems controversial. It should be several decades or years.	Thank you for this comment. We have removed this figure from the chapter of the second
Lawson Handley, Lori	No	2	2	71	2	71	I think you need to clarify the term "intraspecific taxa" in this context - presumably you are meaning populations? If so, clarification is needed on why different populations of the same species might respond differently in an invasion context.	Thank you for comment. In the second order draft, we rephrased the sentence to express that the term 'species' includes genetic variation within the species.
Rebello, Alanna	No	2	2	71			Are the authors referring to hybridization here? (i.e. Frankenflora) or just subspecies? Please clarify.	Thank you for comment. We rephrased the sentence in the second order draft to express that the term 'species' includes genetic variation within the species.
Jeschke, Jonathan	No	2	2	73	2	73	The "s" in "gaps" should also be in bold font.	Thank you, this has been corrected in the second order draft.
Pisanu, Benoit	No	2	2	74	2	74	Typo: lack a coma: (i.e., flora, fauna, and microbes),	Thank you, we have revised this section in the second order draft.
Faulkner, Katelyn	No	2	2	76	2	81	This section seems to outline some indicators for the chapter. If these are indeed indicators that will be used to track changes over time, then further details are required. For example, what these indicators are, what they are meant to show and how/why they were selected is not clear. They need to be properly set out and described. If they are not indicators that will be used to track change, then perhaps remove the word 'indicator' in this section to avoid confusion.	Thank you for your comment. We now introduce what is shown in the chapter in more detail and added a new section on data representation in the second order draft.

Government of Bulgaria	Yes	2	2	83	2	88	Provide links to the databases.	Thank you, this has been added in the second order draft.
Government of Germany	Yes	2	2	85	2	88	One of the most up-to-date dataset in Europe is included in: AquaNIS. Editorial Board, 2015. Information system on Aquatic Non-Indigenous and Cryptogenic Species. World Wide Web electronic publication. www.corpi.ku.lt/databases/aquanis. Version 2.36+. Accessed 2020-09-29. -- If this dataset is not included in one of the five big datasets analysed for this draft, it should be at least reflected in the future.	Thank you for your comment. AquaNIS has been indeed included in the First Records database and thus is considered in the figures and maps. For marine species, we refer to Bailey et al. 2020, where possible, which also includes information from AquaNIS.
Khuroo, Anzar Ahmad	No	2	2	85	2	85	GRIS, there are serious issues with this database. There is no mechanism to clean/separate "Introduced" from "Invasive" species. It is not peer reviewed. Using this database to capture the status and trends of "naturalized" alien species richness across globe will be full of errors.	Thank you for your comment. There are different data sources of different quality, which we do not want to ignore. We address the issue of heterogeneity in definitions and uncertainty, and provide ranges of species numbers where possible. In the second order draft, we added a new section on data and data processing in the introduction.
Jeschke, Jonathan	No	2	2	86	2	87	Remove the first names "Mark" and "César".	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft.
Blackburn, Tim	No	2	2	87	2	87	2017b - the Dyer et al references are messed up throughout - see the reference list for why (from Line 2799).	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Government of Germany	Yes	2	2	91	2	91	It is suggested to add in brackets after database '(s)TWIST'	Thank you for your comment. The section has been completely revised and the respective part has been removed from the second order draft.
Government of Germany	Yes	2	3	97	3	97	Figure 2.1; Figures 4 & 5 (second line) and figures 8 & 9 (third line) do not begin with zero (y-axis); change scale or include broken line marks at the basis of the y-scale. Sources are up to 15 years old (f.e. shipping Garcia-Herrera et al. 2005; please check if newer data are available)	Thank you for your comment. We do not indicate 0 values by color and thus the color bars should not start at 0 (Figure 2.5). The current version is therefore correct. Garcia-Herrera et al. 2015 provides information about historic shipping in the 18th century. It is the most up-to-date reference. Figures 5, 8 and 9 begin with 0. Figure 4 has been deleted in the second order draft.
Pisanu, Benoit	No	2	3	97	3	97	Figure 2.1. The graph for Tourism is strange - y axis should range from 0. One million tourists as upper limit seems also strange (very little !) ...	Thank you for your comment. This was indeed an error, which we have corrected in the second order draft.
Faulkner, Katelyn	No	2	3	98	3	103	The caption for this figure is "Trends in main drivers of alien species introductions", yet not all of the factors included in the figure drive species introductions. For example, climate doesn't influence introductions, it will influence establishment. Reconsider the caption, or what is included in the figure	Thank you for your comment. We revised the legend accordingly in the second order draft.
Government of Germany	Yes	2	3	98	3	103	Missing reference to figure 2.1 in the text	Thank you very much for your comment. References are harmonized in the second order draft
Government of Germany	Yes	2	3	98	3	103	More explanation needed; One can only guess that the presented data are on a global scale.	Thank you very much for your comment. Authors have considered it in the second order
Jeschke, Jonathan	No	2	3	98	3	98	Remove "of".	Thank you, this has been corrected in the second order draft.
Rebello, Alanna	No	2	3	98	3	98	Typo, remove "of".	Thank you, this has been corrected in the second order draft.
Dupont, Lise	No	2	3	102	3	102	Even though there is an acronym list, I think GDP should be defined when first used in the text	Thank you very much for your comment. Acronyms are spelt out in the second order draft
Faulkner, Katelyn	No	2	3	105	3	105	It would be useful to include at the beginning of this section, some figures showing broad global trends. For example, number of all introductions over all time, number of global introductions per taxonomic group.	Thank you, agreed.
Heger, Tina	No	2	3	106	3	107	It is a bit confusing to read here about chapters 2.4.1, 2.4.2 and 2.4.3 but not about what will follow in this chapter. Maybe start with a sentence on what follows in 2.2? Also, these chapter numbers do not seem to be correct. Maybe replace this sentence, e.g. by: "The trends, status and data gaps for alien species are presented by taxonomic group (this chapter), IPBES region (2.3) and IPBES Units of Analysis (2.4).	Thank you for your comment. This has been clarified by preceding the numbers with "section". All numbers refer to sections and subsections within this chapter.
Pisanu, Benoit	No	2	3	106	3	107	Reference to sub-chapters numbers are missidentified, i.e., should be 2.2.1, 2.2.2, 2.2.3 - NOT 2.4.1, 2.4.2, 2.4.3.	Thank you for your comment. This has been clarified by preceding the numbers with "section". All numbers refer to sections and subsections in the second order draft.
Shimura, Junko	No	2	3	109	24	747	Also - it may be interesting to explain that no information are provided on metazoan parasitic species and that a choice have been made to focus on free-living conditions, stowaway (sea containers) of ants, ships ballast water and biofouling of mulluscus etc., preferably using the CBD categories of pathways noted by	Thank you for your comment. We added a new section about pathways based on the CBD pathway definitions in the introduction section of the second order draft.
Faulkner, Katelyn	No	2	3	110	3	110	Under the trends section that starts on this line, there is a need to discuss how recording and reporting delays can influence these trends. It's likely these species, particularly the invertebrates, were already introduced/established before being recorded	Thank you very much for your comment. We have followed this suggestion in the second order draft
Heger, Tina	No	2	3	111	3	111	selected' instead of 'select'	Thanks for this suggested change. We have included it in the second order draft
Pisanu, Benoit	No	2	3	111	3	114	Long sentence. Cut to gain in clarity - especially to early introduce what means "but some patterns have emerged": which ones ??	Thank you for your comment. The section has been revised completely including this sentence in the second order draft.
Blackburn, Tim	No	2	3	112	3	113	Not "constant" then?	Thank you, we have changed the word constant in the second order draft.
Faulkner, Katelyn	No	2	3	114	3	118	In some instances drivers are discussed under the 'status' sections, but also in some cases under the 'trends' sections, and this is leading to repetition. Need to be clear about what is discussed where. For example, on this line temporal changes to pathways for birds is discussed under 'trends', but then this information is repeated under 'status' on lines 152-154.	Thank you for your comment. We have now made sure to limit redundancies and structure issues in the second order draft.
Pisanu, Benoit	No	2	3	117	3	117	According to Dyer et al., 2017a - "more recently" could be replaced by "during the last half of the 20th century"	Thank you for your comment. We considered it in the second order draft.
Government of Germany	Yes	2	3	118	3	118	It is suggested to consider the following reference as well: Carpio, A., et al. (2020). "Intentional introduction pathways of alien birds and mammals in Latin America." Global Ecology and Conservation 22: e00949.	Thanks for your reference, which we have now considered it in the second order draft
Singheiser, Martin	No	2	3	121			Figure 2.2. Since number of alien species strongly depends on the taxonomic group it may considered in either highlighting these issues in the figure legend or in showing all figures in the same axis scale to allow for an easier comparison	Thank you for your comment. In the second order draft, we refer to the definition of alien species provided in chapter 1. So, yes it does include species migrating by their natural means within the alien range.
Wood, Louisa	No	2	4	120	4	121	Could some suggestion be made for the reason mammals have declined in rates of accumulation.	Thank you for your comment. This is not fully clear, but it seems likely that this is a consequence of more stringent regulations, which are in place for mammals. We added information on this in the second order draft.
Lawson Handley, Lori	No	2	4	121	4	126	Fig 2.2 Right hand panels need further explanation. Perhaps provide an example to illustrate	Thank you for your comment. We revised all legends to clarify the content of the figures in the second order draft.
Pisanu, Benoit	No	2	5	136	5	137	About "The analysis based on the seven animal groups (plus vascular plants) revealed two major commonalities: greater proportions of established alien species in regional faunas on islands and in coastal areas. [...]". Do you mean coastal areas on islands? Or coastal areas in general. According to subchapter 2.4.4.4 (page 66) - very few information is available on coastal areas per se. So you probably should write "on coastal and inland areas of islands."	Thank you for your comment. To avoid confusion we have now written "on islands and in mainland coastal areas" in the second order draft.
Singheiser, Martin	No	2	5	140	5	141	Since birds have the ability to fly and thereby can cross large distances as well as barriers such as oceans - which most mammals can't - it may be logic, that birds show three times more alien species than mammals. Therefore it shall be highlighted whether also natural migration processes are considered in this respect to make this point more clear. Please see als my first comment.	Thank you for your comment. We now mention the different scales of color bars in the legends of the figures in the second order draft.
Government of Germany	Yes	2	5	143	5	144	Question: Shouldn't this statement be moved up into the executive summary? Rationale: After all this indicates that no silver bullet exists to address IAS. Rather a complex interplay of site-specific factors may be needed at policy- and decision-making levels.	Thank you for your comment. We have revised this section in the second order draft. Please note that drivers are dealt with in chapter 3.
Pisanu, Benoit	No	2	5	143	5	161	I'm certainly a little picky - but this paragraph should better separate between each taxonomic group presented - because sometimes it's a little difficult to separate the factors affecting birds from invertebrates. In essence - the main message is that human activities are critical for birds, while for invertebrates - climatic factors dominate. Below a proposition (essentially a matter in the form presentation of the paragraph): "Drivers of invasions may strongly differ among taxonomic groups, and therefore the resultant spatial distributions of invasions by particular taxonomic groups can also differ. For example, invasion hotspots for 15 ant species are in South America, equatorial Africa and Southeast Asia (Bertelsmeier et al., 2015), where climatic suitability has remained the most important explanatory variable of invasion success for ants and even though transportation of potentially invasive ants has increased with human activities and global trade (Bertelsmeier et al., 2016). Introduced terrestrial gastropods provide another example for which Capinha et al. (2015) showed that the global distributions are primarily explained by the prevailing climate and, to a smaller extent, by distance and trade relationships. In contrast, bird invasions are concentrated in North America, Western Europe, South African, Japan and Australia and New Zealand (Dyer, Cassey, et al., 2017a). Dyer et al. (2017a) also showed that globally alien bird species numbers are currently highest at the mid-latitudes and are strongly determined by anthropogenic effects, most notably the number of species introduced (i.e., colonisation pressure). Human activities facilitating bird introductions have changed over time resulting in distinct invasions and different explanations for global patterns. Hence the number of bird species introduced to a location can be divided into historical introductions, driven largely by European colonialism, and a rising rate of bird introductions with shifting locations of origin and introduction, probably driven by the cage bird trade.	Thank you for your comment. We have tried to focus here on general patterns, which may or may not differ among taxonomic groups (and different taxonomic groups may share, in parts, some patterns). Therefore, separating between each taxonomic group didn't appear to be the optimal structure. We have nonetheless improved this part in the second order draft.
Government of Germany	Yes	2	5	146	5	147	The recent paper by Carpio, A., et al. (2020). "Intentional introduction pathways of alien birds and mammals in Latin America." Global Ecology and Conservation 22: e00949.) also indicates a high number of invasion of bird species to Latin America (62 species introduced); therefore, please compare the total number with the other regions as well.	Thank you very much for your comment. We have now cited this reference in the second order draft
Feest, Alan	No	2	5	147	5	148	Dyer or Dyers?	Thanks, it is Dyer
Lawson Handley, Lori	No	2	5	148	5	150	Colonisation pressure should be defined more explicitly	Thank you for your comment. The definition is given explicitly for this instance: number of species introduced
Núñez Lendo, Carmela Isabel	No	2	5	148	5	150	Another phenomenon is the tropicalization of temperate latitudes due to climate change - Vergés, A., Steinberg, P. D., Hay, M. E., Poore, A. G., Campbell, A. H., Ballesteros, E., ... & Figueira, W. (2014). The tropicalization of temperate marine ecosystems: climate-mediated changes in herbivory and community phase shifts. Proceedings of the Royal Society B: Biological Sciences, 281(1789), 20140846.	Thank you very much for your comment. We have now mentioned this point in the second order draft.
Blackburn, Tim	No	2	5	150	5	150	Need to be consistent on spelling of colonization/colonisation... it was colonization in chapter 1.	Thank you, spelling across chapters have been harmonized as much as possible in the second
Jeschke, Jonathan	No	2	5	157	5	157	I'd add "ant" before "invasion success", so that it's clear that is statement is still about alien ants.	Thank you for your comment. This section has been removed from the second order draft.

Rebelo, Alanna	No	2	5	158	5	161	Are the authors perhaps mixing up suitable habitat (explanations of distribution) and dispersal mechanisms? I.e. gastropods couldn't reach suitable other habitats without a dispersal mechanism, whereas even if they had a dispersal mechanism but not suitable habitat, they wouldn't naturalise.	Thank you for your comment. Distribution depends on dispersal and establishment, both being necessary. The pattern of terrestrial gastropods reflect both aspects.
Heger, Tina	No	2	5	160	5	161	Fig. 2.3 does not provide examples of naturalized species - the sentence does not match the figure. The reference to Fig. 2.3 could be removed here, and inserted instead in line 131: "with some regions more invaded than others (see also Fig. 2.3)". I suggest changing "Below" to "In the following".	Thank you for your comment. We have duplicated the reference to the figure to add it as suggested line 131, and have modified the sentence to better match the figure in the second order draft.
Government of Germany	Yes	2	5	189	7	189	It is suggested to consider the following reference after Arion ater: Zemanova, M. A., et al. (2018). "Slimy invasion: Climatic niche and current and future biogeography of Arion slug invaders." Diversity and Distributions 24(11): 1627-1640.	Thank you very much. We have now cited this reference in the second order draft.
Faulkner, Katelyn	No	2	6	162	6	162	Figure 2.3, as well as Figure 2.5, Figure 2.7 and Figure 2.8 would be easier to interpret if the graduated colour scale went from light to dark of one colour. I realise these figures are from elsewhere, but it might be possible to redraw them.	Thank you very much for your comment. These figures might be redrawn, but if not they cannot be modified in the second order draft.
Government of Germany	Yes	2	6	162	6	162	Figure 2.3: For reasons of comparability, please use a similar numerical scale for colour (f.e. Molluscs 6 steps; Crustaceans 11 steps); lowest value should be zero not 1 (amphibians, reptiles). Question: do arthropods (excl crustaceans) include ALL other arthropod groups, including marine pycnogonids or only freshwater species excl. crustaceans?	The you very much for your comment. These figures might be redrawn, but if not they cannot be modified. Very few other arthropod groups have been studied, so including all others doesn't mean that all groups have been considered
Rebelo, Alanna	No	2	6	163			The figure needs more explanation. What are the dots?	Thank you very much. We agree and have now mentioned this in the second order draft.
Rebelo, Alanna	No	2	6	163			Yes, it looks to me that these maps may be more a function of data collection intensity rather than actual number of species globally.	Thank you for your comment. We revised all legends to clarify the content of the figures in the second order draft.
Taki, Hisatomo	No	2	6	163	6	164	Adding information of time or duration might be helpful in the caption.	Thank you, this is a comment for Chapter 5 on management - however they cannot add additional text to the chapter due to word length restrictions. They feel their analytical approach is more informative than individual case studies, and we have already incorporated a
Alaux, Christine	No	2	6	166	70	2332	Incorporating some photos of the invasive species cited would make the report more attractive	Thank you for your comment. We added photos to the chapter in the second order draft
Faulkner, Katelyn	No	2	6	166	14	458	I don't think these sections are necessary, or they can be reduced. These sections simply provide examples of invasions and their impacts, and drivers for different animal groups. These sections also do not to follow any specific format. I suggest that a few demonstrative examples are selected and that the details of these examples are provided in boxes. If these sections are meant to highlight the wide variety of invaders in the world, why not rather discuss Figure 2.4? Figure 2.4. is a useful summary figure, yet it is only mentioned correctly once in the text (on line 299).	Thank you very much for your comment. We believe that specific examples are needed because unlike climate change or overexploitation, biological invasions are much more diverse and complex and as a result a relatively more poorly understood driver for the public and decision makers
Faulkner, Katelyn	No	2	6	166	14	458	In this section pathways of introduction are discussed for each taxonomic group. While this is useful, it makes it difficult to pull out the trends within and across groups. Including a figure showing trends across taxonomic groups at a global scale would be useful. A useful reference for this: Saul, W.-C., Roy, H. E., Booy, O., Carnevali, L., Chen, H.-J., Genovesi, P., ... Jeschke, J. M. (2017). Assessing patterns in introduction pathways of alien species by linking major invasion databases. Journal of Applied Ecology, 54(2), 657-669	Thank you very much. Pathways may be mentioned in passing for the convenience of some examples, but they will be specifically treated in Chapter 3 and therefore cannot be the focus of a figure here
Lawson Handley, Lori	No	2	6	166	7	191	I think it would be informative to discuss marine and freshwater molluscs separately. As in previous point, describing the distribution would be informative. Line 177-8 seems to contradict the previous sentence (bivalve invasions have received little attention... and yet there are 24/35 with substantial information about their distribution and effects. A brief summary of the findings of the Sousa paper would be informative.	Thank you for your comment. We have tried to be more consistent in our presentation of each group. We however left out pathways (treated specifically in Chapter 3) and impacts (treated specifically in Chapter 4)
Lawson Handley, Lori	No	2	6	166	14	458	Taxon-specific sections could be more general and present the bigger picture rather than just providing lists and examples, and there is inconsistency between the taxon sections in terms of the information reported. It would be useful to start each taxonomic section by providing a description of the status and distribution, and corresponding proportion of naturalized species - referring to the data in figs 2.2, 2.3 and 2.4 then pathways, impacts and examples. Ideally the structure of these sections should be consistent.	Thank you for your comment. The information is not detailed enough to discuss them separately without being repetitive. The sentences are not really contradictory: little attention and few studies can result in basic information for many species.
Csécserits, Anikó	No	2	6	167	6	167	I suggest to separate the Invertebrate and Vertebrate groups with a as a subheading	Thank you very much for your comment. We have decided not to add more subheadings in order to keep reading easy
Csécserits, Anikó	No	2	6	167	14	458	I think, the structure of each section about the different taxonomic group of animal should be more uniform concerning on the topics covered. E.g. It should be mentioned first, how many invasive species for the give taxonomic groupd there are in the world. If there is knowledge gap, it should be stated, then the typical impact could be mentioned, than tipaical pathway and at the end some iconic species and/or cases. Now it is quite diverse. Moreover I think, there should be some reasoning about the selected taxonomic group.	Thank you very much for your comment. We have tried to be more consistent in our presentation of each group. We however left out pathways (treated specifically in Chapter 3) and impacts (treated specifically in Chapter 4)
Pisanu, Benoit	No	2	6	167	6	167	Picky again - but I recommend to replace "Naturalized bivalve activities [...]" by "Introduced bivalve species that naturalized and are used in activities such as	Thank you for your comment. The section has been completely revised in the second order
Wood, Louisa	No	2	6	167	7	191	Could some suggestion be made on the reasons for introduction of invasive bivalves e.g. importance of aquaculture/ shipping	Thank you very much. We have not added information on pathways as this will be treated specifically in Chapter 3
Government of Germany	Yes	2	6	171	6	171	It is suggested to consider the following reference as well: Dölle, K. and D. E. Kurzmann (2020). "The Freshwater Mollusk Dreissena polymorpha (Zebra Mussel) - A Review: Living, Prospects and Jeopardies." Asian Journal of Environment & Ecology 13(2): 1-17.	Thank you very much for your comment. We have now considered this reference in the second order draft.
Government of Germany	Yes	2	6	171	6	171	It is suggested to consider the following reference as well: Lindberg, C., et al. (2020). "Colonisation of South African kelp-bed canopies by the alien mussel Mytilus galloprovincialis: extent and implications of a novel bioinvasion." African Journal of Marine Science 42(2): 167-176.	Thank you very much for your comment. We have now considered this reference but have not added it as it was not considered suitable for a general reference (too local)
Jeschke, Jonathan	No	2	6	171	7	174	For Dreissena polymorpha and D. rostriformis, you could also add the newer reference by Strayer et al. (2019): Strayer, D.L.; Adamovich, B.V.; Adrian, R.; Aldridge, D.C.; Balogh, C.; Burlakova, L.E.; Fried-Petersen, H.B.; Tóth, L.G.; Hetherington, A.L.; Jones, T.S.; Karatayev, A.Y.; Madill, J.B.; Makarevich, O.A.; Marsden, J.E.; Martel, A.L.; Minchin, D.; Nalepa, T.F.; Noordhuis, R.; Robinson, T.J.; Rudstam, L.G.; Schwalb, A.N.; Smith, D.R.; Steinman, A.D.; Jeschke, J.M. 2019. Long-term population dynamics of dreissenid mussels (Dreissena polymorpha and D. rostriformis): a cross-system analysis. Ecosphere 10, e02701.	Thank you for your comment. We have now updated the citation with the new reference in the second order draft.
Wood, Louisa	No	2	6	172	6	172	Species name change - Magallana gigas	Thank you very much. Crassostrea gigas is considered by part of the scientific community to be the proper denomination; therefore we have not changed it here
Government of Germany	Yes	2	7	176	7	178	Please check whether more recent data about the total number of invasive bivalves are available.	Thank you very much for your comment. We have now checked the number.
Heger, Tina	No	2	7	177	7	178	I suggest changing to "... continents; for 24 of these species, substantial information about distribution or effects is available."	Thank you very much. We have now made this change in the second order draft
Jeschke, Jonathan	No	2	7	185	7	185	Remove author initials.	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Guareschi, Simone	No	2	7	188	7	191	I think it is important to specify where these cited species are considered IAS geographically. For example: <i>Pomacea canaliculata</i> (Native: South America; IAS: Asia, Europe, North America) ideally with the supporting references.	Thank you very much. As this is just a list of examples, for the sake of space we decided not to provide more details for each of these species
Rebelo, Alanna	No	2	7	188	7	191	Shouldn't common names be capitalized? E.g. the Golden Apple Snail.	Thank you. No, we do not capitalize common names.
Government of Germany	Yes	2	7	189	7	189	It is suggested to consider the following reference after Pomacea canaliculata: Yang, Q.-Q., et al. (2018). "Distribution and the origin of invasive apple snails, Pomacea canaliculata and P. maculata (Gastropoda: Ampullariidae) in China." Scientific reports 8(1): 1-8.	Thank you very much. We have now cited this reference in the second order draft
Lawson Handley, Lori	No	2	7	193	8	222	First sentence is rather vague - what is meant by "an important role"? Also can you be more specific than "a noteworthy proportion"? Again I think it would be helpful to more explicitly separate marine and freshwater invasions as the status, distribution and trends could be quite different. Although nearly 10 years old, this article provides a good summary of invasive Crustacea: Hänfling, B., Edwards, F. and Gherardi, F. (2011) "Invasive alien Crustacea: dispersal, establishment, impact and control". Biocontrol, 56(4), pp. 573-595. doi: 10.1007/s10526-011-9380-8.	Thank you for your comment. We revised the whole section including this sentence and added the suggested citation in the second order draft.
Government of Germany	Yes	2	7	202	7	202	It is suggested to consider the following reference after Epifanio, 2009; Blakeslee, A. M., et al. (2017). "Reconstructing the invasion history of the Asian shore crab, Hemigrapsus sanguineus (De Haan 1835) in the Western Atlantic." Marine Biology 164(3): 47.	Thank you very much. We have now cited this reference in the second order draft.
Government of Germany	Yes	2	7	202	7	203	Please check, the following statement is not any longer valid: "The literature on the Asian shore crab is limited in comparison to better known naturalized crabs like the European green crabs". During the last years, numerous data and information about the Asian shore crab have been published.	Thank you very much. We have now cited this reference in the second order draft.
Reshi, Zafar A	No	2	8	2	8	2	The sentence should read as "Over the past 200 years, introductions of alien species have increased....."	Thank you, grammatical mistakes have been corrected in the second order draft.
Reshi, Zafar A	No	2	8	4	8	4	.....and become naturalized every day	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Catford, Jane	No	2	8	5	8	5	perhaps briefly indicate what "first record" means for those unfamiliar with the term	Thank you very much. We have rephrased the executive summary to clarify this point in the second order draft.
Kühn, Ingeolf	No	2	8	7	8	7	Change intern- to inter-	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	2	8	15	8	16	How about trends for other major taxa?	Thank you for your comment. We only show trends for taxonomic groups, where the quantity of records ensures a robust representation of trends. Records of taxonomic groups with too few records where combined in the group 'other animals'.
Reshi, Zafar A	No	2	8	24	8	24	...one comprehensive global analysis reporting that	Thank you, we have revised the executive summary in the second order draft
Guareschi, Simone	No	2	8	212	8	217	Line 212-214. I think it is important here to mention the first study to highlight the impact of signal crayfish on invertebrate functional community diversity in rivers (Mathers et al. 2020. Invasive crayfish alter the long-term functional biodiversity of lotic macroinvertebrate communities. Functional Ecology). Line 215-217. I suggest these lines should be moved to the end of the paragraph so that the description of microcrustaceans is at the end of the section and not between two examples of Decapoda and Amphipoda.	Thank you very much. Impact are specifically treated in Chapter 4, so we have not added this study on impact
Jeschke, Jonathan	No	2	8	212	8	212	The references should be put in one pair of brackets (rather than two pairs).	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Jeschke, Jonathan	No	2	8	216	8	216	Remove "for"	Thank you for your comment. We have now changed the text accordingly in the second order
Kudelska, Theresa	No	2	8	217	8	222	Potential additional references in relation to Dikergammarus villosus: Maazouziab, C.Piscarta, C.Legiera,F. Hervanta, F. 2011. Ecophysiological responses to temperature of the "killer shrimp" Dikergammarus villosus: Is the invader really stronger than the native Gammarus pulex? Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology Volume 159, Issue 3, July 2011 Pages 268-274. Manfred, P. 2019. Success of the invasive Ponto-Caspian amphipod Dikergammarus villosus by life history traits and reproductive capacity. Biological Invasions volume 11, 2021-2041	Thank you very much. We have now considered these references and would have cited the second one proposed but could not find a matching reference.
Wood, Louisa	No	2	8	218	8	222	Economic considerations could also be considered e.g. in the UK, D. villosus is a major concern to water companies - please consult reference Gallardo et al. (2020) Priority setting for invasive species management by the water industry. Water Research 16: 115771. https://doi.org/10.1016/j.watres.2020.115771	Thank you very much. Impact is kept for another chapter, so we have not added economic considerations in this chapter
Government of Germany	Yes	2	8	220	8	220	It is suggested to consider the following reference after "... amphipod species"; Richter, L., et al. (2018). "The very hungry amphipod: the invasive Dikergammarus villosus shows high consumption rates for two food sources and independent of predator cues." Biological Invasions 20(5): 1321-1335.	Thank you very much. We have now considered this reference, but as it is about impact, we did not cite it. Impact is specifically dealt with in Chapter 4

Jeschke, Jonathan	No	2	8	221	8	221	Replace "North American" by "North America".	Thank you for your comment. We have made the change in the second order draft.
Government of Germany	Yes	2	8	222	8	222	It is suggested to consider the following reference at the end of the sentence: Bradbeer, S. J., et al. (2020). "The effectiveness of disinfectant and steam exposure treatments to prevent the spread of the highly invasive killer shrimp, <i>Dikerogammarus villosus</i> ." <i>Scientific Reports</i> 10(1): 1-7.	Thank you very much. We have now considered this reference, but as it is about management, we did not cite it. Management is specifically dealt with in Chapter 5
Jeschke, Jonathan	No	2	8	222	8	222	Remove the comma before "represents".	Thank you for your comment. We have now changed the text accordingly in the second order draft
Csécserits, Anikó	No	2	8	223	8	223	I suggest to use the subtitle Insect, and the ants could be a box.	Thank you very much for your comment. As we already have many boxes, and of more general focused, we have chosen not to use a box for the focus of one single family, but as ants are very important invaders, we have kept a paragraph on this family in the second order draft
Lawson Handley, Lori	No	2	8	223	8	244	An excellent overview of ant invasions is also presented here: Rabitsch, W. (2011) 'The hitchhiker's guide to alien ant invasions'. <i>Biocontrol</i> , 56(4), pp.	Thank you very much. We have now added this reference in the second order draft.
Pisanu, Benoit	No	2	8	223	8	243	On the Ants paragraph. Lacks at least one example of impact. May i suggests - among others: Fisher R, Ineisch Y 2012 Cryptic extinction of a common Pacific lizard <i>Emoia impar</i> (Squamata, Scincidae) from the Hawaiian Islands. <i>Oryx</i> 46:187–95	Thank you for your comment. We have refrained from detailing impacts in this chapter, as Chapter 4 is focused on impacts
Takehara, Mari (Government of Japan)	Yes	2	8	224	8	244	The invasion of fire ants has been occurring due to contamination of marine containers, whether or not the contents of the cargo are plants in Japan. Based on past surveys in Japan, we infer that this is the case not only for ants in general, but also for other insects, amphibian reptiles, and spiders and scorpions, and we consider this to be an important issue. If this is confirmed as a trend, it is desirable to describe it. Please refer to the following references for examples. - A paper on the risks of containers carrying a variety of insects: Stanaway, MA (2001) Pest risk assessment of insects in sea cargo containers. <i>Aust. J. Entomol.</i> 40: 180–192 https://onlinelibrary.wiley.com/doi/epdf/10.1046/j.1440-6055.2001.00215.x - Thesis that plant seeds are carried by sticking to the outdoor air conditioner filter of refrigerated containers: Lucardi, RD (2020) Seeds attached to refrigerated shipping containers represent a substantial risk of nonnative plant species introduction and establishment. <i>Scientific Reports</i> volume 10, Article number: 15017 (2020) https://www.nature.com/articles/s41598-020-71954-3	Thank you for your comment. This would result in a very large number of figures, which is not possible to include given the limited space.
Blackburn, Tim	No	2	8	228	8	228	Replace "over" with "more than".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	8	229	8	229	Replace "over" with "more than".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Government of Germany	Yes	2	8	231	8	231	The citation used is about 20 years old; please check for updated information.	Thank you very much. This is the seminal citation that lists the list; there is no other reference to replace it, unless the list changes.
Jeschke, Jonathan	No	2	8	231	8	231	In the reference, please replace "&" by "et". Also, this is the reference to the original list which has been updated since then. Therefore, I'd provide the source of the current list: http://www.iucngisd.org/gisd/100_worst.php	Thank you for your comment. The list has been updated by one plant added, but has not changed regarding to the ants and the statement, so the reference is still correct. We however now also provide the link as suggested in the second order draft.
Jeschke, Jonathan	No	2	8	237	8	238	Remove the lead author's first name (Petr) and put the references in one pair of brackets. I noticed similar issues in the rest of the draft, but do not highlight them individually in the following pages: if this issue is fixed in the reference software, it will be fixed throughout the text.	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Blackburn, Tim	No	2	8	238	8	238	Merge two brackets of citations into one by using semicolon in between.	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Heger, Tina	No	2	8	239	8	239	I suggest changing to 'by means of multiple separate introductions'	Thanks for this suggested change. We have included it in the second order draft
Government of Germany	Yes	2	8	241	8	241	It is suggested to consider the following reference after Giraud et., 2002; Charrier, N. P., et al. (2020). "Invasive in the North: New latitudinal record for Argentine ants in Europe." <i>Insectes Sociaux</i> 67(2): 331-335.	Thank you very much. We have now cited this reference in the second order draft
Heger, Tina	No	2	8	241	8	241	I suggest changing to 'The latter seems to be a general pattern', since this sentence does not relate to multiple separate introductions, but only to the subsequent secondary spread.	Thank you. We have reworded the second order draft.
Government of Germany	Yes	2	8	245	9	263	It is suggested to insert cross-references to other chapters of the IAS-assembly that address the aspect of IAS and human health. Rationale: Notably insect invaders could pose severe (human) health issues, and should be clearly linked to the discussions on the One Health approach.	Thank you for your comment. Please note that the impacts on human health and governance are dealt with in other chapters.
Csécserits, Anikó	No	2	8	246	8	246	I think, it should be stated that there is a huge knowledge gap, how many alien insect are there. The scientific research is hardly able to follow the changes in the insect communities of the different regions.	Thank you very much for your comment. We have now added such a statement, but in the part knowledge & gaps in the second order draft
Heger, Tina	No	2	8	246	8	246	I suggest deleting 'among'	Thanks for this suggested change. We have included it in the second order draft
Lawson Handley, Lori	No	2	8	246	9	263	Worth referring to the same special issue of BioControl as mentioned in the previous comments. See p378-379 of Roy, H. E. et al. (2011) 'Alien arthropod predators and parasitoids: an ecological approach', <i>Biocontrol</i> , 56(4), pp. 375–382. doi: 10.1007/s10526-011-9388-0. for an "inventory" of invasive arthropods. Also Bradshaw, C. J. A. et al. (2016) 'Massive yet grossly underestimated global costs of invasive insects'. <i>Nature communications</i> , 7, p. 12986.	Thank you very much. In the second order draft, we have added the first reference, but not the second, which is only about impact, a point focused on in Chapter 4
Volpedo, Alejandra	No	2	9	30	9	62	In this section it should also be incorporated that the introductions that took place in the past are either given in the present in some countries by the implementation of socio-economic policies that stimulate the production of certain species for cultivation for example of fish in aquaculture, or for example in the past "recreational" activities such as "hunting" or "sport fishing". An example of this is the introduction of salmon deer and tilapias in South America	Thank you for comment. This is a very general overview about the history of biological invasions, where we do not want to get in depth, also because drivers are presented extensively in chapter 3.
Reshi, Zafar A	No	2	9	33	9	33	Petr be deleted..	Thank you very much, we have corrected and harmonized the style of the references and citations in the second order draft
Feest, Alan	No	2	9	52	9	53	An awkward sentence that needs rephrasing.	Thank you, this sentence has been rephrased in the second order draft.
Guareschi, Simone	No	2	9	245	9	263	Other insects. Being such an important and rich part of animal biodiversity, this section would benefit from further detail. Two topics are currently missing: a) The paradox of the relative absence of invasive aquatic insects in freshwater should be mentioned here. Please see Fenoglio et al. 2016. b) The example of the unique truly full aquatic invasive insect: <i>Trichocorixa verticalis</i> (Hemiptera, Corixidae). This species is aquatic (euryhaline) during all phases of its life cycle from nymphs to adult. In my opinion a reference and some text about this interesting example would be the perfect complement for this section. The species is currently expanding in South Spain and North Morocco. See Guareschi et al. 2013 PLOS ONE for details and predicted worldwide future distributions and Carbonell et al. 2017 for implications. - Fenoglio et al. 2016. <i>Biology Letters</i> . Freshwater ecosystems and aquatic insects: a paradox in biological invasions - Guareschi et al. 2013 PLoS One. How far could the alien boatman <i>Trichocorixa verticalis verticalis</i> spread? Worldwide estimation of its current and future potential distribution - Carbonell et al. 2017. <i>Biological invasion modifies the co-occurrence patterns of insects along a stress gradient</i> . <i>Functional Ecology</i> 31 (10), 1957-1968	Thank you very much. We have now changed the text accordingly in the second order draft
Rebelo, Alanna	No	2	9	253			In South Africa we are currently fighting a major outbreak of the polyphagous Shothole Borer.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these in the second order draft.
Zhou, Mo	No	2	9	254	9	255	Some better citations for EAB are, for instance, Kovacs, K.F., Haight, R.G., McCullough, D.G., Mercader, R.J., Siegert, N.W. and Liebhold, A.M., 2010. Cost of potential emerald ash borer damage in US communities, 2009–2019. <i>Ecological Economics</i> , 69(3), pp.569-578. Herms, D.A. and McCullough, D.G., 2014. Emerald ash borer invasion of North America: history, biology, ecology, impacts, and management. <i>Annual review of entomology</i> , 59.	Thank you for your comment. We included one of the suggested citation as we already have two for EAB in the second order draft.
Blackburn, Tim	No	2	9	255	9	256	Merge two brackets of citations into one by using semicolon in between.	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Zhou, Mo	No	2	9	255	9	256	Some better citations for ALB are, for instance, Dodds, K.J. and Orwig, D.A., 2011. An invasive urban forest pest invades natural environments—Asian longhorned beetle in northeastern US hardwood forests. <i>Canadian Journal of Forest Research</i> , 41(9), pp.1729-1742. Haack, R.A., Hérard, F., Sun, J. and Turgeon, J.J., 2010. Managing invasive populations of Asian longhorned beetle and citrus longhorned beetle: a worldwide perspective. <i>Annual review of</i>	Thank you for your comment. We included one of the suggested citation as we already have two for ALB in the second order draft.
Pisanu, Benoit	No	2	9	260	9	263	Should rephrase the sentence - which is a little difficult to understand. Do you mean invasive pollinators can provide better services when replacing natives species ?? I think that the comma after (<i>Apis mellifera</i>) should be removed - if the meaning is to highlight that <i>A. mellifera</i> should be viewed as an IAS as well when introduced and established outside its native range.	Thank you for your comment. We have revised this section to improve readability in the second order draft.
Blackburn, Tim	No	2	9	262	9	262	Delete comma after " <i>Apis mellifera</i> ".	Thanks, this section has been rewritten in the second order draft
Rebelo, Alanna	No	2	9	262	9	263	The domesticated honey bee is coming under scrutiny in South Africa (http://ujubeec.com/)	Thank you for making this point. We have revised this part in the in the second order draft to include more information on domesticated honey bees.
Csécserits, Anikó	No	2	9	264	9	264	I miss the axonomic group "spiders". I think, it needs also a separate part.	Thank you very much for your comment. We have now added a new part on these species in the second order draft
Government of Germany	Yes	2	9	264	10	296	It is suggested to change the order of the four paragraphs from simple to more complex species groups: 1) Ctenophores; 2) flatworm; 3) Alien earthworms 4)	Thanks, this section has been rewritten in the second order draft
Blackburn, Tim	No	2	9	265	9	265	A plasticity? Need to be more specific here.	Thank you for your comment. We have completely revised this section in the second order
Heger, Tina	No	2	9	265	9	267	Have a plasticity is too vague. Maybe go into detail with what kind of plasticity is meant here (behavioural, physiological,...), or change the sentence e.g. to 'Echinoderms are able to quickly respond to changes in prey availability and to sustain large densities, allowing them to successfully establishing alien	Thank you for your comment. We have completely revised this section in the second order draft.
Blackburn, Tim	No	2	9	270	9	270	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Blackburn, Tim	No	2	9	270	9	270	Replace "large" with "high".	Thank you for your comment. We have completely revised this section in the second order
Blackburn, Tim	No	2	9	277	9	278	Rephrase "ballast water with subsequent spread" to "ballast water. This species subsequently spread".	Thank you for your comment. We have now changed the text accordingly in the second order
Blackburn, Tim	No	2	9	278	9	278	Replace "and" after "Mediterranean Sea" with comma.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	9	279	9	279	Replace "all over" with "throughout".	Thank you for your comment. The section has been revised and your comment has been considered in the second order draft.

Dupont, Lise	No	2	9	280	10	292	Concerning earthworms only the examples of European earthworms which invaded the northern hemisphere are given. Is missing the example of the most representative tropical earthworm, <i>Pontoscolex corethrurus</i> , that has been introduced throughout the southern hemisphere and which is known to compact soils. For a reference, see Taheri et al. 2018 <i>Soil Biology and Biochemistry</i> 116 : 277-289	Thank you very much for your comment. This is a very helpful suggestion, which we included in the section order draft.
Heger, Tina	No	2	9	280	9	292	I suggest changing the order of the sentences in this paragraph: Start with the sentence in line 286 ('Globally,...'), next, the sentences in lines 289 to 292 ('Despite being ecosystem engineers...until 'mostly unnoted (...)', third, the sentence in lines 286 to 289 ('Ongoing invasions...'), and after that continue with	Thank you. We have reworded the second order draft.
Heger, Tina	No	2	9	280	9	280	I suggest changing to 'Alien earthworms can often be found spreading into habitats ...', because it is not a characteristic of a certain species to spread, but a result of a combination of different factors (which is nicely pointed out in other parts of this text)	Thanks for this suggested change. We have included it in the second order draft
Blackburn, Tim	No	2	9	281	9	281	Replace "inn" with "in".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	9	281	9	281	in' instead of 'inn'	Thanks for this suggested change. We have included it in the second order draft
Rebello, Alanna	No	2	9	281			Typo: "inn".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Wood, Louisa	No	2	9	281	8	281	Grammatical change - 'such as in North America, which has been depauperate in native earthworms since the last'.	Thank you, grammatical mistakes have been corrected in the second order draft.
Rebello, Alanna	No	2	9	282			Capitalize: taiga region?	Thank you for your comment, but we see no need to capitalize taiga.
Heger, Tina	No	2	9	284	9	286	I suggest changing to 'Besides a few native species (Csuzid et al., 2017), the earthworm fauna of the American Northeast now includes many alien species from Europe and a rapidly rising number...'	Thank you for making this point. It does not seem to require changes to the text.
Blackburn, Tim	No	2	9	285	9	285	Rephrase "Europee with a rapidly" to "Europe, and rapidly".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	9	286	9	286	Replace "earthworms" with "earthworm species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	9	286	9	286	Replace "over" with "more than".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
kühn, Ingolf	No	2	10	71	10	78	Status definition (ll 71 & 78) is redundant, I believe.	Thank you for your comment. We think that the term 'status' needs to be explained in the introduction as it might not be clear to all readers.
Dupont, Lise	No	2	10	293	10	296	Among introduced flatworms, the new zealand flatworm <i>Arthurdendyus triangulatus</i> , is listed as invasive by the European Commission on its list of invasive alien species of concern for the European Union, in accordance with Regulation (EU) No 1143/2014. This species is responsible for the reduction in the number of aneic earthworms belonging to the species <i>Lumbricus terrestris</i> and <i>Aporectodea longa</i> in the UK (Murchie and Gordon, 2013, <i>Biological Invasions</i> 15: 569-586). Several others flatworms has been reported as invasive species in Europe (review in Justine J. Winsor L, Gey D, Gros P, Thévenot J. 2020. <i>Obama chez moi! The invasion of metropolitan France by the land planarian Obama nungara</i> (Platyhelminthes, Geoplanidae) <i>PeerJ</i> 8:e8385	Thank you very much for your comment. This is a very helpful suggestion, which we included in the second order draft.
Girod, Christophe	No	2	10	293	10	296	Flatworm introduction (not only of New Guinea flatworm) is being increasingly recorded in Europe, e.g in France : Justine J. Winsor L, Gey D, Gros P, Thévenot J. 2014. The invasive New Guinea flatworm <i>Platydemus manokwari</i> in France, the first record for Europe: time for action is now. <i>PeerJ</i> 2:e297 https://doi.org/10.7717/peerj.297	Thank you very much for your comment. This is a very helpful suggestion, which we included in the second order draft.
Csecserits, Anikó	No	2	10	297	10	297	I suggest to use the subtitle: Vertebrate.	Thank you very much for your comment. We have decided not to add more subheadings in order to keep reading easy
Government of Germany	Yes	2	10	297			It is suggested to add a new paragraph here on: tunicates, sea squirts.	Thank you very much. We have now added a new part on these species in the second order
Heger, Tina	No	2	10	299	10	299	I suggest changing to 'the pathways of fish invasion vary, but are often known in great detail', because other pathways probably are 'specific' as well, only not so well known?	Thank you for making this point. It does not seem to require changes to the text.
Lawson Handley, Lori	No	2	10	299	10	300	'pathways of fish invasions vary but are rather specific' seems a contradiction	Thank you very much for your comment. The sentence is not conflicting: there are many (varying) possible pathways, but these are specific (depend on species)
Pisanu, Benoit	No	2	10	299	10	299	Suppress 'are rather specific'.	Thank you for your comment. The sentence is not conflicting: there are many (varying) possible pathways, but these are specific (depend on species)
Wood, Louisa	No	2	10	299	10	299	Sentence is rather conflicting - 'The pathways of fish invasions vary but are rather specific'. Pathways are not common to fish introductions, but reflect the key pathways for many freshwater/marine invasions.	Thank you very much. The sentence is not conflicting: there are many (varying) possible pathways, but these are specific (depend on species)
Heger, Tina	No	2	10	303	10	303	propagule size' is a term that I think is very specific for invasion biology, and not well known outside this community. Maybe add to the glossary? Or avoid, e.g. by changing here to 'escape events can lead to simultaneous release of very high numbers of individuals?'	Thank you. This is added to the glossary the second order draft.
Government of Germany	Yes	2	10	305			It is suggested to add the following sentence at the end of the paragraph: 'Estimates suggest that in Chile more than 900.000 salmonids escape annually from the net pens of salmon farms (Thorstad et al., 2008; Sepúlveda et al. 2013).' Please consider the following references as well: Thorstad, E. B., et al. (2008). "Incidence and impacts of escaped farmed Atlantic salmon <i>Salmo salar</i> in nature." NINA special report 36(6). Sepúlveda, M., et al. (2013). "Escaped farmed salmon and trout in Chile: incidence, impacts, and the need for an ecosystem view." <i>Aquaculture Environment Interactions</i> 4(3): 273-283.	Thank you very much. We have now added this information and associated references in the second order draft.
Blackburn, Tim	No	2	10	306	10	306	"Naturalized" may be better to replace with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	10	307	10	310	unclear citation: Is that information from Dawson et al. or from Arndt et al?'	Thank you. We have modified this to make it clearer the second order draft.
Heger, Tina	No	2	10	308	10	308	unclear: what does 'alone six global invasion hotspots' mean - change to 'are mainly found in six global invasion hotspots?'	Thanks for this suggested change. We have included it in the second order draft
Heger, Tina	No	2	10	310	10	310	I suggest deleting 'For example', because it is not obvious how this exemplifies the previous sentence.	Thank you for making this point. It does not seem to require changes to the text.
Dudgeon, David	No	2	10	311	10	311	Not 'the' Lake Victoria	Thank you, this has been removed from the second order draft
Jeschke, Jonathan	No	2	10	311	10	311	Delete "the" before "Lake Victoria".	Thank you, this has been removed from the second order draft
Dudgeon, David	No	2	10	313	10	313	... in what'. In am doubtful that (as opposed to line 311) <i>Oreochromis niloticus</i> is the driver of this extinction (this is not what the literature says) but <i>Lates niloticus</i> most certainly has been!	Thank you very much. This sentence has been modified in the second order draft
Jeschke, Jonathan	No	2	10	319	10	319	Delete "the" before "Lesserian".	Thank you for your comment. We have now changed the text accordingly in the second
Reshi, Zafar A	No	2	11	98	11	98	Figure 2.1. associated with alien species distributions	Thank you, we have revised the legend in the second order draft.
Faulkner, Katelyn	No	2	11	325	11	325	For Figure 2.4, it would be better to present the results as barplots than pie charts. At the very least the figure should not be in '3D', it's not necessary. The caption for the figure needs to be re-worded, 'distribution' is not the right word to use in this instance. It is also important to mention in the caption that these are animal species. Plants and other groups are not included in the figure.	Thank you for your comment. We removed the figure from the second order draft.
Government of Germany	Yes	2	11	325	11	325	Figure 2.4: Consider changing the size of the smaller pie charts according to portions (chordata 34%; Arthropoda 49%).	Thank you for your comment. We removed the figure from the second order draft.
Pisanu, Benoit	No	2	11	326	11	326	Add 'animal' after naturalized	Thank you for your comment. We removed the figure from the second order draft.
Rebello, Alanna	No	2	11	326			Species of animals?	Thank you for your comment. The caption of this figure has been modified to reflect this in the second order draft.
Girod, Christophe	No	2	11	330	11	346	Lithobates catesbeianus (North American Bullfrog) might be worth developing, too. For impact on native species, see for instance Oda et al. A1 2019 Oda FH, Guerra V, Grou E, de Lima LD, Proença HC, Gambale PG, Takemoto RM, Teixeira CP, Campião KM, Ortega JCG. 2019. Native anuran species as prey of invasive American Bullfrog, <i>Lithobates catesbeianus</i> , in Brazil: a review with new predation records. <i>Amphibian & Reptile Conservation</i> 13(2) [General	Thank you very much for your comment. This chapter does not detail the impacts of IAS
Heger, Tina	No	2	11	330	11	330	global data' instead of 'global maps', because it is unclear how maps can show temporal changes.	Thank you for making this point. It does not seem to require changes to the text.
Vamberger, Melita	No	2	11	330	11	346	It would be good to mention <i>Batrachochytrium salamandrivorans</i> causing mass die-offs in wild European fire salamanders here, since you mention it also in Chapter 4 (page 63 line 1738).	Thank you for your comment. This species has been added in the revised text in the second order draft.
Blackburn, Tim	No	2	11	331	11	332	Don't understand what is meant here.	Thank you very much for your comment. The sentence has been modified in the second order
Heger, Tina	No	2	11	331	11	332	I suggest changing to 'particularly on island of economically hiely developed countries and with heterogeneous climates'.	Thank you for making this point. It does not seem to require changes to the text.
Blackburn, Tim	No	2	11	332	11	333	The size of the pet trade?	Thank you very much for your comment. The sentence has been modified in the second order
Heger, Tina	No	2	11	332	11	334	Clarify: how can pet trade be an indicator - is that number of traded animals, per what? And how is that different from number of introductions?	Thank you for making this point. The section has been completely revised the second order
Blackburn, Tim	No	2	11	333	11	333	The number of alien amphibian species in an area?	Thank you for making this point. The section has been completely revised in the second order
Blackburn, Tim	No	2	11	335	11	335	Meaning of "the trend of invasions of amphibians" is unclear.	Thank you for your comment. We have revised this section and this has been reworded in the second order draft.
Girod, Christophe	No	2	11	337	11	337	Name of Cane Toad is now <i>Rhinella marina</i>	Thank you for your comment. We have now changed the text accordingly in the second order
Dudgeon, David	No	2	11	342	11	343	There is another such fungus: <i>B. salamandrivorans</i> affects urodeles and has been spreading through Europe and probably originated in Asia.	Thank you for your comment. This species has been added in the second order draft.
Blackburn, Tim	No	2	11	343	11	343	Delete hyphen in "disease-causing".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	11	343	11	343	delete '-' between 'disease' and 'causing'	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	11	343	11	343	Delete hyphen between "disease" and "causing".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Government of Germany	Yes	2	11	344	11	344	It is suggested to add the following citation after the year 2004: Berger, L., et al. (2016). "History and recent progress on chytridiomycosis in amphibians." <i>Fungal Ecology</i> 19: 89-99.	Thank you for your comment. We moved this part to the fungi section, where the citation has been included in the second order draft
Heger, Tina	No	2	11	344	11	344	change 'include' to 'are'	Thanks for this suggested change. We have included it in the second order draft
Vamberger, Melita	No	2	11	347	12	389	I miss also a part about invasive turtles and their impact. <i>Trachemys scripta</i> is listed under 100 of the World's Worst Invasive Alien Species (Global Invasive Species Database 2020; downloaded from http://www.iucnqid.org/gisd/100_worst.php on 06-10-2020.) and should also be at least mentioned here.	Thank you very much. We have only provided a few examples and cannot, unfortunately, cite all species, for the sake of space

Csceserits, Anikó	No	2	11	348	12	350	I think, amphibians should not be included and mentioned in this part, which is about reptiles.	Thank you very much for your comment. We have completely revised this section and considered your comment in the second order draft.
Blackburn, Tim	No	2	11	349	11	349	"Amphibians and reptiles"? Amphibian is discussed in the previous section - this one is on reptiles.	Thanks for this suggested change of wording. We have removed reference to amphibians here. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	11	349	11	349	Replace "successful invasions" with "established alien populations".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Vamberger, Melita	No	2	11	349	11	349	I find it a bit confusing to talk in the chapter "Reptiles" also about amphibians. This information should be mentioned in the chapter above in "Amphibians".	Thank you for your comment. We have completely revised this section and considered your comment in the second order draft.
Blackburn, Tim	No	2	12	350	12	350	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	12	352	12	352	Would it be "their numbers" of species? Could be read as population numbers (i.e. sizes).	Thank you very much for your comment. We have reworded this in the second order draft.
Blackburn, Tim	No	2	12	353	12	353	Replace "reptiles" with "reptile species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	354	12	354	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	12	355	12	355	Replace "invasion" with "establishment"?	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	12	356	12	356	I suggest changing to 'and climate matching of native and introduced range'.	Thank you for making this point. It does not seem to require changes to the text.
Blackburn, Tim	No	2	12	357	12	357	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	12	358	12	358	Insert "species" after "reptile".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Rebello, Alanna	No	2	12	359			pet trade repetition of first sentence of paragraph	Thank you very much. The other mention of pet trade was for amphibians, not reptiles
Heger, Tina	No	2	12	361	12	362	I suggest adding 'As a result of these introductions, the reptile...'	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	12	364	12	364	Replace "continents and the number" with "continents, while".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	364	12	364	Replace "snakes and lizards" with "snake and lizard species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	364	12	364	Replace "where" with ". Here,".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	367	12	367	Delete "amphibian and".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Vamberger, Melita	No	2	12	367	12	368	Same as above. I find it a bit confusing to talk in the chapter "Reptiles" also about amphibians. This information should be mentioned in the chapter above in "Amphibians".	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Blackburn, Tim	No	2	12	368	12	368	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	12	369	12	369	Delete "amphibian and".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Singheiser, Martin	No	2	12	371	12	371	Please check the example of the Burmese python: Python bivittatus is a distinct species and not longer belonging as a subspecies to Python molurus. The Burmese python P. vittatus originally belongs to SE-Asia where it lives in marshy areas and now is invasive in Florida. Python molurus also known as the Indian rock python or Asian rock python is originally from India and stays smaller than the Burmese python. Reference: Jacobs, H.J.; Auliya, M.; Bohme, W. (2009). "On the taxonomy of the Burmese Python, Python molurus bivittatus KUHL, 1820, specifically on the Sulawesi population". Sauria, 31: 5–11.	Thank you for your comment. It might be logical indeed, but the converse could be justified as well: being good dispersers, birds should be good natural colonizers and should therefore have fewer regions to be introduced to (and therefore had fewer IAS). In absence of test, neither of these two opposite hypotheses can be put forward
Blackburn, Tim	No	2	12	374	12	374	Starting when?	Thank you very much for your comment. The information was not available, but it is assumed it was at the time of the publication
Blackburn, Tim	No	2	12	375	12	375	Delete "at".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	12	375	12	375	See my comment in line 303: add propagule pressure to glossary?	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	12	376	12	376	Replace "naturalized" with "established".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	378	12	378	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	12	382	12	382	Replace "now colonizes" with "has since colonized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	383	12	384	Rephrase "Guam lacks native bird predators" to "Guam lacks native predators of birds".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	385	12	385	Replace "birds" with "bird species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	385	12	385	Replace "lizards and bats" with "lizard and bat species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	12	389	12	389	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	13	392	12	393	Most birds have small alien ranges (see Dyer et al. 2016). Is this statement accurate?	Thank you for your comment. We have revised the whole section and considered your comment in the second order draft.
Csceserits, Anikó	No	2	13	392	13	393	I think, beside mentioning the app. Number of invasive bird species, here it should be mentioned, how do you deal and separate the spontaneously spreading (e.g because of climate change) and the invasion assisted by humans. I know, that there is a definitio, but especially in case of fly species, like insects or birds, it could be an important question and for the reader it would help to emphasize the difference in one sentence.	Thank you very much for your comment. This point is dealt with in Chapter 1
Girod, Christophe	No	2	13	392	13	413	An interesting study has been conducted on an invasive bird in Reunion Island, which facilitates the dissemination of some invasive plant species : Mandon-Dalger, I., Clergeau, P., Jacques Tassin, Jean-Noël Rivière, & Sylvain Gatti. (2004). Relationships between Alien Plants and an Alien Bird Species on Reunion Island. Journal of Tropical Ecology, 20(6), 635-642. Retrieved October 17, 2020, from http://www.jstor.org/stable/4092109	Thank you very much for your comment. Inversional meltdown is dealt with in Chapter 3 in the second order draft
Jeschke, Jonathan	No	2	13	394	13	394	Add comma after "New York City"	Thank you, comma added in the second order draft.
Blackburn, Tim	No	2	13	395	13	395	Replace "individuals in" with "individuals across the entire continental". It's the spread that is the key point here, not the numbers, if you are making the point about dispersal efficiency.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	13	397	13	397	I suggest changing to 'acclimatization and later by pet trade'.	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	13	398	13	398	Note that in the reference list, Dyer et al. 2017a and 2017b are the same reference, while a second reference is in as Dyer et al 2017. Needs to be sorted out.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	13	400	13	400	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Heger, Tina	No	2	13	401	13	401	Why insufficient? The next sentence tells about current patterns, but these regulations can only affect the number of new introductions. These may have gone down to zero even if invasive species are present as a consequence of previous introductions. Delete 'but insufficient'?	Thank you very much. Wildlife trade is not the only source of bird invasions; consequently, wildlife trade bans have an effect, but they were found to be insufficient because of other
Blackburn, Tim	No	2	13	404	13	404	Citation would be "Dyer, Cassey, et al., 2017a" rather than "Dawson et al., 2017".	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Heger, Tina	No	2	13	406	13	406	I suggest changing to 'than interspecific competition in explaining bird invasions in avian communities'.	Thank you for making this point. It does not seem to require changes to the text.
Blackburn, Tim	No	2	13	407	13	409	We know from Dyer et al. 2017a that colonisation pressure is the key driver of alien bird species richness (with a secondary effect of distance from a historic port), so this sentence needs rewriting.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	13	415	13	415	Replace "naturalized mamals" with "alien mammal species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	13	415	13	426	This paragraph is very poorly written, and needs to be rethought.	Thank you for your comment. We have completely revised the paragraph in the second order
Heger, Tina	No	2	13	415	13	415	I suggest deleting 'notorious and' because this valuation is not necessary here.	Thanks for this suggested change. We have included it in the second order draft.
Jeschke, Jonathan	No	2	13	415	13	417	Another reference that would fit well here and which is already cited elsewhere in this chapter is: Bellard et al. (2016): Bellard, C.; Genovesi, P.; Jeschke, J.M. 2016. Global patterns in threats to vertebrates by biological invasions. Proc. R. Soc. B 283, 20152454.	Thank you for your comment. We have now considered this reference; it could indeed fit, but it doesn't bring more than the 5 already cited references there, so we have not cited it in the
Lawson Handley, Lori	No	2	13	415	13	415	"not many" is quite vague - can you be more specific or state what this is relative to?	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.

Scalera, Riccardo	No	2	13	415	13	416	The statement "There are not many naturalized mammals" sounds misleading. I suggest rephrasing, because it gives the impression that alien mammals are very few, but compared to what? The other taxa such as plants or invertebrates? (which however are characterized by a much greater number of species globally) I understand this sentence aimed at stressing the fact that although there are no many naturalised taxa, most of them have a major impact, but all this should deserve a more detailed discussion. Also the wording "especially ecologically" sounds not very nice. I suggest replacing the first sentence with the following "Alien mammals are especially notorious for being among the most impactful IAS, especially for the threat they represent for biodiversity at the global level" or	Thank you very much. We have reworded this in the second order draft.
Blackburn, Tim	No	2	13	416	13	416	Delete "e.g.," from citation.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Pisanu, Benoit	No	2	13	417	13	418	About these rodents - there should have some more words on their synanthropic habits - highlighting a long-lasting commensalism se eg Puckett, E. E., Orton, D., & Munshi - South, J. (2020). Commensal Rats and Humans: Integrating Rodent Phylogeography and Zooarchaeology to Highlight Connections between Human Societies. <i>BioEssays</i> , 42(5), 1900160. https://onlinelibrary.wiley.com/doi/full/10.1002/bies.201900160	Thank you for your comment. We considered the suggested reference in the second order draft.
Pisanu, Benoit	No	2	13	418	13	419	On rats on islands - perhaps should go a little more on their role as 'ecological engineers' and consequences on direct/indirect trophic cascading effects linking almost all biotopes/habitats Fukami T, Wardle DA, Bellingham PJ, Mulder CPH, Towns DR, Yeates GW, Bonner KI, Durrett MS, Grant-Hoffman MN, Williamson WM (2006) Above- and below-ground impacts of introduced predators in seabird-dominated island ecosystems. <i>Ecol Lett</i> 9:1299–1307. doi:10.1111/j.1461-0248.2006.00983.x *Graham, N.A.J., Wilson, S.K., Carr, P. et al. Seabirds enhance coral reef productivity and functioning in the absence of invasive rats. <i>Nature</i> 559, 250–253 (2018). https://doi.org/10.1038/s41586-018-0202-3 Kurle CM, Croll DA, Ter shy BR (2008) Introduced rats indirectly change marine rocky intertidal communities from algae- to invertebrate-dominated. <i>Proc Natl Acad Sci USA</i> 105:3800–3804. doi:10.1073/pnas.0800570105 Mulder CPH, Grant-Hoffman MN, Towns DR, Bellingham PJ, Wardle DA, Durrett MS, Fukami T, Bonner KI (2009) Direct and indirect effects of rats: does rat eradication restore ecosystem functioning of New Zealand seabird islands? <i>Biol Invasions</i> 11:1671–1688. doi:10.1007/s10530-008-9396-x Wardle DA, Bellingham PJ, Bonner KI, Mulder CPH (2009) Indirect effects of invasive predators on litter decomposition and nutrient resorption on seabird-dominated islands. <i>Ecology</i> 90:452–464. doi:10.1890/08-0097.1	Thank you for your comment. Impacts of invasive alien species are treated specifically in Chapter 4
Blackburn, Tim	No	2	13	421	13	421	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Heger, Tina	No	2	13	422	13	423	I suggest deleting this sentence ('It is therefore justified' until 'carnivores').	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	13	423	13	423	The new paragraph should start here instead of in line 427. I suggest.	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	13	424	13	424	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Blackburn, Tim	No	2	13	426	13	426	Insert "house" in front of "mouse (<i>Mus musculus</i>)".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Government of Germany	Yes	2	13	426	13	426	Please add the word "house" before "mouse".	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Jeschke, Jonathan	No	2	13	426	13	427	I'd remove the paragraph break here, as the next paragraph also deals with omnivores, at least in the beginning. Maybe rather break the next paragraph, e.g. use separate paragraphs for herbivores and carnivores.	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Rebelo, Alanna	No	2	13	426			the mouse, common name is "house mouse".	Thank you very much. We have made this change in the second order draft.
Jeschke, Jonathan	No	2	13	430	14	448	Bellard et al. (2016; particularly look at Figure 4 in that paper) is also a relevant reference for pigs, goats and cats being high-impact invaders. Dogs and cattle are, according to this study, also high-impact invaders, so should possibly also be mentioned here.	Thank you for your comment. We have now considered this reference, but kept more species references here. That reference is cited elsewhere
Rosa, Hugo Henrique Marques da	No	2	13	430	14	432	These three papers could help to justify the impacts caused by the wild boar (<i>Sus scrofa</i>), (Pereira, C. Z., Rosa, C. A., & Zanini, A. C. (2019). Perception of the presence, impacts and control of the invasive species <i>Sus scrofa</i> in the local community living near the Itatiaia National Park, Brazil. <i>Ethnobiology and Conservation</i> , 8.; da ROSA, C.A. Porcos Selvagens no Parque Nacional do Itatiaia: Distribuição e Impactos. <i>Boletim</i> 21 PNI, 2015.; da ROSA, C.A. Mamíferos exóticos invasores no Brasil: situação atual, riscos potenciais e impactos da invasão de porcos selvagens em florestas tropicais. 2016. 160p. Tese (Doutorado em Ecologia Aplicada) – Universidade Federal de Lavras, Lavras, 2016.)	Thank you very much. Impacts of IAS are treated specifically in Chapter 4
Catford, Jane	No	2	14	162	14	164	What are units for bars/colour scheme (in this and all related figures)? Specify in caption that this figure just covers animals (likewise for other related figures in different sections of the chapter)	Thank you very much for your comment. The units are presented in the caption (number of IAS) and the taxonomic groups are indicated in bold above each map
Volpedo, Alejandra	No	2	14	172	14	172	Authors should include the reference (PENCHASZADEH, P.E. 2005 Invasores: Invertebrados Exóticos En El Rio de La Plata y Region Marina Aledaña EUDEBA, ISBN: 950-23-1388-7)	Thank you for your comment. We have now considered this reference and have not included it here as this part is focusing on specific taxa and not specific regions (and all taxa already have
Volpedo, Alejandra	No	2	14	173	15	178	Authors should review quotations in order to correspond to the text and be relevant.	Thank you for your comment. We considered it in the second order draft.
Blackburn, Tim	No	2	14	432	14	432	Rephrase "Also worth mentioning".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Rosa, Hugo Henrique Marques da	No	2	14	434	14	438	This reference could help to support the argument about the grey squirrel in UK and Italy: "Jones, H., White, A., Lurz, P., & Shuttleworth, C. (2017). Mathematical models for invasive species management: Grey squirrel control on Anglesey. <i>Ecological Modelling</i> , 359, 276–284."	Thank you very much. This reference is about management, which is dealt with specifically in Chapter 5
Rebelo, Alanna	No	2	14	435			The Grey Squirrel has naturalized in South Africa too -suburban areas, particularly in Cape Town, with known impacts on birds.	Thank you for your comment. We added this example in the second order draft.
Heger, Tina	No	2	14	438	14	440	I suggest changing to 'Herbivores causing significant negative impact include rabbits..., and several other ungulates'.	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	14	440	14	440	Rephrase "infamous".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	14	440	14	442	I suggest changing to 'A widespread carnivore is the domestic cat (<i>Felis catus</i>), which has been introduced on most islands worldwide and is responsible for many extinctions (Bonnaud et al., 441 2011; Medina et al. 2011), and also affects continental prey (Doherty...).'	Thank you. This has been reworded in the second order draft. .
Scalera, Riccardo	No	2	14	440	14	440	The wording "Infamous" carnivores sounds not scientifically correct, maybe replace with "most threatening" or similar	Thank you for your comment. We rephrased this and other sentences to avoid the term 'infamous' in the second order draft.
Rebelo, Alanna	No	2	14	442			And Seymour et al. 2020 - https://www.sciencedirect.com/science/article/pii/S2351989420307393	Thank you very much for sharing this information. We have now considered this reference and not added it, for we had more general references on this species already
Heger, Tina	No	2	14	443	14	443	I suggest starting a new sentence here: 'Other examples are the small Indian mongoose...'	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	14	444	14	444	Replace "minks" with "mink".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	445	14	445	Replace "foxes" with "red fox".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	446	14	446	Replace "dogs" with "dog".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	446	14	446	Replace "stoats" with "stoat".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Kudelska, Theresa	No	2	14	446	14	446	This is a possible additional Raccoon dog reference it is an excellent paper which explains about the impacts and invasion history of the species in Europe as well as it's ecology: Mulder, J. 2012. A review of the ecology of the raccoon dog (<i>Nyctereutes procyonoides</i>) in Europe. <i>Geography</i> . Available on: https://www.zoogdiervereniging.nl/sites/default/files/publications/Lutra%2055%282%29_Mulder_2012.pdf	Thank you very much. We have now considered this reference in the second order draft.
Blackburn, Tim	No	2	14	447	14	447	Replace "weasels" with "weasel".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	449	14	449	Rephrase.	Thank you very much. This sentence was deleted in the second order draft.
Heger, Tina	No	2	14	449	14	450	I suggest deleting this sentence, because it contains a contradiction (pathways are specific but shared?).	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	14	449	14	458	I suggest moving this paragraph to the beginning of the section (line 415), and changing the order of its sentences: Start with lie 453-458 (Globally...), followed by lines 451-453 (and deleting the sentence in lines 449-450).	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	14	450	14	450	36 mammal species I assume, rather than individuals?	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	450	14	450	For fur farming, or from it?	Thank you very much. This was changed to "via" in the second order draft.
Blackburn, Tim	No	2	14	451	14	451	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Jeschke, Jonathan	No	2	14	451	14	453	This sentence is hard to read/understand, so please consider revising it.	Thank you, it has been revised in the second order draft.
Blackburn, Tim	No	2	14	453	14	453	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft

Blackburn, Tim	No	2	14	453	14	453	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	455	14	455	Replace "naturalized mammals" with "alien mammal species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Faulkner, Katelyn	No	2	14	459	16	506	I suggest that this section on data gaps should be moved to where the summary of the findings/trends are discussed (possibly to line 165). In so doing all general trends are discussed before getting into the detailed sections and examples for different taxonomic groups (lines 166-458).	Thank you very much. A part on "Data and knowledge gaps" is systematically added to each part in the second order draft.
Heger, Tina	No	2	14	459	14	459	Shouldn't this header be formatted like 'trends' and 'status', to be on that same level?	Thank you for your comment. We checked and revised all headers to have consistency among them in the second order draft.
Yiu, Evonne	No	2	14	459	15	501	It could also be the case where data and knowledge exists/are being collected, but by different institutions and groups, for various purposes and in various languages. For eg local governments may keep data and records of taxonomy but they are never analysed or published as literature.	Thank you very much. We have added this point in the second order draft.
Blackburn, Tim	No	2	14	460	14	467	This needs to be rewritten - it is very poor at present.	Thank you very much. We have rewritten it in the second order draft.
Heger, Tina	No	2	14	460	14	460	I suggest reformulating to "For some taxonomic groups, data coverage is relatively good, but has spatial gaps, making..."	Thank you, we have revised this section in the second order draft.
Jeschke, Jonathan	No	2	14	460	14	461	This sentence should be backed up by references, I think. Relevant papers that I know of would be Pysck et al. (2008), Jeschke et al. (2012) and Bellard & Jeschke (2016); Pysck, P.; Richardson, D.M.; Pergl, J.; Jarošík, V.; Sixtová, Z.; Weber, E. 2008. Geographical and taxonomic biases in invasion ecology. Trends Ecol. Evol. 23, 237-244. Jeschke, J.M.; Gómez Aparicio, L.; Haider, S.; Heger, T.; Lortie, C.J.; Pysck, P.; Straver, D.L. 2012. Taxonomic bias and lack of cross-taxonomic studies in "Some taxonomic groups" is again vague. Can you be more specific? Unclear what the examples on line 463 correspond to	Thank you for your comment. In the second order draft, we have included the suggested citation in the global section (2.2).
Lawson Handley, Lori	No	2	14	460	14	465		Thank you, this has been revised accordingly in the second order draft.
Blackburn, Tim	No	2	14	464	14	464	Replace "the status" with "their status".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	465	14	465	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	14	469	14	470	Replace "14 others cumulatively" with "other 14 species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Volpedo, Alejandra	No	2	15	179	15	191	Authors should review quotations in order to correspond to the text and be relevant.	Thank you for your comment. We considered it in the revised version of the chapter in the second order draft.
Faulkner, Katelyn	No	2	15	472	15	473	Will also depend on what researchers are interested in and where they carry out their work	Thank you very much. We have modified the sentence to reflect this nuance in the second order draft.
Blackburn, Tim	No	2	15	473	15	473	Delete "Simply put,".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	15	473	15	474	This statement should open this whole section.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Dupont, Lise	No	2	15	474			For this issue of taxonomic impediment in invasive earthworms, the reference of Porco et al. (2013) Biological Invasions 15: 899-910 could be given.	Thank you for your comment. We have included this citation in the data and knowledge gap section of animals in the second order draft.
Lawson Handley, Lori	No	2	15	474	15	476	sentences could be combined	Thank you for your comment. We have revised this section in the second order draft.
Blackburn, Tim	No	2	15	475	15	475	Delete "with distributions beyond their places of origin".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	15	475	15	475	Insert "alien" after "hundreds".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	15	475	15	475	Replace "over" with "more than".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	15	476	15	477	Delete "Earthworms remain understudied compared to the impact they have on invaded ecosystems".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Dupont, Lise	No	2	15	477			In connection with the example of earthworms, the soil habitat is largely understudied. Smaller-bodied invaders, not having the same size as earthworms and the same perceivable activity, undoubtedly occur in soils and remain ignored.	Thank you very much. We have now added this point in the second order draft.
Faulkner, Katelyn	No	2	15	477	15	478	I think this sentence should be elsewhere in the document, where gaps for different habitats are discussed	Thank you very much. This part has been removed from the second order draft.
Lawson Handley, Lori	No	2	15	477	15	478	evidence needed to support this statement	Thank you for your comment. The references added on this topic throughout the chapter support this statement.
Blackburn, Tim	No	2	15	480	15	483	This is repetitive and poorly structured. It needs a good hard edit.	Thank you very much. It has been rewritten in the second order draft.
Faulkner, Katelyn	No	2	15	480	15	484	I would argue that fish are relatively well studied in comparison to other groups (e.g. invertebrates). Perhaps they are overlooked in Europe, but in other parts of the world they are relatively well-studied.	Thank you very much. We have added this nuance in the second order draft.
Rebello, Alanna	No	2	15	480	15	483	Alien invasive fish are relatively well studied in South Africa	Thank you very much for your comment. We have added this nuance in the second order draft.
Lawson Handley, Lori	No	2	15	481	15	482	It is not correct to say that only one of the 66 species on the EU list is a fish. Do you mean marine fish?	Thank you for your comment. We have removed this statement from the second order draft.
Government of Germany	Yes	2	15	483	15	483	"the only marine animal added only to the 2019 implementation" -- it is suggested to delete the second "only".	Thank you very much. We have revised this section and this comment in the second order draft.
Blackburn, Tim	No	2	15	486	15	494	The drafting of this whole section is very poor. I cannot rewrite it in comment boxes I'm afraid.	Thank you very much. We have rewritten this section in the second order draft.
Faulkner, Katelyn	No	2	15	486	15	494	What about extra-limital species (species that are both native and alien within the same country)? This topic requires some discussion. Such populations are probably not included in these analyses, and if not introductions and invasions are under-estimated. A useful reference: Vitule, J. R. S., Oechi, T. V. T., Kang, B., Matsuzaki, S.-I., Bezerra, L. A., Daga, V. S., ... Padial, A. A. (2019). Intra-country introductions unraveling global hotspots of alien fish species. Biodiversity and Conservation, (0123456789). doi: 10.1007/s10531-019-01815-7	Thank you very much. We agree this is an import, up to now overlooked, point. We have added it in the Chapter in the second order draft.
Faulkner, Katelyn	No	2	15	491	15	494	There are many reasons why the number of fish invasions would differ from the number of bird invasions. Perhaps there is a better example? Fish will always have more restricted distributions than birds because of the nature of their habitat.	Thank you very much. We have added this nuance in the second order draft.
Lawson Handley, Lori	No	2	15	491	15	494	Sentence is difficult to understand	Thank you, it has been revised in the second order draft.
Blackburn, Tim	No	2	15	496	15	496	"Temporary information" on what exactly? Fig. 2.4 implies just first record dates, but this phrase could be taken to mean accumulation of alien species richness or growth in population sizes.	Thank you very much. We have rewritten this sentence for clarity in the second order draft.
Blackburn, Tim	No	2	15	496	15	496	Replace "taxonomic animal groups" with "animal taxa".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	15	496	15	497	Fig. 2.4 does not show data on the availability of temporal information - delete reference to this figure? Also, what exactly is meant with 'temporal information' - maybe add an explanation, e.g. 'Temporal information, e.g. concerning first introduction or changing abundances over time, is largely lacking.' Or, if just first record data are meant here, then exchange 'temporal data' by 'first record data'.	Thank you for your comment. We revised the captions to improve clarity in the second order draft.
Rebello, Alanna	No	2	16	497			Should this be Figure 4.5?	Thank you, this has been corrected in the second order draft.
Government of Germany	Yes	2	16	502	16	502	Figure is not very clear/confusing; also too small.	Thank you for your comment. We revised the figure and captions to improve clarity in the second order draft.
Rebello, Alanna	No	2	16	503			Again, what are dots representing? Islands?	Thank you for your comment. Yes, dots represents islands. We revised the figure and captions to improve clarity in the second order draft.
Taki, Hisatomo	No	2	16	503	16	506	Adding information of time or duration might be helpful in the caption.	Thank you for your comment. We revised all legends to clarify the content of the figures in the second order draft.
Heger, Tina	No	2	16	504	16	506	The term 'temporal information' is misleading here, because these figures only show the availability of first record data. Other temporal information, e.g. on change in species abundances, may be available. I suggest replacing 'temporal information' with 'first record data'.	Thank you for your comment. We revised the figure and captions to improve clarity in the second order draft.
Willette, Demian	No	2	16	508	20	644	Forgive my research area bias, but this section on plants omits invasive marine vascular plants, notably invasive seagrass. I feel these should be mentioned and provide both a brief statement and available references. The seagrass <i>Zostera japonica</i> was introduced to the Pacific Northwest in the mid-1900s likely via the oyster aquaculture and has since spread & had an ecological impact on native <i>Z. marina</i> and ecosystem processes (recently reviewed in Shafer, D. J., Kaldy, J. E., & Gaeckle, J. L. (2014). Science and management of the introduced seagrass <i>Zostera japonica</i> in North America. Environmental Management, 53(1), 147-162.) Additionally <i>Halophila stipulacea</i> invaded and is widespread in the Mediterranean Sea (Lessepsian migration) and more recently has invaded and spread across the Caribbean Sea - Notably termed the World's First Globally Invasive Marine Angiosperm (see Willette, D. A., Chalifour, J., Debrot, A. D., Engel, M. S., Miller, J., Oxenford, H. A., ... & Védie, F. (2014). Continued expansion of the trans-Atlantic invasive marine angiosperm <i>Halophila stipulacea</i> in the Eastern Caribbean. Aquatic botany, 112, 98-102.; AND Winters, G., Beer, S., Willette, D. A., Viana, I. G., Chiquillo, K. L., Beca-Carretero, P., ... & Migliore, L. (2020). The tropical seagrass <i>Halophila stipulacea</i> : reviewing what we know from its native and invasive habitats, alongside identifying knowledge gaps.	Thank you for your comment. In the second order draft, we considered your references and expanded the section on aquatic plants to also consider marine vascular plants.
Heger, Tina	No	2	16	509	16	509	I suggest changing to 'gaps for introduced vascular plants, bryophytes, ...'	Thanks for this suggested change. We have included it in the second order draft.
Khuroo, Anzar Ahmad	No	2	16	509	16	509	Instead of "introduced plants", here "introduced vascular plants" is more appropriate.	Thank you for your comment. It has been considered in the second order draft.
Reshi, Zafar A	No	2	17	270	17	270	D.J.Ross.....pattern not consistent	Thank you, this has been fixed in the second order draft.
Reshi, Zafar A	No	2	17	281	17	281	.....depauperate in native.....	Thank you, grammatical mistakes have been corrected in the second order draft.
Blackburn, Tim	No	2	17	513	17	513	Replace "tends" with "tend".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	17	513	17	514	Confusing: How can plant data be biased towards plants? Delete or re-formulate (biased towards plants in comparison to which other groups?).	Thank you. This has been reworded in the second order draft.

Blackburn, Tim	No	2	17	521	17	522	Replace "and continuing to increase" with "but then starting to increase again".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	525	17	525	Replace "plants" with "plant species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	527	17	527	Merge two brackets of citations into one by using semicolon in between.	Thank you very much. This change will be made throughout in the second order draft.
Rebello, Alanna	No	2	17	527			And most importantly, microbes "the quiet invasion of the soil fauna"	Thanks for this suggested change. We have included it in the second order draft.
Blackburn, Tim	No	2	17	528	17	528	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	531	17	531	Replace "naturalized" with "established".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	537	17	537	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	17	537	17	537	Replace "naturalized" with "established".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	540	17	540	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	17	542	17	545	A tropical climate also promotes the establishment of alien plants: irradiance, humidity, fertile soil, rainfall	Thank you for this comment. Here we deal with continents, biomes are dealt with on 1.562-570
Blackburn, Tim	No	2	17	543	17	543	Replace "naturalized alien plants" with "alien plant species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	546	17	546	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	17	547	17	547	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Reshi, Zafar A	No	2	18	317	18	317	Para beings abruptly....please check	thank you very much. This sentence has been modified in the second order draft
Singheiser, Martin	No	2	18	549	18	549	Figure 2.6. Since number of alien species strongly depends on the taxonomic group it may considered in either highlighting these issues in the figure legend or in showing all figures in the same axis scale to allow for an easier comparison	Thank you very much. This has been corrected in the second order draft
Blackburn, Tim	No	2	18	556	18	556	Delete "naturalized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	556	18	556	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Khuroo, Anzar Ahmad	No	2	18	556	18	560	The number of "Naturalized Taxa" given have serious issue with regard to actual "Naturalized" status in different regions of the world. Global synthesis of species data published, without validation in the real natural conditions, must be questioned, how they harmonised the term "Naturalized" used differently by different workers across the world. To explain further, what a researcher published as "Naturalised" plant in Europe doesn't necessarily mean the same what researchers published as "Naturalized" in other parts of the world. This is a serious issue that the global data syntheses often neglect.	Thank you for your comment. This term is defined in the glossary - it is part of the definitions we worked on with Helen
Heger, Tina	No	2	18	557	18	557	I suggest replacing 'means' with 'indicates'.	Thank you. This has been reworded in the second order draft.
Blackburn, Tim	No	2	18	558	18	558	Replace "naturalized" with "established".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	559	18	559	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	560	18	560	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	18	562	18	562	Replace "naturalized species" with "alien plant species".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	564	18	564	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	18	564	18	570	This information is based on number of studies. But the number of studies in certain regions (for example, Central/South America and Asia = tropical areas) is underrepresented (biased).	Thank you very much for your comment. No, this information is not based on number of studies, it is based on numbers of naturalized species in individual regions for each zoniobiome and the area of those regions, plotted against each other
Blackburn, Tim	No	2	18	565	18	565	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	566	18	566	Delete "naturalized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Faulkner, Katelyn	No	2	18	566	18	570	Rate of accumulation is discussed here under the 'status' section. Surely this should be under 'trends'	Thank you for this comment, the accumulation rate per area is used here as a measure of vulnerability to invasion, it does not refer to trends over time. We rephrased the text to make it clear in the second order draft
Blackburn, Tim	No	2	18	567	18	567	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	568	18	568	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	569	18	569	Replace "colonization" with "accumulation".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	572	18	572	Replace "naturalized species richness" with "alien species richness".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	572	18	572	Replace "percent of naturalized aliens" with "percent of aliens".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	18	572	18	576	Unclear: Do these sentences related to all IAS (as indicated by the formulation) or to alien invasive plants (as should be the case in this section)?	Thank you for your comment. All aspects within the plant section relate to plants. We have revised the text that the distinction between alien and invasive alien species becomes clearer in the second order draft.
Blackburn, Tim	No	2	18	575	18	576	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	18	575	18	575	Do you mean IAS or aliens?	We mean "Aliens", thank you for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	18	576	18	576	Delete "naturalized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Catford, Jane	No	2	19	325	19	327	For people skim-reading the chapter, make it clear that this figure just covers animals (likewise for all figs similar to this in rest of chapter)	Thank you very much for your comment. The caption of this figure has been modified to reflect this in the second order draft.
Mc Kay, Fernando	No	2	19	577	19	614	In line 613, Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently recircumscribe to include Eichhornia species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commelinales) sheds light on the necessity of its recircumscription and synopsis of Pontederia L. Phyt Keys 108: 25–83. doi: 10.3897/phytokeys.108.27652	Thank you for this comment. This has been changed throughout the text of our chapter. Pontederia is now used in the second order draft. .
Blackburn, Tim	No	2	19	578	19	578	Insert comma after "California".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	578	19	578	Insert comma after "continent)".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	579	19	580	Delete "representing the world's highest richness in naturalized alien vascular plants" - it is not really meaningful without a qualifier (e.g. highest in some sort of administrative region) but not hugely meaningful with one.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	579	19	579	Replace "naturalized" with "established alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	583	19	583	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Government of Germany	Yes	2	19	585	19	586	"vulnerability" implies negative impacts, but that does not automatically follow the higher numbers mentioned.	Thank you for making this point. It does not seem to require changes to the text. In fact the term vulnerability here refers to the resistance of the region to invasion and has nothing to do with the number of species.
Blackburn, Tim	No	2	19	586	19	586	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Blackburn, Tim	No	2	19	588	19	588	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	19	588	19	603	In this paragraph, references are missing. Is that from Pysek et al. 2017?	Thank you. The wording has been clarified in the second order draft.

Blackburn, Tim	No	2	19	590	19	590	Delete two "naturalized" in this line.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	19	590	19	593	I suggest reformulating to 'Some families are disproportionately represented in alien floras on island (...) or mainlands (...).'	Thank you. This has been reworded in the second order draft.
Blackburn, Tim	No	2	19	593	19	593	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	19	593	19	593	I suggest replacing 'its' by 'this family's'.	Thank you. This has been reworded in the second order draft.
Blackburn, Tim	No	2	19	595	19	595	Delete "naturalized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	597	19	597	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	19	598	19	598	I guess this should read 'genera' instead of 'families'.	Thank you for your comment. No, please, the cited study analyses families.
Blackburn, Tim	No	2	19	599	19	599	Replace "naturalize" with "establish".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	599	19	603	Should genus names not be italicised?	Thank you very much for your comment. Formatting errors have been corrected in the second order draft.
Blackburn, Tim	No	2	19	600	19	600	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	603	19	603	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	605	19	606	Needs rewording. It's also not hugely informative, because these species could all have rather small isolated established populations, rather than covering large areas. Is there no better way of expressing this?	Thank you very much for your comment. This has been reworded in the second order draft.
Blackburn, Tim	No	2	19	606	19	606	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Heger, Tina	No	2	19	606	19	606	I suggest changing to 'are naturalized, which corresponds to...'	Thank you. This has been reworded in the second order draft.
Gya, Ragnhild	No	2	19	607	19	608	I did not understand this sentence: <i>Sonchus oleraceus</i> occurs in 48% of the regions that cover 42% of the globe. It would improve the readability of the report if this was clarified.	Thank you, it is reworded to ensure clarity in the second order draft.
Blackburn, Tim	No	2	19	611	19	611	Replace "naturalized" with "established".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	19	614	19	614	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Heger, Tina	No	2	19	614	19	614	I suggest deleting 'on top'.	Thank you. This has been reworded in the second order draft.
Catford, Jane	No	2	20	381	20	381	Might like to mention that loss of birds because of snakes has had cascading impact, affecting forest plant community composition (b/c most plants here rely on bird dispersal). Wandrag, E. M., Dunham, A. E., Duncan, R. P. & Rogers, H. S. (2017) Seed dispersal increases local species richness and reduces spatial turnover of tropical tree seedlings. <i>Proceedings of the National Academy of Sciences</i> .	Thank you very much for your comment. Impacts of IAS are treated specifically in Chapter 4.
Government of Germany	Yes	2	20	615	20	615	Please check Figure 2.7: Bryophytes; the scale does not begin with 0.	Thank you for your comment. We revised all maps to improve readability in the second order draft.
Heger, Tina	No	2	20	616	20	617	A reference to Figure 2.7 is missing in the status section; it could be inserted e.g. in line 570.	Thanks for this suggested change. We have included it in the second order draft.
Taki, Hisotomo	No	2	20	616	20	617	Adding information of time or duration might be helpful in the caption.	Thank you for your comment. We revised the figure and captions to improve clarity in the second order draft.
Kudelska, Theresa	No	2	20	619	20	619	The data and knowledge gaps section mainly concentrates on gaps in terms of naturalised species. Were there any overarching issues with the data available, i.e. in accurate or out of date information, did they always record eradications in a timely way? If so then please expand on this.	Thank you for your comment. We believe that the statement "Individual datasets also greatly vary in the quality of information" with the description of what proportion of data is unavailable at all for individual regions actually addresses the reviewer's point
Blackburn, Tim	No	2	20	620	20	621	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Gya, Ragnhild	No	2	20	620	20	622	It might be good to remind the reader what the GloNAF database is. I searched for it, and it is explained, but that is very far away from this in the text. It would help the reader if what the abbreviation stands for was in this part of the text as well.	Thank you, we have expanded all the acronyms in the text in the second order draft.
Blackburn, Tim	No	2	20	622	20	622	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Khuroo, Anzar Ahmad	No	2	20	622	20	624	Claiming "completeness" of data availability on "Naturalised" alien plants for >84% requires rigorous global validation. Simply based on secondary published sources, which are beset with biases, is not enough. Taking this instance, I have a general issue with using "naturalised" taxa to depict the status and trends of alien species richness across the world. Agreed, it has scientific merit, as invasion is a stage based process. But all the "naturalized" species do not necessarily have an 'impact'. The latter is recognised in the definition adopted by this IPBES Assessment: "Invasive alien species – hereafter IAS – are defined as animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, and generating an impact on local ecosystems and species". So, I suggest, better representation of status and trends will be the "Invasive" species	Thank you for your comment. This information is based on the GloNAF database that includes verified data from regions of the world and represent the best globally validated information published. Concerning the IPBES definitions, there is now a new taxon that specifically points that literature sources used their own definitions that do not necessarily correspond to the IPBES claim. We agree though that the word "complete" may have specific connotations and we deleted it in the second order draft.
Blackburn, Tim	No	2	20	624	20	624	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Faulkner, Katelyn	No	2	20	625	20	628	What is 'complete data'? It seems unlikely that data for Africa is 98% complete, we definitely don't have that in South Africa, and that's the best studied region in Africa	Thank you very much for your comment. This was misunderstanding, we meant that for 98% of African countries there are published/reported data on their alien floras, not that those floras are completely known. We rephrased the sentence to make it clear in the second order draft.
Blackburn, Tim	No	2	20	627	20	627	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	20	630	20	630	Replace "naturalized" with "alien".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	20	631	20	631	Delete "naturalized".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Faulkner, Katelyn	No	2	20	632	20	634	How does this information relate to what was reported above in the paragraph on the completeness of the GLONAF database? Surely, these other datasets feed into GLONAF and so issues with completeness etc in these datasets will then also impact GLONAF.	Thank you very much. We believe that with respect to the above clarification (that completeness refers to number of regions that have some data) and including of the caution raised by the same reviewer to line 626-632, this comment is no longer relevant.
Blackburn, Tim	No	2	20	635	20	635	Delete "highly".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Blackburn, Tim	No	2	20	636	20	636	Delete first name from citation.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft.
Reshi, Zafar A	No	2	21	418	21	418	Please have a look keen look at the sentence	Thank you, this has been reworded in the second order draft.
Faulkner, Katelyn	No	2	21	640	21	640	Figure 2.8 and other figures on data completeness are based on what species are known to be introduced/invasive. It would also be good to discuss the groups where the known number of introductions/invasions are likely underestimated, for example fungi.	Thank you for your comment. We discuss the issue of under sampling and underestimation throughout the chapter now and included a new figure of data gaps (Fig. 2.5 Data gaps in the second order draft) in the second order draft.
Heger, Tina	No	2	21	641	21	642	A reference to Figure 2.8 is missing, it could be inserted in line 634, e.g.: 'pathways. Availability of data on first occurrences of alien plants is strongly varying across regions (Fig. 2.8).'	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	21	641	21	642	The term 'temporal information' is misleading here, because these figures only show the availability of first record data. Other temporal information, e.g. on change in species abundances, may be available. I suggest replacing 'temporal information' with 'first record data'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	21	646	21	646	A reference to the box is missing in the text.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	21	659	21	660	I suggest changing to 'This number includes 106... and 41 cryptogenic species'.	Thank you, we have rephrased this sentence for better clarity in the second order draft.
Heger, Tina	No	2	21	663	21	664	I suggest reformulating to '(the invasion of this moss being the best documented, with an introduction to the UK in 1941 and to coastal Europe in 1954, and a spread into Russia in the east and the Mediterranean in the south).	Thank you, we have rephrased this sentence for better clarity in the second order draft.
Heger, Tina	No	2	22	667	22	667	Insert 'with 34 and 27 species, respectively'.	Thanks for this suggested change. We have included it in the second order draft.
Pan, Xubin	No	2	22	683	22	683	The category should be the same in the whole document.	Thank you, this has been fixed in the second order draft.
Government of Germany	Yes	2	22	688	22	688	Figure 2.9: Bacteria and Protozoans: This figure isn't really informative; consider omitting it.	Thank you for the comment. We have revised the figure by adding oomycetes as well in the second order draft. We are keeping the figure because these taxa are understudied and it is
Rebello, Alanna	No	2	23	696			Title: Species of what? Fungi?	Thank you for the comment. This has been corrected in the second order draft.
Taki, Hisotomo	No	2	23	696	23	697	Adding information of time or duration might be helpful in the caption.	Thank you for your comment. We revised all figure and table legends to improve clarity in the second order draft.
Pisanu, Benoit	No	2	23	701	23	701	check for Monteiro et al. 2020 references throughout the § lines 699-712	Thank you for the comment. This has been corrected in the second order draft.
Feest, Alan	No	2	23	703	23	704	Repeated reference	Thank you for the comment. This has been corrected in the second order draft.
Heger, Tina	No	2	23	710	23	710	Insert reference to Fig. 2.10 here, e.g.: (see Fig. 2.10 for an overview on all groups of fungi).	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	23	714	23	714	Add 'The majority of known alien fungi and microorganisms are, however...'	Thank you for your comment, we have revised this section and this sentence has been removed from the second order draft.
Heger, Tina	No	2	23	715	23	715	I suggest 'that often cause the emergence of novel diseases'.	Thank you for making this point. It does not seem to require changes to the text.

Kudelska, Theresa	No	2	23	727	23	727	The following reference identifies a number of rusts which have been introduced which have caused significant harm to crop which may also be good examples for this section See section 6.3.1.3 of the following reference: Fried, G. Chauvel, B. Reynaud, P. & Sache, I. 2017. Decrease in crops production by non-native Weeds and Pests and Pathogens. Impacts of Biological Invasion on Ecosystems Services. Invading Nature – Springer Series in Invasion Ecology	Thank you, but this is about impacts and does not seem relevant to our chapter
Heger, Tina	No	2	24	238	24	241	The term 'temporal information' is misleading here, because these figures only show the availability of first record data. Other temporal information, e.g. on change in species abundances, may be available. I suggest replacing 'temporal information' with 'first record data'.	Thanks for this suggested change. We have included it in the second order draft
Reshi, Zafar A	No	2	24	509	24	509	...introduced vascular plants.....	Thanks for this suggested change. We have corrected it in the second order draft.
Vamberger, Melita	No	2	24	730	24	732	Again here it would be also good to mention Batrachochytrium salamandrivorans.	Thank you for the suggestion, this has been added in the second order draft
Government of Bulgaria	Yes	2	24	742	24	751	With respect to microorganisms there can be high uncertainty regarding them having native vs non-indigenous status of species. The issue should be treated as IAS with caution.	Thank you for comment. We address the issue of uncertainty and knowledge gaps now throughout the chapter. In the second order draft, we have greatly expanded the section that you refer to and added a note about the difficulty of assigning status as native or introduced to
Mestre, Mircea	No	2	24	742	24	747	I really miss this information. Same in lines 833-835, 954-956, 1057-1058	Thank you for this comment. We are pleased to say that we have now fully developed this section as well as other sections relating to microorganisms throughout the chapter in the
Heger, Tina	No	2	24	748	24	748	A reference to the box is missing in the text.	Thanks for this suggested change. We have included it in the second order draft
Heger, Tina	No	2	24	754	24	755	The numbers given here for the chapters are not correct.	Thanks for this suggested change. We have included it in the second order draft
Rebelo, Alanna	No	2	25	763			I'm pretty sure Africa's gentler slopes in the graph is due to lack of data.	Thank you for this comment. We have added text to this paragraph that addresses your point in the second order draft.
Heger, Tina	No	2	25	776	25	777	This sentence is contradicted by the numbers given in the following sentences; I suggest changing: 'For many taxonomic groups, all IPBES regions except Africa harbour a similar...'	Thank you for your suggestion, which we adopted in the second order draft.
Singheiser, Martin	No	2	25	781	25	783	The question is whether this difference is due to a lack of alien species in these regions or due to a lack of data/knowledge (e.g. lack of crustaceans in Africa, Americas and Asia and the Pacific) - which is to my assumption rather unlikely if one takes into account the intercontinental transport as well as similar climatic	Thank you for your comment. We have revised the figure and captions to improve clarity in the second order draft.
Faulkner, Katelyn	No	2	25	785	26	787	Consider making Table 2.1 a figure. The table is difficult to interpret. Does the figure on page 27 demonstrate the results in Table 2.1? The figure does not have a caption. If it does demonstrate the results in Table 2.1, then the Table can be removed.	Thank you for the suggestion but we have removed the figure on p. 27 and chosen to retain table 2.1 for consistency throughout the chapter in the second order draft.
Government of Germany	Yes	2	26	786	26	786	It is suggested to delete the table 2.1. Rationale: Table on page 27 illustrates the same information in a better way.	Thank you for the suggestion but we have removed the figure on p. 27 and chosen to retain table 2.1 for consistency throughout the chapter in the second order draft.
Catford, Jane	No	2	27	588	27	603	Information source for this?	Thank you very much. Reference added in the second order draft
Reshi, Zafar A	No	2	27	589	27	589	Instead of Compositae, use of Asteraceae would be better.	Thank you. We have made this change in the second order draft.
Reshi, Zafar A	No	2	27	600	27	603	Generic names be italicized	Thanks for this suggested change. We have corrected it in the second order draft.
Taki, Hisatomo	No	2	27	788	27	789	I do not see the caption of the figure.	Thank you for the comment. The figure and legend have been significantly revised in the second order draft.
Heger, Tina	No	2	27	789	27	789	Very nice idea to have this Figure instead of the table - I guess the table will be deleted, and the reference in the text should then be adjusted.	Thank you very much
Catford, Jane	No	2	28	615	28	617	These figs are great, but can't see some countries because of dots (e.g. UK, Ireland). A way to resolve??	Thank you for your comment. We revised all maps to improve readability in the second order
Catford, Jane	No	2	28	626	28	632	Need to make clearer that good geographic coverage doesn't mean that this information is complete though; may still have gaps even if geog covered. Limitations of data availability, even for well studied regions, need to be more strongly acknowledged. Also worth acknowledging that we don't always know which species are native vs alien (e.g. origin of some very prominent species are uncertain, e.g. <i>Poa pratensis</i> in much of North America)	Thank you for this suggestion. We have chosen to include it in the section by adding a sentence: "%) in the second order draft. However, it needs to be noted that a good geographical coverage does not automatically mean that the information on the alien flora for a given region is complete; even for well studied regions there may be data gaps (Pyšek et al. 2008) as well as uncertainties with respect to the species status."
Kudjawa, Jewel (Government of Ghana)	Yes	2	28	792	28	804	The narrative and graphs in this section does not match with the TITLE PLANTS. I suggest we remove PLANTS and use General overview of IAS in Africa.	Thank you for your comment. We apologize for the error. We have streamlined the chapter and ordered all taxa consistently throughout the chapter in the second order draft.
Pan, Xubin	No	2	28	792	28	292	Plants first or Animals first?	Thank you. We have made the taxonomic order throughout the chapter consistent in the
Rebelo, Alanna	No	2	28	793			Trends: southern Africa is due to good data collection and research in RSA, and data paucity in the rest of Africa. I don't think any more statements can be made about the data than this.	Thank you for this comment. In the second order draft, we agree and added the sentence: "It needs to be, however, noted that this pattern is to some extent likely due to more intensive research and better data accumulated for South Africa compared to the rest of the continent."
Government of Ethiopia	Yes	2	28	794	28	798	How are sub-regions of Africa are defined? Is it possible to list member countries of each sub-region?	Thank you for your comment. The delineation of IPBES regions and sub-regions follow the standard classification of regions as defined by IPBES (https://ipbes.net/sites/default/files/downloads/Decision_IPBES_3_1_EN_0.pdf).
Heger, Tina	No	2	28	796	28	796	Insert a reference to Fig. 2.13 here ('century. (Fig. 2.13). In contrast...').	Thanks for this suggested change. We have included it in the second order draft
Fumeey, Christian (Government of Ghana)	Yes	2	28	800	28	801	The trend does not include other taxonomic groups like algae and fungi etc.	Thank you very much for your comment. I guess that's because we know little about algae in Africa? Shall we just change "various" to "selected" in the caption? In the second order draft
Mc Kay, Fernando	No	2	29	812	29	836	Line 828, Table 2.2. Instead of the Americas it should say Africa.	Thank you very much. This is corrected in the second order draft.
Rebelo, Alanna	No	2	29	812	29	822	Invasive alien trees are conspicuously absent here and shouldn't be due to their (well researched) impacts on water, fire intensity and biodiversity	Thank you for this suggestion. We have chosen to include it in the second order draft by adding a paragraph on tree invasions.
Kudjawa, Jewel (Government of Ghana)	Yes	2	29	818	29	820	<i>Eichornia</i> does not fit in the narrative. I propose the inclusion of aquatic to the "native vegetation".	Thank you for making this point. It does not seem to require changes to the text.
Heger, Tina	No	2	29	819	29	819	I suggest changing to 'impacts and transform native vegetation'.	Thanks for this suggested change. We have included it in the second order draft
Government of Ghana	Yes	2	29	822	29	822	Reference (D M) should be deleted. It should be (Richardson et al.).	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Rius Viladomiu, Marc	No	2	29	824	29	824	Text missing on the section on animals, especially considering all that is known in South Africa, e.g.: Mead A, Carlton JT, Griffiths CL, Rius M (2011) Revealing the scale of marine bioinvasions in developing regions: a South African re-assessment. Biological Invasions 13: 1991-2008; Mead A, Carlton JT, Griffiths CL, Rius M (2011) Introduced and cryptogenic marine and estuarine species of South Africa. Journal of Natural History 45: 2463-2524	Thanks for this suggested change. We have included it in the second order draft
Government of Ghana	Yes	2	29	825	29	826	Consult www.cabi.org/isc for information on Africa.	Thank you for your suggestion, it is greatly appreciated by the chapter authors.
Caceres, Sarah	No	2	29	828	29	828	Please replace The Americas by Africa.	Thanks for this suggested change. We have included it in the second order draft.
Caceres, Sarah	No	2	29	828	29	830	The Table 2.2 could be completed with the data of French Indian Ocean islands (Mayotte, Reunion, Scattered Islands, French Subantarctic islands). Please consult reference (Soubeyran et al. 2015).	Thank you very much for this comment. We note that we have cited this paper in the chapter but the information in the paper is not included in the data bases that we have used in the chapter. For consistency, we are using two databases throughout rather than relying on information from individual papers in the second order draft.
Faulkner, Katelyn	No	2	29	828	29	831	Table 2.2 could be a figure. But, may not be required as this information can be gleaned from other figures in the section on the different taxonomic groups.	Thank you for your comment. We have decided to keep the table as an easy reference for readers in the second order draft.
Feest, Alan	No	2	29	828	29	828	Is this America or Africa? See title.	Thanks for this suggested change. We have included it in the second order draft.
Government of Ethiopia	Yes	2	29	828	29	829	Table 2.2 caption needs to be corrected as "Number of alien species reported for sub-regions of Africa and various taxonomic groups."	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	29	828	29	828	Reference to this table (later figure, I hope) is missing; insert e.g. in line 810 ('see Table 2.2 for an overview of the number of alien species per sub-region').	Thanks for this suggested change. We have included it in the second order draft
Lawson Handley, Lori	No	2	29	828	29	832	Table title is incorrect - Africa, not Americas	Thanks for this suggested change. We have included it in the second order draft.
Pisanu, Benoit	No	2	29	828	29	828	Title of Table 2.2. Replace The Americas by The Africas	Thanks for this suggested change. We have included it in the second order draft.
White, Michael	No	2	29	828	29	828	Table 2.2 should be Africa not the Americas	Thanks for this suggested change. We have included it in the second order draft.
Government of Ghana	Yes	2	29	830	29	831	Add a footnote to explain the figures in the table. The year of assessment should also be provided.	Thank you for this comment. We have not added a footnote, but the caption has been expanded to provide more information in the second order draft.
Government of Ghana	Yes	2	29	834	29	836	Consult Cabi compendium above for information.	Thank you for this suggestion
Catford, Jane	No	2	30	681	30	681	Important to consider study effort for each of these taxonomic groups as reported elsewhere in this report, not all taxa studied equally. Pyšek, P., Richardson, D. M., Pergl, J., Jarošík, V., Svitová, Z. & Weber, E. (2008) Geographical and taxonomic biases in invasion ecology. Trends in Ecology & Evolution, 23, 237-244. Important to acknowledge that absence of data is not data of absence. Would be good to explicitly refer to this somewhere and somehow in the chapter - e.g. control for study effort by looking at number of studies done on	Thank you, this reference is included in the second order draft
Butchart, Stuart	No	2	30	838			Section 2.3.1.4 could usefully refer to and draw on the data in the Threatened Island Biodiversity Database at http://tib.islandconservation.org/ which includes information on the distribution of all vertebrate IAS and native highly threatened species (Critically Endangered and Endangered) on each island, and the impacts of the former on the latter on each island. Plus the various papers based upon these data, including: Holmes et al (2019) Globally important islands where eradicating invasive mammals will benefit highly threatened vertebrates. <i>PLoS ONE</i> 14: e0212128. Spatz et al. (2017) Globally threatened vertebrates on islands with invasive species. <i>Sci Advances</i> . doi:10.1111/cons12 Dawson et al. (2014) Prioritising islands for the eradication of invasive vertebrates in the UK overseas territories. <i>Conserv. Biol</i> 29: 143-153. McCressell et al. (2016) Past and estimated future impact of invasive alien mammals on insular threatened vertebrate populations. <i>Nature Communications</i> 7: 12488.	Thank you for this valuable comment. We recognize the importance of the information that you provide. However, this chapter only addresses the status and trends of invasions. Other chapters in this assessment are focused on impacts (Chapter 4) and management (Chapter 5).
Caceres, Sarah	No	2	30	838	30	848	There could be an example about IAS herpetofauna on Reunion island. Please consult reference (Sanchez & Probst 2016).	Thank you for this suggestion. This chapter does not address impacts. Chapter 4 focuses on the impacts of invasive alien species.
Caceres, Sarah	No	2	30	838	30	848	There could be an example of the fast expansion of <i>Pycnonotus jocosus</i> in Réunion island. Please consult references (Clergeau & Mandon-Dalger 2001; Le Gros et al. 2016). And of the expansion of <i>Casuarina equisetifolia</i> . Please consult references (Potgieter et al. 2014).	Thank you for this suggestion. Due to limited space, we cannot cover all taxa on all islands. We have referred to herpetofauna on Madagascar and specifically mention invasive plants on

Caceres, Sarah	No	2	30	838	30	848	There could be more examples for explain the catastrophic impact of IAS in Mascarene island. Few IAS mammals are responsible (at least for a part of it) of extinctions of endemics species. Please consult references (Thébaud et al. 2009; Cheke 2013; Russell et al. 2016)	Thank you for this suggestion. This chapter does not address impacts. Chapter 4 focuses on the impacts of invasive alien species.
Girod, Christophe	No	2	30	838	30	848	In addition to Mauritius and Rodrigues, Reunion Island has more than 2000 estimated alien plant species among which 102 at least are invasive (e.g. <i>Leucanea leucoccephala</i> , <i>Hiptage benghalensis</i> , <i>Ulex europaeus</i>) and have major impact on the ecosystems. See for instance : BARET, S., ROUGET, M., RICHARDSON, D.M., LAVERGNE, C., EGOH, B., DUPONT, J. and STRASBERG, D. (2006), Current distribution and potential extent of the most invasive alien plant species on La Réunion (Indian Ocean, Mascarene islands). <i>Austral Ecology</i> , 31: 747-758. doi:10.1111/j.1442-9993.2006.01636.x and also Soubeyran, Y., Meyer, J., Lebouvier, M. et al. Dealing with invasive alien species in the French overseas territories: results and benefits of a 7-year Initiative. <i>Biol Invasions</i> 17, 545–554 (2015). https://doi.org/10.1007/s10530-014-0766-2 for the number of species. The impact of animals species on ecosystems is also very important.	Thank you for this comment. The information and the references have been added in the second order draft.
Government of Germany	Yes	2	30	846	30	846	It is suggested to add the following reference after "(Dullool et al., 2002); Florens, F. B. V., et al. (2017)": "Long-term declines of native trees in an oceanic island's tropical forests invaded by alien plants." <i>Applied Vegetation Science</i> 20(1): 94-105.	Thank you very much. This section has been revised and this particular reference has been removed from the second order draft.
Faulkner, Katelyn	No	2	30	850	30	852	There was a paper from South Africa that discussed data gaps in South African alien species databases. See 'Faulkner, K. T., Spear, D., Robertson, M. P., Rouget, M., & Wilson, J. R. U. (2015). An assessment of the information content of South African alien species databases. <i>Bothalia: African Biodiversity and</i>	Thank you. We have added this reference in the second order draft.
Feest, Alan	No	2	30	850	0	0	Nothing about Malagasy?	Thank you very much for your comment. We have chosen not to include it in the assessment, since no supporting evidence was provided.
Government of Germany	Yes	2	30	851	30	852	The reference "(Peir Pýšek et al., 2008)" may be outdated. Please try to include up to date information.	Thank you for your comments. We have revised this section and this reference has been removed from the second order draft
Faulkner, Katelyn	No	2	30	861	30	862	What is meant here by 'completely covered'? How the completeness of GLONAF is determined is not clear in this document, and I find it highly unlikely that the information on naturalised plants for Africa is complete. Indeed later in the same sentence it states 'thereby leaving regions where information remains scarce'. This all needs to be clarified, as some of these statements are misleading.	Thank you for your comment. We rephrased the sentence to clarify that checklists of alien plant species are available for nearly all African countries, but the quality and comprehensiveness distinctly varies in the second order draft.
Faulkner, Katelyn	No	2	30	869	30	870	A very comprehensive book on biological invasions in South Africa was recently released which is freely available online. Perhaps some information for this section, or the other sections under 'Africa' can be obtained from that: 'Van Wilgen, B.W., Measey, G.J., Richardson, D.M. et al (2020a). Biological invasions in South Africa. <i>Invading Nature</i> . Springer Series in Invasion Ecology vol. 14. Springer, Berlin. https://link.springer.com/book/10.1007/978-3-030-32394-3 '	Thank you very much. This section has been revised and the suggested reference has been added to the chapter in the second order draft.
Government of Ethiopia	Yes	2	30	872	30	872	Citation related correction - the corrected one seems 'Witt 2018' not 'Witt 2010' because the latter is not in the reference list.	Thank you very much for your comment. We have revised this section in the second order
Reshi, Zafar A	No	2	31	715	31	715	...infect naïve hosts or native hosts	Thank you for your comment. We have revised this section and this sentence has been removed from the second order draft.
Catford, Jane	No	2	31	728	31	728	<i>Hymenoscyphus fraxineus</i> (<i>Chalara fraxinea</i>) and ash dieback in Europe	Thank you for this suggestion. This has been added in the second order draft.
Heger, Tina	No	2	31	876	31	894	It is not really clear how this section relates to the units of analysis - it could also be added to the general section in lines 850 to 864.	Thank you. This section focuses on gaps in units of analysis. It does not seem to require
Government of Germany	Yes	2	31	880	31	884	Conclusions are based on data that are far too old (about 20 years old). In most African countries the HDI is raising and the investments in research is sometimes higher than in some European countries. On the other hand, data collection and documentation does not need to be expensive. Have a look at current WHO publications or for a first overview in wikipedia.	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Government of Ethiopia	Yes	2	31	884	31	888	The statement "This is further exacerbated by conflicts of interest from the underestimated benefits lack of political will including interest in regulatory and control efforts of invasions." appears epmtroversial and hence needs revision.	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Government of Germany	Yes	2	31	884	31	884	McNeely is missing in the chapter's list of references.	Thank you, we have corrected and harmonized the style of the references and citations in the second order draft
Lawson Handley, Lori	No	2	31	884	31	888	This sentence isn't completely clear to me	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Faulkner, Katelyn	No	2	31	886	30	888	This is not necessarily driven by a lack of political will, but a lack of resources.	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Government of Ethiopia	Yes	2	31	893	31	894	The expression "Except in South Africa , there are no national assessments to document all IAS at all." is misleading as there could be many countries (including Ethiopia) that undertook assessments. (Please consult 'Rezene et al. 2012' in the case of Ethiopia).	Thank you for your comment. We have completely revised the whole section and considered your comment in the second order draft.
Heger, Tina	No	2	31	912	31	912	Add 'has the highest alien species richness'.	Thank you for your comment. The numbers were taken from the cited studies, but differ from those presented in tables and maps slightly, because of varying availability of data sources. We addressed this variation throughout the chapter including the legends and added a new section about data and data sources in the introduction in the second order draft. As this text is part of the plant section, the numbers refer to plants.
Heger, Tina	No	2	31	912	31	914	How do these numbers relate to the numbers in Table 2.2? The differences (if they did not happen by accident) need to be discussed, and a reference to the table needs to be included here. Also, it is not clear here whether these numbers relate to plants (they should), since this section is about plants, but the text only	Thanks for this suggested change. We have included it in the second order draft
Heger, Tina	No	2	31	918	31	918	Add 'naturalized plant species in North America'.	Thank you. We have chosen to use alien instead of naturalized.
Heger, Tina	No	2	31	921	31	921	Add 'naturalized plant species'.	Thank you. We have chosen to use alien instead of naturalized in the second order draft.
Heger, Tina	No	2	31	926	31	926	Add 'naturalized alien plants'.	Thank you. We have chosen to use alien instead of naturalized in the second order draft.
Heger, Tina	No	2	31	928	31	928	Add 'naturalized alien plants'.	Thank you. We have chosen to use alien instead of naturalized in the second order draft.
Girod, Christophe	No	2	32	921	32	927	The same work has also been conducted for French Guiana (French overseas territory) in which 490 alien plant species have been documented representing 9% of the total flora (Delnatte & Meyer 2012 : Delnatte, C., Meyer, J. Plant introduction, naturalization, and invasion in French Guiana (South America). <i>Biol Invasions</i> 14, 915–927 (2012). https://doi.org/10.1007/s10530-011-0129-1). In the Guianas (Suriname, French Guiana, Guyana), 821 alien plant species are recorded, accounting for 4% of the total flora. I think this work is worth mentioning. Also, concerning South America, datas are available for Argentina and Chile. I think additional datas concerning South America would be useful. See : Fuentes, N., Ugarte, E., Kühn, I. et al. Alien plants in southern South America. A framework for evaluation and management of mutual risk of invasion between Chile and Argentina. <i>Biol Invasions</i> 12, 3227–3236 (2010).	Thank you for this comment. We only highlighted some countries, and based on your comments we added a sentence to make clear that the data are available for many regions in the second order draft
Government of Ethiopia	Yes	2	32	932	32	932	Consider modifying the caption as "Figure 2.14: Temporal trends in numbers of alien species" This may apply to other figures too.	Thank you for making this point. It does not seem to require changes to the text as we feel that the temporal aspect is clear.
kühn, Ingolf	No	2	33	776	33	779	I am not sure whether all regions indeed harbour a similar number of alien species. I would rather argue, they have a similar knowledge base about alien species. You might consider exchanging "harbour" or similar by "are reported from" or similar, throughout this text.	Thank you for this comment. Harbour has been changed to "report" in the second order draft.
Faulkner, Katelyn	No	2	33	942	33	951	A potentially useful study for this section: Carpio, A. J., Alvarez, Y., Oteros, J., León, F., & Tortosa, F. S. (2020). Intentional introduction pathways of alien birds and mammals in Latin America. <i>Global Ecology and Conservation Journal</i> , 22, e00949	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	2	33	949	33	951	Please note that the references for South America are not up to date; please check for newer information.	Thank you, we replaced Peck et al. 1998 by Fuentes et al. 2020 (Fuentes, N., Marticorena, A., Saldaña, A., Jerez, V., Ortiz, J.C., Victoriano, P., Moreno, R.A., Larrain, J., Villaseñor-Parada, C., Palfner, G., Sánchez, P. & Pauchard, A. (2020) Multi-taxa inventory of naturalized species in Chile. <i>NeoBiota</i> , 60, 25–41. DOI: 10.3897/neoBiota.60.55366.) in the second order draft.
Willette, Demian	No	2	33	958	34	991	Islands - I would suggest inclusion of the invasive marine angiosperm/seagrass <i>Halophila stipulacea</i> in this section as recent publications (below) demonstrate its extensive spread across most eastern Caribbean islands, substantial transformation of shallow water habitats (<i>H. stipulacea</i> replacing native seagrasses & bare sand, growing over dead corals and in sand halos), and evidence suggesting modification of food webs. Three recent references are included here: (1) Willette, D. A., Chalifour, J., Debrot, A. D., Engel, M. S., Miller, J., Oxenford, H. A., ... & Védie, F. (2014). Continued expansion of the trans-Atlantic invasive marine angiosperm <i>Halophila stipulacea</i> in the Eastern Caribbean. <i>Aquatic botany</i> , 112, 98-102.; (2) Muthukrishnan, R., Chiquillo, K. L., Cross, C., Fong, P., Kelley, T., Toline, C. A., ... & Willette, D. A. (2020). Little giants: a rapidly invading seagrass alters ecosystem functioning relative to native foundation species. <i>Marine Biology</i> , 167(81), 81.; (3) Willette, D. A., Chiquillo, K. L., Cross, C., Fong, P., Kelley, T., Toline, C. A., ... & Muthukrishnan, R. (2020). Growth and recovery after small-scale disturbance of a rapidly-expanding invasive seagrass in St. John, US Virgin Islands. <i>Journal of Experimental Marine Biology and</i>	Thank you for your comment. This section is dealing specifically with islands, not about the marine species close to them, so we did not include this example
Government of Germany	Yes	2	34	970	34	972	The number of introduced plant species seems much too low, see: de Lourdes Torres, M. and C. F. Mena (2018). Understanding Invasive Species in the Galapagos Islands: From the Molecular to the Landscape, Springer. These authors name nearly 900 introduced plant species (page xviii).	Thank you for your comment. We have made the correction and added this reference in the second order draft.
Government of Germany	Yes	2	34	979	34	981	The information as structured at the moment is slightly confusing if desert islands are included in this section as well. Kindly consider discussing 'desert islands'	Thank you, this error has been corrected in the second order draft.
Heger, Tina	No	2	34	983	34	983	Change to 'Data and knowledge gaps', to make it match the header in the other sections.	Thank you. We have made the change in the second order draft..
Government of Ethiopia	Yes	2	34	984	34	966	Mixing up of 'North America', 'the Caribbean' and 'South America'.	Thank you for your suggestion, it is greatly appreciated by the chapter authors. However, we note that we must use the regional approach mandated by IPBES and this section refers to the Americas which includes both North and South America as well as the Caribbean.
Zhou, Mo	No	2	34	984	34	991	A good reference for the status of invasive species in South America is Macdonald, I.A.W., Reaser, J.K., Bright, C., Neville, L.E., Howard, G.W., Murphy, S.J. and Preston, G., 2003. Invasive alien species in Southern Africa: national reports and directory of resources. Invasive alien species in Southern Africa: national reports and directory of resources.	Thank you, however this section focuses on the Americas, which includes South America, while the reference you provide refers to South Africa.
Heger, Tina	No	2	34	989	34	989	I guess this should read 'Fig. 2.8.'	Thank you for your comment. The figure number has been updated in the second order draft.
Catford, Jane	No	2	35	788	35	790	consider presenting relative to study effort for that group (e.g. number papers published in total) and relative to species richness of that group - can help to indicate relative levels of invasion after accounting for spp pool, and will indicate likely knowledge gaps for some taxa based on study effort (if little effort, then not surprising that fewer spp). important to make clear difference between absence of data vs "true" absence	Thank you for this comment. We agree that this is very important but the lack of abundance data for many regions and taxa precludes the inclusion of relative abundance. However, it is an excellent point for the data gaps section.
Heger, Tina	No	2	35	1003	35	1003	Add 'naturalized alien plants'.	Thank you. We have chosen to use alien instead of naturalized in the second order draft.
Government of Germany	Yes	2	35	1019	36	1025	The citations used here are not up to date. Please check for newer information.	Thank you for making this point. It does not seem to require changes to the text.
Khuroo, Anzar Ahmad	No	2	36	1032	36	1033	In India, Inderjit et al., 2018 reports 471 naturalised alien species which comes as 2.6% of the flora; and not 730 naturalized aliens making up 3.8% of the flora as written. As I have worked in India, that is why I could recognise this factual error. I suggest to check this for other regions as well.	Thank you for spotting this mistake, it is corrected in the second order draft.

Heger, Tina	No	2	36	1037	36	1037	Add a reference to table 2.4, e.g. here (e.g. 'for a summary of the numbers of alien plants, algae and bryophytes per sub-region see table 2.4').	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	2	37	812	37	822	possible to get info on relative abundance, at least for some taxonomic groups? Dominance is arguably much more important than richness (though the two can be related, albeit not always) concepts discussed here: Catford, J. A., Vesik, P. A., Richardson, D. M. & Pyšek, P. (2012) Quantifying levels of biological invasion: towards the objective classification of invaded and invadable ecosystems. <i>Global Change Biology</i> , 18, 44-62. If not possible to get/show that information (or not for many species), suggest include a brief discussion/explanation of these issues and acknowledge limitations/issues with relying on SR when gauging invasion level. Examples of r'ships between alien plant richness vs alien abundance here (and these relationships vary across ecosystem types): Catford, J. A. & Jansson, R. (2014) Drowned, buried and carried away: effects of plant traits on the distribution of native and alien species in riparian ecosystems. <i>New Phytologist</i> , 204, 19-36. Catford, J. A. & Jones, L. P. (2019) Grassland invasion in a changing climate. <i>Grasslands and Climate Change</i> . (ed. by D. J. Gibson and J. A. Newman), pp. 149-171. Cambridge University Press, Cambridge.	Thank you for this comment. We agree that this is very important but the lack of abundance data for many regions and taxa precludes the inclusion of relative abundance. However, it is an excellent point for the data gaps section.
Heger, Tina	No	2	37	1061	37	1063	I suggest reformulating to 'Many islands in the Asia-Pacific region are significantly impacted by IAS (IPBES Regional Assessment 2018), with several IAS having additive and even synergistic effects on invaded ecosystems'.	Thanks for this suggested change. We have included it in the second order draft.
Takehara, Mari (Government of Japan)	Yes	2	37	1067	37	1077	Although there is a reference to the impact of mongoose, it would be desirable to mention the progress of control measures. Details could be included in other chapters. In Japan, significant impacts due to green anoles and others have been pointed out in the Ogasawara Islands, and this is an important example of a case study of	Thank you for these very useful references. It was decided however that pathways are dealt with in Chapter 3 and not in Chapter 2
Heger, Tina	No	2	37	1078	37	1079	I suggest changing to 'Some islands are invaded by only a few alien species, but with significant effects'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	37	1086	38	1087	I suggest changing to 'Introduced plant pathogens negatively affect environmentally important and culturally iconic tree species on several islands, including...'	Thanks for this suggested change. We have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	38	1091	38	1095	Missing <i>Miconia Calvescens</i> - Meyer, J. Y., & Florence, J. (1996). Tahiti's native flora endangered by the invasion of <i>Miconia calvescens</i> DC. (<i>Melastomataceae</i>). <i>Journal of Biogeography</i> , 23, 775-781.	Thank you for your suggestion. We have included the reference in the second order draft.
Heger, Tina	No	2	38	1097	38	1100	I suggest changing to 'Temporal information is scarce for most regions in Asia and the Pacific. For birds and amphibians, some information can be found (Fig. 2.5), and for vascular plants several studies are available for at least a few countries such as Australia, New Zealand, Japan and India (Fig. 2.8).' I suggest moving this sentence to the end of this section (i.e. after line 1106)	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	2	38	1113	42	1246	We have noted that original literature was only used for the databases and analyses if it was published in English and had a rather global focus. Regional work e.g. on a European level is hardly considered or is partly based on outdated knowledge (e.g. Gollasch 2006). There is no mention of the Marine Strategy Framework Directive with its descriptor 2 "Neobiota" and the related (and relevant!) work at European level. For the subchapter on Europe, it is suggested to consider the following recent work in addition to the publications already mentioned elsewhere in this Excel table: - Mediterranean non indigenous species at the start of the 2020s: recent changes (https://doi.org/10.1186/s41200-020-00191-4) - How many marine aliens in Europe? Management of Biological Invasions (http://dx.doi.org/10.3391/mbi.2013.4.1.05) - New Arrivals: An Indicator for Non-indigenous Species Introductions at Different Geographical Scales	Thank you for this comment. For consistency throughout the chapter, we have used a small number of databases in our analyses and we note the benefits and deficiencies of this approach in our chapter. The marine aliens sections (and the relevant literatures) have been significantly updated and supplemented by numerous experts including Bella Galil, James Carlton and Evangelina Schwindt in the second order draft
Heger, Tina	No	2	38	1117	38	1117	Add reference to Fig. 2.16 here.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	38	1121	38	1121	Change 'which' to 'with'.	Thanks for this suggested change. We have revised this section in the second order draft.
Jeschke, Jonathan	No	2	38	1121	38	1121	Add "is" after "which".	Thanks for this suggested change. The sentence has been revised in the second order draft.
Heger, Tina	No	2	38	1124	38	1124	I suggest changing to 'increase after 1950, with the main pathway being ornamental trade, followed by...'	Thanks for this suggested change. We have included it in the second order draft.
Karimov, Bakhtiyor	No	2	39	1126	39	1127	Fig. 2.16 better to give separately for XVIII Century, first half and second half of XX century, because most IAS invasions and introductions were in XX century, especially in second half (Central Asia). By this way one can see clearly the trends for CA ans EE.	Thank you for your comment. We agree that the trend figures are dominated by the trend in Central and Western Europe, but splitting the trends into different time periods will not change this. As we are bound to the delineation of IPBES regions, we unfortunately cannot change this
Karimov, Bakhtiyor	No	2	39	1128	39	1133	Fig. 2.16: Trends in numbers of alien species. Central Asian are missing; and in general, there is not enough attention given to Central Asia. Need to integrate more Russian (language) literature.	Thank you for your comment. The time series and maps shown in this chapter are all based on the same global databases, which we cannot change. But we updated the underlying database where possible, which added information also for Central Asia in the second order draft. But for some taxonomic groups like crustaceans, information is lacking completely for Central Asia and thus trends do not show up. We, however, did our best to include literature from Central
Heger, Tina	No	2	39	1135	39	1135	Change 'most naturalized species' to 'highest numbers of naturalized alien plant species'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	39	1135	39	1135	Maybe start with a reference to Table 2.5, e.g. 'In Central and Western Europe, a total of 8420 vascular plants, 408 Algae and 26 Bryophytes have been recorded (Table 2.5). The highest numbers of naturalized alien plant species are recorded in England...'	Thanks for this suggested change. We have included it in the second order draft.
Dool, Serena	No	2	39	1138	39	1138	"British and Irish Isles". Replace with "Britain and Ireland" perhaps.	Thank you. This has been corrected in the second order draft.
Heger, Tina	No	2	39	1138	39	1139	Add 'naturalized alien plants'.	Thank you. We are using established alien instead of naturalized alien.
Heger, Tina	No	2	39	1143	39	1143	Add 'naturalized alien plants'.	Thank you. We are using established alien instead of naturalized alien.
Heger, Tina	No	2	39	1153	39	1155	This sentence is contradicting the numbers given above (1135-1137) - discuss!	Thank you for your comment. The species numbers may differ among sources, because of inconsistency in the original studies. We address the issue of heterogeneous data now throughout the chapter and added a new section on data sources in the introduction, where we discuss the issue and our approach in the second order draft.
Heger, Tina	No	2	39	1155	39	1157	This sentence is incomplete.	Thanks for this suggested change. We have included it in the second order draft.
Reshi, Zafar A	No	2	40	912	40	913	naturalized aliens could be confusing, instead naturalized vascular plant aliens ...could be more appropriate	Thank you for this comment. We no longer use the term "naturalized" in the text. We agree that it is confusing. The text is standardized to refer to aliens, established aliens and invasive alien species in the second order draft.
Government of Germany	Yes	2	40	1155	40	1156	"Flowering plants most introduced is the (i.e., <i>Magnoliophyta</i> : 200 out of 210, Nunes et al., 2015)" -- The sentence is incomplete, the name of the plant species is missing.	Thank you. This has been corrected in the second order draft.
Government of Bulgaria	Yes	2	40	1159	40	1162	In table 2.5 for example such as the other tables (2.1, 2.2, 2.3 and 2.4) algae are included as alien species. Some species of blue-green microalgae (cyanobacteria) are not exactly alien, but they are invasive and harmful for human health because toxic species of them can release toxins called cyanotoxins. One of the most important toxin (microcystin-LR) is included in the revised European directive for monitoring of drinking water. The global climate changes and eutrophication favor the development of such species. Therefore, if there is information about them, it would be useful to mention it.	If they are not alien they cannot be (by definition) considered invasive. Native species are not part of the IPBES assessment
Government of Germany	Yes	2	40	1161	40	1162	Table 2.5: In order to allow for more user-friendliness, it is suggested to arrange the taxonomic groups in subgroups, e.g. flora and fauna.	Thank you for this suggestion but we will keep the table as it is currently formatted for consistency throughout the chapter in the second order draft.
Government of Germany	Yes	2	40	1161	40	1162	Table 2.5: It is suggested to rethink the order of the regional column. Maybe it would make more sense to follow a geographical gradient from Central/Western Europe, to Eastern Europe and Central Asia.	Thank you for this suggestion but we will keep the table as it is currently formatted for consistency throughout the chapter.
Karimov, Bakhtiyor	No	2	40	1166	41	1192	I did not see any literature on Central Asia. Also no conclusions on CA. Rates of increase remained mostly constant for all groups in Eastern Europe, and available numbers in Central Asia are often too low to assess trends. But no literature stated. However, there are a lot of publications on ichthyofauna.	Thanks for your comment. This is reported in the text "available numbers in Central Asia are often too low to assess trends"
Reshi, Zafar A	No	2	41	954	41	945	Fungi and microorganisms...please check	Thank you. We have categorized fungi under microorganisms section in the second order draft.
Heger, Tina	No	2	41	1185	41	1185	Add 'aquarium trades were most important'	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	2	41	1189	41	1195	Para on status: Why are only freshwater animals looked at? Main heading is "animals".	Thank you for your comment. We have to implement this session.
Heger, Tina	No	2	41	1189	41	1189	Add 'in Europe and Central Asia'	Thanks for this suggested change. We have included it in the second order draft.
Kudelska, Theresa	No	2	41	1199	41	1204	Phytophthora ramorum impact in the UK has been significant and was thought to have been introduced through the ornamental plant trade (according to Forest Research in the UK : https://www.forestryresearch.gov.uk/tools-and-resources/pest-and-disease-resources/ramorum-disease-phytophthora-ramorum/) and could be a good example to insert here. The impacts are outlined in: Kenis, M., A. Roques, A. Santini and A. M. Liebhold, 2017. Impact of non-native invertebrates and pathogens on market forest tree resources. <i>Impacts of Biological Invasion on Ecosystems Services. Invading Nature – Springer Series in Invasion</i>	Thank you. We have incorporated this information in the second order draft.
Catford, Jane	No	2	41	general	41		need to consider opportunities for invasion, including time lag between introduction and records of naturalisation, and some regions better studied than others. Old world has had more opportunities for invasion and more opportunities for records of invasion. Trends will likely change in the future - even if all	Thank you, time lags have been added to the second order draft
Heger, Tina	No	2	42	1208	42	1210	This sentence is weird - maybe delete the first part '(Island invasions in the European and Central Asian IPBES regions)?'	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	42	1209	42	1209	Rather than 'Antarctic Ocean', it should read 'Southern Ocean'?	Thank you. We have edited this section and no longer use the term Antarctic Ocean in the second order draft.
Heger, Tina	No	2	42	1211	42	1213	I suggest changing to 'Mediterranean islands constitute a hotspot of biodiversity and have been invaded by a large number of alien invasive plants and animals for centuries. Many alien species are now naturalized, which may mean that many local species sensitive to invasions already have gone extinct, thus masking true levels of IAS impacts.'	Thank you for your suggestion. We have revised this section completely and deleted this sentence from the second order draft.
Faulkner, Katelyn	No	2	42	1213	42	1213	The text on the Antarctic islands does not belong in the section that focuses on Europe. These islands should either be discussed under the continent with which they are associated (Marion Island is South African, Kerguelen is Australian) or they should have their own section.	Thank you for this comment. We have now included island sections for each IPBES region and clarified the text in this section in the second order draft.
Hughes, Kevin	No	2	42	1213	42	1214	Despite a history of fewer invasions on Arctic and Antarctic islands...' I am not sure this is entirely accurate. Human introductions in the sub-Antarctica islands have generally accompanied human presence throughout history. See: Frenot, Y., Chown, S. L., Whinam, J., Selkirk, P. M., Convey, P., Skotnicki, M., & Bergstrom, D. M. (2005). Biological invasions in the Antarctic: Extent, impacts and implications. <i>Biological Reviews</i> , 80(1), 45-72.	Thank you for your comment We have revised this section completely and deleted this sentence from the second order draft.

Lawson Handley, Lori	No	2	42	1214	42	1224	Just checking if it is correct that Antarctic islands and the Kerguelen archipelago are included in this section? Are they included in the European and Central Asian IPBES region?	Thank you for this comment. We have now included island sections for each IPBES region and clarified this section of the text in second order draft.
Government of Germany	Yes	2	42	1226	42	1236	Para on "Data and Knowledge Gaps": The focus is on plants only and the reason for that is not clear. It is suggested to add data and knowledge gaps also for fauna, fungi, and other groups mentioned above.	Thank you for your comment. We have revised this section significantly and now address additional taxa in the second order draft.
Dupont, Lise	No	2	43	1260	43	1261	All terrestrial habitats are not equivalent in terms of invasion studies. This is particularly the case of soils, which are largely understudied. This should be acknowledge somewhere.	Thank you for your comment. Lack of knowledge and data are addressed in the individual unit of analysis sections in the second order draft.
Catford, Jane	No	2	43	general			study effort - need to account for that (as well as propagule pressure, colonisation pressure etc)	Thank you for your comment. Research effort has been included in this section by presenting the number of available studies for each realm in the introduction of section 2.4. We refer to reasons of observed patterns such as propagule pressure and colonisation within the individual section, but these aspects are more broadly covered in the chapter about drivers in the second order draft.
Government of Germany	Yes	2	44	1277	44	1277	Figures like figure 2.17 without reference in text could also be moved to the attachment.	Thank you for your comment. This is a relevant figure for the whole section. We would like to keep it in the main text, but now refer to it in the individual sections.
Takahashi, Yasuo	No	2	45	1281	66	2183	It would be helpful if the IAS trend is presented in diagrams for each unit of analysis with a taxonomic group breakdown, as IAS under different taxonomic groups dominate different units of analysis.	Thank you for raising this point. We specifically address data and knowledge gaps in this and every major section in the second order draft.
Heger, Tina	No	2	45	1283	45	1289	These sentences would better fit into the section 'data and knowledge gaps'.	Thank you for your comment. We have moved the sentences in the second order draft as
Faulkner, Katelyn	No	2	45	1290	45	1321	Much of this text repeats what has already been discussed in the document, or should have been discussed earlier in the document	Thank you for your comment. Repetitions cannot and should be fully avoided as readers will likely just read single section rather than the full document. But we will try to reduce redundancy as much as possible in the second order draft.
Heger, Tina	No	2	45	1290	45	1290	Add 'alien species in terrestrial ecosystems'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	45	1294	45	1294	Change to 'numbers of alien species in terrestrial ecosystems'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	45	1296	45	1296	Add 'in terrestrial ecosystems'.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	45	1303	45	1303	The Pickard, 1984, reference is not appropriate, as Lord Howe Island is not a sub-Antarctic island. Rather is has a latitude of only 31oS. Also the reference Frenot et al. 2001 should be Frenot et al 2005.	Thanks for this suggested change. In the second order draft, we removed the Pickard 1984 citation, but keep Frenot et al. 2001 as this study shows the actual trends to which we are referring. But in addition, we now included Frenot et al. 2005 as it provides a more general
Heger, Tina	No	2	45	1310	45	1310	Add reference to Fig. 2.17 here.	Thanks for this suggested change. We have included it in the second order draft.
kühn, Ingolf	No	2	46	1121	46	1121	"which an" --> "which is an"	Thanks for this suggested change. The sentence has been revised in the second order draft.
Heger, Tina	No	2	46	1322	46	1322	I suggest changing to 'Common explanations for the spatial distribution of terrestrial alien species are the variation in number of individuals introduced per species (propagule pressure), in the number of introduced species (colonisation pressure), and in the degree of disturbance in the recipient areas'.	Thanks for this suggested change. We have included it in the second order draft.
Lawson Handley, Lori	No	2	46	1323	46	1323	Not convinced "intensity" is the right word here. "Number" would be more appropriate	Thank you. We have fully revised this section and the word "intensity" is no longer included in the second order draft.
Kudelska, Theresa	No	2	46	1347	46	1347	Possible additional references for the Tropical and subtropical forests: Brown, K. A. Scatena, F. N. Gurevitch, J. 2006 Effects of an invasive tree on community structure and diversity in a tropical forest in Puerto Rico. Forest Ecology and Management Volume 226, Issues 1-3, P. g. 145-152. Morris, r. J. 2010. Anthropogenic impacts on tropical forest biodiversity: a network structure and ecosystem functioning perspective. Philosophical Transactions of the Royal Society. Volume 365, Issue 1558. Denslow J. S. & Dewalt S. J. 2008. Exotic plant invasions in tropical forests: patterns and hypotheses. Tropical forest community ecology (eds. Carson W. P. & Schnitzer S. A.). Oxford, UK: Wiley-Blackwell.	Thank you very much for providing these references. We included them in the second order draft.
Government of Germany	Yes	2	46	1353	46	1354	The growing season of temperate forests is longer (not shorter) than 130 days, that of boreal forests is shorter (not longer) than 140 days. Furthermore, not all temperate forests experience a cold continental climate! The temperate deciduous forest e. g. of Western and Central Europe or the Eastern United States experience a mild oceanic climate.	This is a direct citation from a published document and cannot be changed. We will remove this part in the second order draft.
Zhou, Mo	No	2	46	1353	46	1354	How is it possible that boreal forests have a longer growing season than temperate forests?	Thank you for your comment. This is a direct citation from a published document and cannot be changed. We will remove this part from the second order draft.
Zhou, Mo	No	2	46	1357	46	1358	Interior Alaska is mostly covered by boreal forests, too.	Thank you for your comment. This is a direct citation from a published document and cannot be changed. We will remove this part from the second order draft.
Feest, Alan	No	2	46	1360	0	0	These are all west coasts!	Thank you very much. This is a direct citation from a published document and cannot be changed. We will remove this part in the second order draft.
Kühn, Ingolf	No	2	47	1139	47	1142	I am not sure whether the northern parts of Europe are indeed more heavily invaded, or whether, as you write the next sentence, this reflects our knowledge base. For theoretical reasons, i.e. most alien plants species are from warmer climates, it can be expected that in warmer parts of Europe more species would be naturalized, given similar economic states.	Thank you for your comments. This is what the data say, but we deleted the word "most" to reflect your comment in the second order draft.
Kudelska, Theresa	No	2	47	1362	47	1362	Potential reference for the Boreal forest section: Sanderson, L. A. McLaughlin, J. A. Antunes, P. M. 2012. The last great forest: a review of the status of invasive species in the North American boreal forest. Forestry: An International Journal of Forest Research, Volume 85, Issue 3, 3 July 2012, Pages 329-340.	Thank you very much for providing these references. We included them in the second order draft.
Rebello, Alana	No	2	47	1366			The importance of fire in alien plant invasion is critical in Med regions	Thank you. We have made this addition in the second order draft.
Zhou, Mo	No	2	47	1370	47	1371	"north western America (e.g. California chaparral), southern America 1371 (Chilean matorral)" these terms are odd. Maybe Pacific southwest in the U.S. (California chaparral) and west coast of South America (Chilean matorral).	Thank you very much for your comment. This is a direct citation from a published document and cannot be changed. We will remove this part in the revised version.
Gya, Ragnhild	No	2	47	1388	47	1390	These two sentences defining what you mean by arctic and mountain tundra reads a little strange. I would suggest to write something like this: "IPBES definitions tundra in the following way: "Tundra vegetation, composed of low-growing herbaceous plants, shrubs, mosses, and lichens, grows beyond the cold limit of tree growth". Two types are recognized: mountain tundra at high elevations, and arctic tundra at high latitudes."	Thank you for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Gya, Ragnhild	No	2	47	1395	47	1397	I would change this sentence slightly, removing the "for example", to this: "Species richness in the tundra is low, the arctic tundra contains only 9% of the world's species of plants and animals (Ichii, Kazuhito et al., 2019)."	Thank you for this suggestion. We have chosen not to include it in the section as the current text follows the official definition provided by IPBES.
Gya, Ragnhild	No	2	48	1403	48	1406	I find it a bit strange to use a reference from 1994 to say something about current invasion in the Arctic. I would skip this reference, or update with a newer one.	Thanks for this suggested change of wording. It is an improvement and we have included more up to date references in the second order draft.
Gya, Ragnhild	No	2	48	1406	48	1407	I think there is a part of this sentence missing. What are we expecting futur alien species from different taxonomic groups to do?	Thank you, this has been clarified in the second order draft.
Heger, Tina	No	2	48	1406	48	1407	Something is missing here - 'is expected to increase'?	Thank you, this has been clarified in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	48	1415	48	1418	Also release of unknown microorganisms that are below the permafrost - Cavicchioli, R., Ripple, W. J., Timmis, K. N., Azam, F., Bakken, L. R., Baylis, M. ... & Crowther, T. W. (2019). Scientists' warning to humanity: microorganisms and climate change. Nature Reviews Microbiology, 17(9), 569-586.	Thanks for this suggested change. We have included it in the second order draft.
Shimura, Junko	No	2	48	1415	48	1418	"Invasive disease risk" is not clear in terms of predicted disease causative agents, host species that are anticipated to be impacted and their risks related to climate change. Need more explanatory information.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Faulkner, Katelyn	No	2	48	1416	48	1418	Should this text not be in the section on 'Future dynamics'?	Thank you for this suggestion. We have chosen to keep this section here in this specific section and explicitly mention its relevance for the subsection in the second order draft.
Rosa, Hugo Henrique Marques da	No	2	48	1420	48	1435	These dissertations could help to support the increasing number of alien species in mountains areas and its association with the number of visitors. We are working on both dissertations to publish the papers, while they can be accessed using the links: 1 "http://177.105.2.222/bitstream/1/41389/1/DISSERTA%3c%87%e3%830_Altitude%20and%20native%20of%20driver%20of%20the%20distribution%20of%20on-native%20and%20native%20animals%20at%20the%20Itatiaia%20National%20Park.pdf"; 2 "http://177.105.2.222/bitstream/1/42381/1/DISSERTA%3c%87%e3%830_Patterns%20of%20native%20and%20alien%20plant%20species%20distribution%20along%20roads%20and%20trails%20on%20altitudinal%20gradient%20of%20a%20tropical%20mountain%20forest.pdf"	Thank you for the suggested references. We have decided not to include them in the assessment, as the references cited do already support the statement well enough and are published in peer reviewed literature.
Núñez Lendo, Carmela Isabel	No	2	48	1422	48	1424	The reason for that is the warming or tropicalization of high altitudes (mountains), which is changing the vegetation landscape - Walther, G. R., Beilner, S., & Pott, R. (2005). Climate change and high mountain vegetation shifts. In Mountain ecosystems (pp. 77-96). Springer, Berlin, Heidelberg.	Thank you for this suggestion, we have chosen not to include this line of argument here as it refers to drivers of invasions and is covered in the respective chapter (Chapter 3 of the
Gya, Ragnhild	No	2	48	1437	49	1458	In the status section I am missing something about how the invasive species could potentially affect plants in the arctic and mountainous systems. We know that species who live there are bad competitors (at least within plants), so the potential risk from the invasives that do come there could be high. See these references for examples of this: (1) Olsen, S. L., Tøpper, J. P., Skarpaas, O., Vandvik, V., & Klanderud, K. (2016). From facilitation to competition: Temperature - driven shift in dominant plant interactions affects population dynamics in seminatural grasslands. Global Change Biology, 22(5), 1915-1926. (2) Choler, P., Michalet, R., & Callaway, R. M. (2001). Facilitation and competition on gradients in alpine plant communities. Ecology, 82(12), 3295-3308. (3) Dormann, C. F., & Brooker, R. W. (2002). Facilitation and competition in the high Arctic: the importance of the experimental approach. Acta Oecologica.	Thanks for this suggested change. We have included it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	48	1438	48	1442	I am not sure about this statement. There is a lot of research on vegetation change in high altitudes going on. - Walther, G. R., Beilner, S., & Pott, R. (2005). Climate change and high mountain vegetation shifts. In Mountain ecosystems (pp. 77-96). Springer, Berlin, Heidelberg.	Thank you for this suggestion. We have chosen not to include it in the assessment, as the reference by Walther and colleagues does not provide any information on alien plant species richness trends in high elevations or mountain tundra regions.
Rosa, Hugo Henrique Marques da	No	2	48	1438	48	1442	My research has shown that the number of alien species are higher in the extremes of the altitudinal gradient, being also an exception for what has been seen. While the work done by Paiaro et al. (2011) was located in a temperate zone, our was done in a tropical one. We are working on the dissertation to publish the paper. So far, the results can be accessed using the link http://177.105.2.222/bitstream/1/42381/1/DISSERTA%3c%87%e3%830_Patterns%20of%20native%20and%20alien%20plant%20species%20distribution%20along%20roads%20and%20trails%20on%20altitudinal%20gradient%20of%20a%20tropical%20mountain%20forest.pdf	Thank you for this additional reference, we have included it in the second order draft
Rosa, Hugo Henrique Marques da	No	2	49	1448	49	1453	We have also found the correlation of alien species richness and anthropogenic disturbances along transportation routes, and that the alien species richness decreases with increasing distance from these infrastructures. We are working on the dissertation to publish the paper. So far, the results can be accessed using the link http://177.105.2.222/bitstream/1/42381/1/DISSERTA%3c%87%e3%830_Patterns%20of%20native%20and%20alien%20plant%20species%20distribution%20along%20roads%20and%20trails%20on%20altitudinal%20gradient%20of%20a%20tropical%20mountain%20forest.pdf	Thank you for making this point. It does not seem to require changes to the text.
Pisanu, Benoit	No	2	49	1457	49	1458	Just a remark: IAS may well rapidly adapt to such change in habitat suitability ...	Thank you for your comment. The positive feedback is greatly appreciated by the chapter

Courault Romain	No	2	49	1463	49	1465	"research efforts are generally less intensive for animal and plants [...] likely also true for other taxonomic groups": please specify which ones (mosses, lichens, etc.)	Thanks for this suggested change. We have included it in the second order draft.
Kudelska, Theresa	No	2	49	1475	49	1475	Possible reference for this section: Foxcroft, L. C., Richardson, D. M., Rejmanek, M., Pysek, P. 2010. Alien plant invasions in tropical and sub-tropical savannas: patterns, processes and prospects. <i>Biological Invasions</i> . Volume 12, pages 3913–3933. Available on: https://doi.org/10.1007/s10530-010-9696-6	Thank you. We have incorporated this reference in the second order draft.
Government of Germany	Yes	2	50	1495	50	1506	Regarding the characterization of arid and hyper-arid lands it is suggested to analyse the characterization provided in the IPBES LDRA report (2018), and the recently approved IPCC special report on "climate change and land" (chapter 3, pages 254 and 255 of this IPCC report) to ensure alignment where ever possible between recently developed science-policy assessments: https://www.ipcc.ch/site/assets/uploads/sites/4/2019/11/06_Chapter-3.pdf	Thank you for your comment. We revised the text and do not mention this anymore as the IPBES definition was there was informational and not meant to be included in later the second order draft.
Feest, Alan	No	2	50	1496	0	0	Are there no temperate/polar deserts?	Thank you very much for the comment. In this chapter we follow the IPBES units of analysis. Please refer to the supplementary material of Chapter 1.
Government of Germany	Yes	2	50	1512	54	1657	It is suggested to check, whether the recently approved IPCC special report on the Ocean and Cryosphere in a changing climate (2019) provides any useful facts for this section: https://www.ipcc.ch/srocc/	Thank you for your suggestion. It is greatly appreciated.
Barbosa, Andres	No	2	50	1521	50	1523	Penguins are not a good example here. They don't use sea ice for hunting.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	51	1526	51	1527	The sub-glacial Lake Vostok may not be isolated, as many sub-glacial lakes are considered to be part of a larger network of lakes. See: Wingham D, Siegert M, Shepherd A, Muir AS (2006) Rapid discharge connects Antarctic subglacial lakes. <i>Nature</i> 440: 1033–1036.	Thank you for your comment. It is greatly appreciated by the chapter authors.
Hughes, Kevin	No	2	51	1543	51	1544	The numbers of tourists for the 2019/20 season was 74,401. See: IAATO. 2020. IAATO Antarctic visitor figures 2019–2020. Available at https://iaato.org/wp-content/uploads/2020/07/IAATO-on-Antarctic-visitor-figures-2019-20-FINAL.pdf	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	51	1544	51	1553	The examples provided do not give 'an idea of the increasing human pressure' but rather provide 21st Century snap shots of introductions at a variety of locations. Human activity by national operators has peaked at other times (e.g. during the International Geophysical Year 1957/58) and levels of introductions may have been higher at this point for some location, particularly due to the high levels of building activity (e.g. McMurdo Station and the thousands of	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	51	1554	51	1554	Please clarify: introductions to were started increasing - to all cryosphere areas globally?	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	51	1554	51	1556	Perhaps include here the paper by Hughes et al. 2015, which provides a list of all known non-native species introduced to Antarctica. Hughes, Kevin A., Pertierra, Luis R., Molina-Montenegro, Marco A., Convey, Peter. (2015) Biological invasions in terrestrial Antarctica: what is the current status and can we respond?. <i>Biodiversity and Conservation</i> , 24, 1031-1055. 10.1007/s10531-015-0896-6	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	51	1559	51	1560	Delete Hughes et al., 2015. Reference should be: Hughes, Kevin A., Lee, Jennifer E., Tsujimoto, Megumu, Imura, Satoshi, Bergstrom, Dana M., Ware, Chris, Lebouvier, Marc, Huiskes, Ad H.L., Gremmen, Niek J.M., Frenot, Yves, Bridge, Paul D., Goshon, Steven L. (2011) Food for thought: risks of non-native species transfer to the Antarctic region with fresh produce. <i>Biological Conservation</i> , 144, 1682-1689. 10.1016/j.biocon.2011.03.001	Thank you for this suggestion, we have included it in the second order draft.
Pisanu, Benoit	No	2	51	1560	51	1561	"However, European rabbit fleas were introduced for biological control of rabbits in the Kerguelen Islands (Yves Frenot et al., 2005)." This is anecdotal. Rabbit fleas were only experimentally introduced onto a single small island (Ile du Cimetiere) of the Kerguelen Archipelago. The rabbit flea was long-ago introduced onto the Macquarie island. Should be deleted. See Chapuis et al. 2011. Eradication of invasive herbivores: usefulness and limits for biological conservation in a changing world - <i>Animal Conservation</i> 14: 471–473. https://zslpublications.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1469-1795.2011.00499.x	Thanks for this suggested change. We have included it in the second order draft.
First, Matthew	No	2	51	1566	52	1567	Disagree with the general statement regarding biofouling on commercial ships; the problem is not as well known, but perhaps due to difficulty in attribution (see: Moser et al. 2017 https://link.springer.com/article/10.1007/s10530-017-1386-4 for risk of niche areas and Moser et al. 2015 for total surface area of the commercial fleet; https://link.springer.com/article/10.1007/s10530-015-1007-z)	Thanks for this suggested change. We have included it in the second order draft
Faulkner, Katelyn	No	2	52	1570	52	1574	This section of text discusses marine introductions, bull falls under section 2.4.1. on the terrestrial environment	Thank you for making this point. It does not seem to require changes to the text.
Hughes, Kevin	No	2	52	1572	52	1573	Please see earlier comments on Hyas arenas. Also, the mussel introduction reported by Cardenas et al., 2020, did not establish and is thought to be no longer present at the site of discovery in the South Shetland Islands (see the paper for further information)	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	52	1573	52	1573	I suggest changing to 'the most recent introduction (a mollusc) has been recorded in 2019'	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1579	52	1581	Poa pratensis was introduced in 1954/55 with soil imported from Argentina for the trial cultivation of beech trees (therefore, remove the 'probably') See: Corte A (1961) La primera fanerogama adventicia hallada en el continente Antartico. <i>Contribucion del Instituto Antartico Argentino</i> 62:1–14. Poa annua was not introduced in 1953 by the Polish. Chwedorzewska et al (2015) say 'Poa annua was recorded for the first time in Antarctica in 1953 near the ruined whaling station on Deception Island, South Shetland Islands (Skottsberg 1954:Fig. 1). According to Longton's (1966) observations conducted during the austral summer season of 1964–1965 the species flowered and produced scattered seedlings. Collected seeds also germinated successfully. This population was destroyed during a volcanic eruption in November 1967 (Collins 1969)'	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1579	52	1589	This section is not entirely accurate and is confusing. Perhaps rewrite with reference to the literature.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1582	52	1582	Poa annua was introduced to Arctowski Station in 1985. See the timeline in Figure 6 of Hughes and Pertierra (2016). Hughes, Kevin A., Pertierra, Luis R. (2016) Evaluation of non-native species policy development and implementation within the Antarctic Treaty area. <i>Biological Conservation</i> , 200, 149-159. 10.1016/j.biocon.2016.03.011	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1584	52	1585	Having checked Malfasi et al, the grass on Signy was not eradicated 'from the wild' in 1973, but from the experimental plots. I think the paper authors are saying that the recent discovery of the plant in the wild (which they eradicated) was 2.1 km from the site where the plant was introduced between 1960 and	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	52	1586	52	1587	I suggest deleting 'but they were accidentally introduced', since this seems to contradict the first part of the sentence. Alternatively, please add a reference and specify in some way (e.g. 'but those that are known have been introduced accidentally').	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1595	52	1595	Hypogastura viatica' should be 'Hypogastura viatica'. Furthermore, I checked Greenslade and Convey and could see no mention of H. viatica on Signy Islands: their paper concerns the sub-Antarctic islands. As far as I am aware H. viatica is not present on Signy (see Hughes et al., 2015).	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1595	52	1599	It is not known how Trichocera maculipennis arrived on King George Island, and the text saying 'It was probably introduced by the cargo of root vegetables' is speculation. It was first observed on the road between Frei and Escudero station on King George Island on 19 Nov 2006 by Peter Fretwell and then it was recorded in the sewage treatment plant of the Uruguayan Artigas Station (Volontario O, de Leon RP, Convey P, Krzemińska E (2013) First record of Trichocericidae (Diptera) in the maritime Antarctic. <i>Polar Biol</i> 36:1125–1131).	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	52	1603	52	1607	I think some mammals were introduced before the 1950s, e.g. reindeer on South Georgia. It would be helpful to make it clear that the vertebrates have survived on the sub-Antarctic Islands, but not on any islands within Antarctica itself as the conditions are probably too extreme unless the species was living	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	52	1606	52	1606	Add 'intentionally introduced'	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	53	1608	53	1608	Add a reference for this statement, or reformulate, e.g. 'Based on ... it has to be expected that...'	Thanks for this suggested change. We have included it in the second order draft.
Faulkner, Katelyn	No	2	53	1613	53	1615	This section of text discusses marine introductions, bull falls under section 2.4.1. on the terrestrial environment	Thank you for making this point. It does not seem to require changes to the text.
Faulkner, Katelyn	No	2	53	1624	53	1629	This section of text discusses marine introductions, bull falls under section 2.4.1. on the terrestrial environment	Thank you for making this point. It does not seem to require changes to the text.
Hughes, Kevin	No	2	53	1629	53	1632	I think you need to be clear which geographic area you are referring to (as earlier). There are many more than 15 non-native species in the wider Antarctic (i.e. including the sub-Antarctic Islands). I don't think Hughes et al. (2020) supports this sentence well. Perhaps try Hughes et al., 2015: Hughes, Kevin A., Pertierra, Luis R., Molina-Montenegro, Marco A., Convey, Peter. (2015) Biological invasions in terrestrial Antarctica: what is the current status and can we respond?. <i>Biodiversity and Conservation</i> , 24, 1031-1055. 10.1007/s10531-015-0896-6	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	53	1635	53	1636	Alien species have been found close to many research station.	Thanks for this suggested change. We have included it in the second order draft.
Barbosa, Andres	No	2	53	1636	53	1636	The vulnerability of THESE AREAS	Thanks for this suggested change. We have included it in the second order draft.
Barbosa, Andres	No	2	53	1636	53	1636	to research STATIONS	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	53	1636	53	1637	This sentence is more relevant for the trends section than for the status section.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	53	1637	53	1639	On the islands close to the continental area...' see earlier comment about which areas are included within Antarctica/the Antarctic area/continental area, etc.	Thanks for this suggested change. We have included it in the second order draft.
Pisanu, Benoit	No	2	53	1639	53	1640	"with ongoing and completed eradication programs for some species (e.g. rats already eradicated from South Georgia in 2011) (Broder et al., 2011; Chapuis et al., 1994)." Unprecise references and sentence, should be deleted Rats eradication on the total area of South Georgia cannot be ascertain yet (Martin, A. R., & Richardson, M. G. (2019). Rodent eradication scaled up: clearing rats and mice from South Georgia. <i>Oryx</i> , 53(1), 27-35. doi: 10.1017/S003060531700028x). Broder et al., 2011 deals with successful eradication of rabbits and positive consequences on native birds communities on a single small island of the Kerguelen archipelago (Verte Island).	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	53	1641	53	1649	These sentences would better fit into the section 'trends'.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	53	1641	53	1643	This study by Hughes et al (2020) was only for the Antarctic Peninsula, not the sub-Antarctic or the rest of the continent.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	2	54	1653	54	1657	I may have missed it, but I couldn't find the Chwedorzewska et al. 2019 reference. Also, when I read the sentence and the phrase 'particularly invertebrates', I expected the following example to be about invertebrates. Perhaps consider rephrasing? Finally, I noted the phrase 'but specialists are missing'. Do you mean specialist species or taxonomic specialists?	Thanks for this suggested change. We have included it in the second order draft.
Barbosa, Andres	No	2	54	1658	54	1658	Comments about microorganisms and their introduction risk is lacking. Comments about the lack of knowledge about microorganisms to assess the impact of alien microorganisms is lacking. Comments about emerging infectious diseases and the risk of introduction and effect on wildlife is lacking.	Thank you very much for this comment. We now have a distinct section on microorganisms in this chapter and throughout the chapter in the second order draft.

Wood, Louisa	No	2	54	1665	61	1960	Supporting paper on trends for global marine, estuarine and freshwater ecosystems - Bailey, S.A., Brown, L., Campbell, M.L., Canning - Clode, J., Carlton, J.T., Castro, N., Chainho, P., Chan, F.T., Creed, J.C., Curd, A., and Darling, J., Trends in the detection of aquatic non-indigenous species across global marine, estuarine and freshwater ecosystems: A 50-year perspective. Diversity and Distributions.	Thank you for this comment. We have included this reference and Dr. Bailey and Dr. Carlton as contribution authors on this chapter.
Kudelska, Theresa	No	2	54	1680	54	1680	There are a number of interesting papers associated with the introduction of this paper which may be of interest and could potentially be used as references for this section: Tomassen, H. B. M. Smolders A. J. P. Limpens, J. Lamers, L. P. M. Roelofs, J. G. 2004. Expansion of invasive species on ombrotrophic bogs: desiccation or high N deposition? Journal of Applied Ecology. Volume 41, Issue 1.	Thank you for your comment. This is indeed a very relevant publication, which will be considered in the second order draft.
Government of Germany	Yes	2	55	1690	55	1691	The source used for providing evidence on the decline of freshwater species populations by 81% is the WWF (2016). Please consider citing another reference as well or instead.	Thank you for your comment. This sentence is a direct citation from a published paper and has to be removed in the revised version.
Guareschi, Simone	No	2	55	1693	56	1762	The example cited above should be mentioned or the whole section (around line 245) should be moved here. Specifically mention the paradox of invasive aquatic insects in freshwaters. Please see Fenoglio et al. 2016. At the same time, I suggest giving some space about one of the few invasive aquatic insects (Trichocorixa verticalis, Corixidae, Hemiptera). Please see Guareschi et al. 2013 PLOS ONE for details and predicted worldwide future distribution of the	Thank you for the suggested references, which will be included in the second order draft.
Government of Ethiopia	Yes	2	55	1695	55	1703	No reference is made to Africa.	Thank you for your comment. We added a reference to Africa as well in the second order draft.
Faulkner, Katelyn	No	2	55	1723	55	1726	This section of text should either be in the sections discussing the continents or the section on fish	Thank you for your comment. As alien fishes represent an important component of the alien freshwater fauna, we would like to keep a reference to alien fishes here in the second order
Núñez Lendo, Carmela Isabel	No	2	56	1764	56	1764	Missing the tropicalization of temperate waters (E.g. Sydney harbour) by colonization of tropical fishes due to climate change - David Booth's research / Montero - Serra, I., Edwards, M., & Genner, M. J. (2015). Warming shelf seas drive the subtropicalization of European pelagic fish communities. Global Change Biology, 21(1), 144-153.	Thank you for your comment. Please note that we are not referring to drivers such as climate change in our chapter as this will be addressed in detail in chapter 3. We will, however, report on changes in alien fish composition in the second order draft.
Camacho, Rulao A.	No	2	57	1772	57	1772	I prefer the term of "mangrove wetlands" or "mangrove wetland forest" when referring to mangrove forest. The mangrove ecosystem consist not only the trees, but the wetland areas associated with it. The importance of the associated wetland (often referred to as swamps) is often ignored, leading to backfilling and other modification, which reduces the ability of the mangrove ecosystem to operate.	Thank you for your comment. This is a direct citation from a published article. We will remove this part in the second order draft.
Government of Germany	Yes	2	57	1773	57	1773	Please include a reference for the statement and a reference size f.e. m ² after "Both sequester more carbon than tropical rain forests."	Thank you for your comment. This is a direct citation from a published article. We have to remove this part in the second order draft
Government of Germany	Yes	2	57	1787	58	1815	Please consider including more recent references for this paragraph.	Thank you for your comment. We have included more recent publications in the second order
Government of Germany	Yes	2	57	1813	58	1815	The last sentence of this paragraph should be varified, because one can not speak about "very recent numbers of newly recorded marine alien species", if one uses references from 2005 and 2006.	Thank you for your comment. We rephrased this sentence and included more recent references.
Government of Germany	Yes	2	57	1813	58	1815	The publications cited here are more than 15 years old. In the EU in particular, since the introduction of the Marine Strategy Framework Directive (MSFD) and the descriptor 2 "alien species" to be assessed, recording programs on marine non-native species have been significantly expanded. A decrease in their discovery and reporting maybe not exist any more at present, at least for this region.	Thank you for your comment. We rephrased this sentence and included more recent references in the second order draft.
Catford, Jane	No	2	58	1485	58	1491	This might be helpful: Catford, J.A. & Jones, L.P. (2019). Grassland invasion in a changing climate. In: Grasslands and Climate Change (eds. Gibson, DJ & Newman, JA). Cambridge University Press Cambridge, pp. 149-171. Seabloom, E.W., Borer, E.T., Buckley, Y., Cleland, E.E., Davies, K., Firn, J. et al. (2013). Predicting invasion in grassland ecosystems: is exotic dominance the real embarrassment of richness? Global Change Biology, 19, 3677-3687. Seabloom, E.W., Borer, E.T., Buckley, Y.M., Cleland, E.E., Davies, K.F., Firn, J. et al. (2015). Plant species' origin predicts dominance and response to nutrient enrichment and herbivores in global grasslands. Nature Communications, 6.	Thank you very much for the suggested references. We have included citation of Catford et al. in the second order draft but the other two are not about trends and status of invasive alien species
Reshi, Zafar A	No	2	58	1513	58	1513	"The Cryosphere comprises ...or comprised.."	Thank you, this has been removed from the second order draft
Faulkner, Katelyn	No	2	58	1818	58	1819	A useful global marine study has recently been published: Bailey, S. A., Brown, L., Campbell, M. L., Canning-Clode, J., Carlton, J. T., Castro, N., ... Zhan, A. (2020). Trends in the detection of aquatic non-indigenous species across global marine, estuarine and freshwater ecosystems: A 50-year perspective. Diversity and Distributions, 00(March), 1–18. doi: 10.1111/ddi.13167	Thank you for this comment. We have included this reference in the second order draft and Dr. Bailey and Dr. Carlton as contribution authors on this chapter.
Pisanu, Benoit	No	2	58	1818	58	1819	"One of the few global studies of marine alien species revealed that these mostly consisted of crustaceans, molluscs, algae and fish (60%) " Better to order taxa according to their most obvious evolutionary age: algae, molluscs, crustaceans, and fishes	Thank you for your comment. We adopted the suggested order in the second order draft.
Government of Germany	Yes	2	58	1825	58	1847	Please note, the publications used here are not up to date, especially for given numbers of invasive species per region, significant changes (increase) occur during very short time periods; therefore, citations older than 20 years do not reflect the actual situation.	Thank you for your comment. We agree that some surveys may be outdated, but it is likely that the species are still present due to the lack of eradication efforts. Although the numbers are likely higher today, we would prefer to keep the references instead of removing them, which would reduce our coverage. But we added more recent publications as suggested in the second
Heger, Tina	No	2	59	1873	59	1875	I suggest changing to 'Many alien marine species tolerate a broader thermal range than native species and are able to show rapid physiological adaptation; both characteristics give invaders more habitat opportunities than natives'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	59	1875	59	1877	Please clarify: What is the Caribbean Creep, and why is it an example for broader thermal range and more rapid physiological adaptation?	Thanks for this suggested change. We have included it in the second order draft. We have rephrased the sentence to 'For example, the term known as 'Caribbean Creep' refers to has resulted in a number of marine invertebrates (e.g., green porcelain crab Petrolisshes armatus) from the Caribbean which have expanded their distribution ranging poleward and invading the southern and mid-Atlantic U.S. coast (Canning-Clode et al. 2011).'
Heger, Tina	No	2	59	1878	59	1878	Please clarify: What is meant by 'could have' - which kind of estimate is this?	Thank you for your comment. This means that there are not exact records. The evidence suggests it but does not prove it. And this is an estimation reported by Carlton, 1999 and is not
First, Matthew	No	2	59	1881	59	1882	Suggest that the efforts by the IMO be cited (e.g., the BW Management Convention's entry into force, the adoption of BWMS for most ships). These are substantial efforts that should be cited in the "Trends"; Likewise, New Zealand and other nations have worked to address biofouling on ship's vessels, and the IMO has undertaken the GloFouling project.	Thank you very much for pointing this out, we reviewed and added the missing sources in the second order draft.
Government of Germany	Yes	2	59	1887	59	1895	There is a new publication in the context of the MSFD relevant for this section: https://doi.org/10.1016/j.marpolbul.2019.06.012 . It is also suggested to spell out 'MSFD' as it may not be known by all.	Thank you for this suggestion. Reference was reviewed and cited in the text.
Government of Germany	Yes	2	59	1893	59	1893	Please consider also including the database AquaNIS (Information system on aquatic non-indigenous and cryptogenic species). This is a product of the project VECTORS "Vectors of Change in Oceans and Seas Marine Life, Impact on Economic Sectors" funded during the European Community's Seventh Framework Programme (FP7/2007-2013). The information system is now hosted by the University of Klaipeda. The data base provides updated information for different regions, f.e. the Mediterranean Sea (fish) with 859 species.	Thank you very much for pointing this out, we reviewed and added the missing sources in the second order draft.
Government of Germany	Yes	2	60	1908	60	1909	First sentence: This sentence is tricky because biodiversity indices do not include biomass nor a specific size of an area. A direct comparison between shelf biodiversity and deep sea biodiversity is hardly possible without further explanations.	Thank you, we have rephrased the sentence and replaced the 'biodiversity' with 'species richness' in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	60	1908	60	1910	Coral reefs (shallow areas) harbour at least 35% of global species - Reaka, M. L., Rodgers, P. J., & Kudla, A. U. (2008). Patterns of biodiversity and endemism on Indo-West Pacific coral reefs. Proceedings of the National Academy of Sciences, 105(Supplement 1), 11474-11481.	Thank you, we have added this missing information and the citation in the second order draft.
Heger, Tina	No	2	60	1912	60	1912	Delete 'In contrast'	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	60	1913	60	1913	Please clarify: from where to where do the decreases and reductions happen?	Thanks for this suggested change. We have included it in the second order draft. We have added 'e.g., inputs of organic carbon are 15-80 times lower in the eastern Mediterranean Sea
Heger, Tina	No	2	60	1915	60	1918	Please clarify: Where does this fish come from, and where is it invasive? And what is it an example for? (Relation to the last sentence unclear, maybe delete 'for example', 'shallower than' - please add 'with occurrences shallower than' or something like that.	Thanks for this suggested change. We have included it in the second order draft. This sentence was added to the text for further clarification 'fluxes (e.g., inputs of organic carbon are 15-80 times lower in the eastern Mediterranean Sea than in the western basin)'
Government of Germany	Yes	2	60	1923	60	1926	This sentence can not be used for a chapter describing deep sea fauna. Sample depth of <i>Caulerpa racemosa</i> in the cited study was 10m and 30m, respectively.	Thank you very much. We have removed this text and the citation from this part in the second
Government of Germany	Yes	2	60	1931	60	1934	It is suggested to check, whether the recently approved IPCC special report on the Ocean and Cryosphere in a changing climate (2019) provides any useful facts for this section: https://www.ipcc.ch/srocc/ . The SPM of this report states: "Globally, marine heat-related events have increased; marine heatwaves, defined when the daily sea surface temperature exceeds the local 99th percentile over the period 1982 to 2016, have doubled in frequency and have become longer-lasting, more intense and more extensive (very likely). It is very likely that between 84–90% of marine heatwaves that occurred between 2006 and 2015 are attributable to the anthropogenic temperature increase. (Table 6.2, 6.4, Figures SPM.1, SPM.2)" (Source to be found at:	Thank you very much for pointing this out, we reviewed and added the missing sources here. We have added contents from IPCC 2019 to the Open Ocean and Deep Sea parts referring to potential impacts of climate change on invasions of marine species in shallow water and deep sea in the second order draft.
Faulkner, Katelyn	No	2	60	1933	61	1941	Future trends are discussed here that should be discussed in the future dynamics section	Thank you very much for your comment. We believe that this is the status of the present trends with the impact on the future
Government of Germany	Yes	2	60	1936	61	1938	Neolithodes is the only lithodid genus exclusively known to occur at bathyal depths, up to the depth of 2,500 m. It would be very useful to insert depth distributions for the species groups mentioned in the text.	Thank you very much. We have added the missing information to the text in the second order draft. 'Neolithodes yaldwyni was reported for the first time at the depth of 1440 m in continental shelf of the West Antarctic Peninsula region (Smith et al. 2012).'
Hughes, Kevin	No	2	60	1936	61	1941	The authors may like to re-read the paper by Smith et al. 2012. I don't think there is a suggestion that the crabs were introduced by human activities, therefore an expansion to shallower waters would be a natural effect (albeit facilitated by 'unnatural' climate change). As a result, I am not sure the example is relevant to this particular document. Also, the crabs didn't necessarily come from the Ross Sea region (at least I don't know of evidence to suggest they were introduced by humans recently).	Thank you for your comment. You are right, but we will still keep this reference, but we have added this sentence in the second order draft for clarification 'However, this invasion is very likely related to natural invasion pathways, but it exemplify the high risks of deep-sea species invasions by human activities in the future.'
Government of Germany	Yes	2	61	1947	61	1950	Is <i>Tubastraea</i> really a deep-water coral or is its distribution associated to shallow and mesotrophic waters? The citation in the text indicates the latter. In this case the example should be included in the section discussing shallow water and not in the deep sea section.	Thank you, this part was moved to the surface open ocean part in the second order draft.
Feest, Alan	No	2	61	1950	61	1950	Sun Corals lack natural predators	Thank you very much. It has been rephrased in the second order draft
Government of Germany	Yes	2	61	1953	61	1954	The formulation could be problematic, because Macreadie et al. asked: Rigs - to - reefs: will the deep sea benefit from artificial habitat? But they did not give the answer to this questions, they only presented arguments.	Thank you, we have rephrased the sentence to '... Could facilitate... in the second order draft.

Government of Germany	Yes	2	61	1968	61	1970	It is suggested to use new data: World Bank 2020 is mentioning 55%, not 54 %.	Thank you, updated in the second order draft.
Catford, Jane	No	2	62	1663	62	1682	Might be helpful: Catford, J. A. (2017) Hydrological Impacts of Biological Invasions. Impact of Biological Invasions on Ecosystem Services. (ed. by M. Vilà and P. E. Hulme), pp. 63-80. Springer International Publishing, Cham. Catford, J. A. & Jansson, R. (2014) Drowned, buried and carried away: effects of plant traits on the distribution of native and alien species in riparian ecosystems. New Phytologist, 204, 19-36. Catford, J. A. & Kyle, G. (2016) Alien plant invasions in Australia's riparian ecosystems. Vegetation of Australia's Riverine Landscapes: Biology, Ecology & Management. (ed. by S. J. Capon, C. James and M. Reid), pp. 325-342. CSIRO Publishing, Melbourne. Catford, J. A., Naiman, R. J., Chambers, L. E., Roberts, J., Douglas, M. & Davies, P. (2013) Predicting novel riparian ecosystems in a changing climate. Ecosystems, 16, 382-400. Catford, J. A., Roberts, J., Capon, S. J., Froend, R. H., Windecker, S. M. & Douglas, M. M. (2017) Wetland vegetation of inland Australia Australian Vegetation. (ed. by D. A. Keith). Cambridge University Press.	Thank you, we have included the last 3 references in the second order draft (but the first ones are about drivers or impacts and are not relevant to chapter 2).
Government of Germany	Yes	2	62	1979	62	2004	Information on invasive alien species is missing. As far as I understand the definition of IAS, only a share of naturalized alien species is invasive and e.g. chapter 5.3.2.3.2 reflects this by differentiating between alien and invasive alien species.	Thank you. Yes, this paper that we use as the most comprehensive global overview is based on all alien species regardless of status. The reason is that most cities do not have consistently classified species as invasive
Heger, Tina	No	2	62	1979	62	1979	Header is missing - I guess 'Trends' are missing, and this is 'Status'?	Thanks for this suggested change. We have included it in the second order draft.
Shimura, Junko	No	2	62	1981	62	1981	Exotic bird -> alien bird species: use consistent terminology	Thank you, it has been changed to alien in the second order draft.
Heger, Tina	No	2	62	1982	62	1986	Please clarify: 'Although the majority... are native' is confusing - weren't the numbers of alines given in lines 1981-1982? And what is meant by 'is very low compared to ...'? - does that refer to the density of alien bird and plant species, or to densities in general? the numbers (8% and 25% of native species), why are they relevant in this context?	Thanks for this suggested change. In the second order draft, we deleted the sentence about native species densities as it was irrelevant for the IPBES assessment
Heger, Tina	No	2	62	1986	62	1987	Please clarify: Few naturalized alien plants and birds, or plants and birds in general?	thank you for your comment. We rephrased the sentence to make it clear in the second order
Heger, Tina	No	2	62	2000	62	2003	Please clarify: What do these percentages relate to? The sentence sounded like they should add up to 100% naturalized species in total, but they don't.	Thank you very much for your comment. This is percentage of the total number of naturalized species reported for that a region that occur in particular habitat type. We tried to make it clear by giving more details on l. 2000-2001
Faulkner, Katelyn	No	2	62	2009	64	2061	In this section on cultivated areas, it needs to be clarified what types of introductions are considered. Many cultivated plants are alien species. Are these included, or just their pests, or alien species that have impacts on these systems?	Thank you very much for your comment. We specified this by adding "occurring as weeds and pests" to indicate that this does not refer to cultivated plants and animals
Giuseppe, Brundu	No	2	62	2009	63	2060	In my opinion there should be more stress on agricultural areas. Many introductions - and secondary spreads - do occur in these areas. For example alien species (weeds) can be introduced as contaminants of seeds, or spread by machinery and grazing animals, water channels, etc. In addition the use of plant protection products may promote the development of herbicide resistant alien weeds, as in the case of Amaranthus, Solanum, etc. In addition agricultural areas are often first sites of new introduction of novel crops, GMOs, biofuel crops, and novel genotypes of cultigens. In some parts of the worlds, also ornamental	Thank you for your comments. We added these facts to the text in the second order draft.
Government of Germany	Yes	2	62	2010	63	2060	Please consider „livestock“, and especially „feral ungulates“, more specifically throughout the chapter.	Thank you, we reviewed the chapter with your comment in mind and refer to livestock or ungulates where appropriate in the second order draft
Giuseppe, Brundu	No	2	62	2013	62	2015	For the definition of Agroforestry I suggest to take into account also FAO FRA 2020 definitions, thys can be found, e.g. at: http://www.fao.org/3/i8661en/i8661en.pdf	Thank you for your comment. We revised the text and do not mention this anymore as the IPBES definition was there was informational and not meant to be included in the second order
Government of Germany	Yes	2	62	2015	62	2016	Please consider replacing "projected to exceed 9 billion people by 2050 (FAO, 2017)" with "projected to account for almost 10 billion people by 2050 (UN World Population Prospects, 2019)". Rationale: This proposal is intended to make the message stronger that planetary boundaries have already been crossed.	Thank you for your comment. We revised the text and do not mention this anymore as it did not refer to biological invasions directly in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	62	2017	62	2017	It should be differentiated between meat (and crops for feeding cattle) and vegetables. The demand for meat (and crops for feed the animals) has increased tremendously in the recent years -> Deforestation has increased -> IAS have increased (including farmed animals that do not belong to that region)	Thank you for your comment. We revised the text and do not mention this anymore in the second order draft as it did not refer to biological invasions directly.
Reshi, Zafar A	No	2	63	1696	63	1696	.....trends in rising alien species number are.....	Thanks for this suggested change. We have included it in the section order draft
Heger, Tina	No	2	63	2019	63	2019	Header is missing - I guess 'Trends' are missing, and this is 'Status'?	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	63	2022	63	2022	Please clarify: of all naturalized plants in the region?	Thank you for this comment, we rephrased the text to make it clear in the second order draft.
Feest, Alan	No	2	63	2024	63	2025	As a matter of principle %s should always be accompanied by the real data	Thank you for this comment. Agreed. However, in this case we have chosen not to do this to increase readability of this very long report. We note that the underlying data is publicly
Feest, Alan	No	2	63	2029	63	2029	The most invaded	Thank you. This has been corrected in the second order draft.
Heger, Tina	No	2	63	2029	63	2029	Please clarify: what does 'of all regions' refer to?	Thanks for this comment, we specified that it refers to all regions in Europe
Pisanu, Benoit	No	2	63	2029	63	2036	Provide sample size for plot of arable lands as indicated in the supplementary material of Chytrý et al 2008 If I'm wright: "On arable land, recorded in a total of 2936 vegetation plots 15–200 m ² in size, there were, on average, 7.3±9.8% of neophytes (plant species introduced after 1500) in Catalonia (n = 506), 5.6±5.2% in the Czech Republic (n = 1441) and 14.3±25.6% in the United Kingdom (n = 989; M Chytrý et al., 2008)."	Thank you for this comment, this information was added in the second order draft.
Heger, Tina	No	2	63	2031	63	2031	Please clarify: 7.3%±9.8% of the recorded plants were neophytes?	Thanks for this comment, yes this refers to neophytes
Pisanu, Benoit	No	2	63	2048	63	2059	Does these sanitary measures could explain the slowdown in number of IAS observed for Cultivated areas (and eventually Temperate grasslands) on figure 2,17 ??	Thank you for your comment. We updated the master database, which underlies all figures and tables of this chapter. This resulted in a change of trends to rather stable/increasing trends. We therefore believe that the decline observed in former versions of the figure was mostly due to lacking information. We discuss the issue of lacking information now throughout this chapter
Government of Germany	Yes	2	63	2051	63	2053	Please also include other species groups besides insects as examples for plant pests, f.e. nematodes.	Thank you. We have made this addition in the second order draft.
Government of Germany	Yes	2	63	2053	63	2053	It is suggested to add "including soil and planting substrates" after "live plants"	Thank you. We have made this addition in the second order draft.
Faulkner, Katelyn	No	2	64	2063	66	2161	In this section on aquaculture, aquaculture is discussed as a pathway of introduction, as opposed to a system that is influenced by invasions. Need to be specific about what the focus is here. This section should be discussed in the same way as the section on cultivated lands, as both aquaculture and agriculture are pathways of intentional introduction, but are also systems that are negatively impacted by invasions.	Thank you very much. We have rewritten this section to narrow the focus and discuss aquaculture as both impacted by invasions and as a pathway for biological invasions in the second order draft.
Heger, Tina	No	2	64	2076	66	2161	In this section, it is unclear to me what the data refer to. Invasive species are defined in ch. 1 as "animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, and generating an impact on local ecosystems and species", and this report is to deal with invasive alien species, as far as I understand. The question is, what should be dealt with in the chapter on aquaculture areas. My understanding would be that here, it should be only about IAS that established within aquacultures (e.g. as pests), and not with the species that are farmed there. I therefore did not look at this section in greater detail.	Thanks for this suggested change. We have clarified and included it in the second order draft.
Heger, Tina	No	2	64	2083	64	2084	Please clarify: alien naturalized species, or alien species farmed in aquaculture?	Thanks for this suggested change. We have clarified and included it in the second order draft.
Government of Ethiopia	Yes	2	64	2092	64	2092	In the segment "... introduced carp and translocated tilapia ...", the terms "introduced" and "translocated" need elaboration for better communication.	Thanks for this suggested change. We have clarified and included it in the second order draft.
Dudgeon, David	No	2	65	2112	65	2113	It is not only Oreochromis niloticus that is invasive, but others from this genus too, esp. auratus, mossambicus, zilli, rendalli and hybrids of some of these. See Lines 513-7 in Chapter 4, and Table 4.25 and 4.26 where O. mossambicus is mentioned (and line 3239 in Chapter 4)	Thank you for your comment. It is greatly appreciated by the chapter authors.
Dudgeon, David	No	2	65	2113	65	2113	It would be more accurate to mention both brown and rainbow trout as they have different origins and different invaded ranges (although they overlap in invaded ranges in some places: e.g. New Zealand and Argentina).	Thanks for this suggested change. We have clarified and included it in the second order draft.
Dudgeon, David	No	2	65	2139	65	2139	Parentheses need attention	Thanks for this suggested change. We have clarified and included it in the section order draft.
Dudgeon, David	No	2	66	2146	66	2146	As above, there is a bracket missing. Also, delete 'for'.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	67	2190	67	2190	I suggest changing to 'Predicting future distributions...'	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and it is more convenient for us to maintain it.
Liu, Chunlong	No	2	67	2190	70	2332	The sentences should be clearer: you don't need to include all related research findings into one sentence. Take the first sentence of the first paragraph as an example. "Range shift" can be represented by "future distributions of alien species"	Thanks for this suggested change. We have included it in the second order draft.
Liu, Chunlong	No	2	67	2190	70	2332	There are some mistakes in the citations. For example, the first names of some authors have been cited (e.g. Mark van Kleunen et al., 2019), which should be removed. And some citations should be combined together in one bracket (e.g., "Peacock & Worner, 2006)(Bellard et al. 2016)").	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft.
Heger, Tina	No	2	67	2194	67	2194	I suggest deleting 'existing'.	Thanks for this suggested change. We have included it in the second order draft.
Feest, Alan	No	2	67	2196	67	2196	assessing	Thanks for this suggested change of wording. This does not change the meaning, it is a matter of style which not be adopted in the second order draft.
Willette, Demian	No	2	67	2209	67	2214	Thank you for including 'hybrid' models. I would like to bring your attention to recent paper on SDM + physiology for modeling across multiple taxa (invertebrates, plant & algae): Gamliel, I., Buba, Y., Guy - Haim, T., Garval, T., Willette, D., Rilov, G., & Belmaker, J. (2020). Incorporating physiology into species distribution models moderates the projected impact of warming on selected Mediterranean marine species. Ecography.	Thank you for this suggestion. We have chosen not to include it in this section in Chapter 2. Information on scenarios and modelling approaches have been moved to chapter 1 of the second order draft and we have considered your suggested reference there.
Heger, Tina	No	2	67	2220	67	2221	I suggest changing to 'This section provides an overview on the results of studies on general trends of future...'	Thanks for this suggested change. We have included it in the second order draft.
Volpedo, Alejandra	No	2	68	1889	69	1960	The definition of deep sea should be revised since IPBES is not the definition. The deep sea is between the thermocline and the seabed. Thermocline does not match the euphotic zone. The methodology for studying and determining the presence of species in the deep sea is very scarce due to pressure and temperature conditions. This session should be reviewed as isolated cases are what is known about this environment. In this area of the deep sea > 1800 m, there are almost no records of marine life so talking about invasive species in this area so little studied in general would not be relevant. In addition, this session does not speak strictly of the deep ocean but epipelagic and mesopelagic areas in some cases and the examples also belong to aeriels of different oceanographic characteristics.	We absolutely agree with your comments, the definition of the deep-sea is different as you mentioned, it could be the area deeper than 200m(old books and papers), or recently definition as deeper than 500m (World Register of Deep Sea Species). We have revised this part majorly addressing your comment in the second order draft.
Government of Australia	Yes	2	68	1919	68	1928	The example of the green algae Cautlerpa growing better in the deep sea (below 200m) seems to be incorrect. What sort of time frames did the "historical physiological adaptations" of the shallow water gastropod take place, and the "colonisation and radiation" of shallow water species into the deep occurred? Are these evolutionary time frames?	Thank you, this example has been reviewed and deleted in the second order draft
Heger, Tina	No	2	68	2230	68	2230	I suggest changing to 'but these regions vary according to the species investigated'.	Thanks for this suggested change. We have included it in the second order draft.

Liu, Chunlong	No	2	68	2232	68	2241	I think the first half of this paragraph is redundant with the texts in the previous paragraph. And the second half can be combined with the previous paragraph.	Thank you for this suggestion. We have chosen to include it in second order draft.
Heger, Tina	No	2	68	2242	68	2256	It is counterintuitive to have a section 'Status' in a section about future dynamics. I suggest deleting these sub-sections, as well as the data and knowledge gaps sections, and have no subsections here at all. The text in this section in my point of view is dealing with trends as well and could be added to the text ending in line 2241.	Thank you for this suggestion. In the second order draft, we include your comment and have changed the structure of the "Future dynamics" section, combining the sub-headings for "Status" and "Trends" and moving the limitations to a separate sub-section at the end.
Rebelo, Alanna	No	2	68	2242			Much research also on the impacts of anthropogenic climate change to on the establishment of woody species (C3) over shrubs and grasses (C4) -William Bond	Thank you for the comment. We decided not to include it here as the comment mainly refers to climate change driven changes in community composition and drivers are covered specifically in Chapter 3 of the assessment.
Liu, Chunlong	No	2	68	2243	68	2256	The 'invasion hotspot' issues have been discussed in the paragraph started with "At the global scale", and I think these texts can be merged with the texts above	Thank you for this suggestion. We have chosen to include it in the second order draft.
Núñez Lendo, Carmela Isabel	No	2	68	2254	68	2256	No coherence between this statement and the statement from Chapter 1, page 31, lines 1248-1251	Thank you very much for your comment. It is considered in the second order draft by the co-
West, Vicky	No	2	68	2262	69	2296	Detail on the data/scenarios used to predict the increase/decreases in animal populations is important to understand the outcomes. What type of models and parameters were used to show overall decreases in amphibians, birds, fish etc? (Line 2264). A long list of more focused studies are provided for different animal groups but no results (e.g. increase, decreases, certain species) presented in the chapter.	Thank you for this suggestion. We have chosen to include it in the second order draft.
Volpedo, Alejandra	No	2	69	1943	69	1953	All this parafro speaks of corals and plastic pollution affecting coral and pelagic environments is not relevant to deep sea.	Thank you, this part was moved to the surface open ocean part. This part is about how human-related activities which could change the ecosystem functioning leading to invasive alien
Liu, Chunlong	No	2	69	2265	69	2271	Some taxa have been mentioned in the previous sentence, such as 'fish' and 'mammal'.	Thank you for making this point. It does not seem to require changes to the text.
Faulkner, Katelyn	No	2	69	2284	69	2296	Future trends in terms of rates of introduction should also be discussed in this section	Thank you for this suggestion. We have chosen to include it in the section in the second order
Heger, Tina	No	2	69	2284	69	2296	It is counterintuitive to have a section 'Status' in a section about future dynamics. I suggest deleting these sub-sections, as well as the data and knowledge gaps sections, and have no subsections here at all. The text in this section in my point of view is dealing with trends as well and could be added to the text ending in line 2282.	Thank you for this suggestion. In the second order draft, we include your comment and have changed the structure of the "Future dynamics" section, combining the sub-headings for "Status" and "Trends" and moving the limitations to a separate sub-section at the end.
Dool, Serena	No	2	69	2301			Suggested references relating to fungi: Fisher, Matthew C., et al. "Emerging fungal threats to animal, plant and ecosystem health." Nature 484.7393 (2012): 186-194. & Fisher, Matthew C., et al. "Threats posed by the Fungal Kingdom to humans, wildlife, and agriculture." mBio 11.3 (2020).	Thank you for this suggestion. We have chosen to include it in the section in the second order draft.
Shimura, Junko	No	2	69	2301	70	2312	Separate Fungi and other microorganisms (Fungi are large taxonomic group completely separated from microorganism) See also the following references to cover zoonotic pathogens as IAS: https://www.nature.com/articles/s41467-020-16153-4.pdf?origin=ppub https://journals.plos.org/plosntds/article?rev=2&id=10.1371/journal.pntd.0008179 https://www.pnas.org/content/117/17/9423/ https://www.pnas.org/content/pnas/116/16/7911.full.pdf	Thank you for this suggestion. We have chosen to include it in the second order draft.
Feest, Alan	No	2	69	2305	69	2305	Phytophthora cinnamomi	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	2	70	1990	70	1992	Might be helpful (paper shows trait-based changes in urban floras by examining native extinct, native extant and exotic extant species): Palma, E., Catford, J. A., Corlett, R. T., Duncan, R. P., Hahs, A. K., McCarthy, M. A., McDonnell, M. J., Thompson, K., Williams, N. S. G. & Vesik, P. A. (2017) Functional trait changes in the floras of 11 cities across the globe in response to urbanization. <i>Ecography</i> , 40, 875-886.	Thank you for your comment, we added the suggested reference in the second order draft
Reshi, Zafar A	No	2	70	2010	70	2010	Definition of cultivated areas may be looked at for language	Thank you for your comment. We revised the text and do not mention this anymore as the IPBES definition was there was informational and not meant to be included in later drafts.
Heger, Tina	No	2	70	2320	70	2321	Please clarify: why do you think they are biased? Also, I suggest making this two sentences, the second being 'These studies have limitations.'	Thank you for your comment. We believe the reader misread the sentence. It is "based" not
Willette, Demian	No	2	70	2320	70	2332	Perhaps mentioned elsewhere and I missed it, I would like to point out regional shifting processes associated with climate change, such as the tropicalization of the Mediterranean Sea, constitute some limitations in SDMs and warrants mentioning.	Thanks for this suggested change. We have included it in the second order draft.
Faulkner, Katelyn	No	2	70	2324	70	2324	Selecting study species based on the availability of data is not arbitrary, as the results of models using poor data are not meaningful	Thank you very much the nice comment. But we disagree! Choosing based on data availability is arbitrary. It is necessary for the mentioned reason but still not systematic or "controlled".
Liu, Chunlong	No	2	70	2326	70	2329	The equilibrium assumption and niche conservatism assumption should be explained in more details.	Thanks for this suggested change. We have included it in the second order draft.
Faulkner, Katelyn	No	2	70	2329	70	2330	It has also been shown that in some cases species occurrence data for species that are not at equilibrium with their environment can predict potential distribution. See: Barbet-Massin, M., Rome, Q., Villemant, C., & Courchamp, F. (2018). Can species distribution models really predict the expansion of invasive species? <i>PLoS One</i> , 13(3), e0193085.	Thanks for this suggested change. We have included it in the second order draft.
Pisanu, Benoit	No	2	70	2334	70	2334	Awaiting a summary from Seebens, H, Bacher, S, Blackburn, TM, et al. Projecting the continental accumulation of alien species through to 2050. <i>Glob Change Biol</i> . 2020; 00: 1– 13. https://doi.org/10.1111/gcb.15333	Thanks for this suggested change. We have included it in the second order draft.
Reshi, Zafar A	No	2	72	2068	72	2068	.....only sporadic national statistics exist.	Thanks for this suggested change. We have included it in the second order draft.
Reshi, Zafar A	No	2	73	2132	73	2132	.....over 90% to the sector (Silva et al., 2001): aquaculture heavily relies on alien species.	Thanks for this suggested change. We have clarified and included it in the second order draft.
Reshi, Zafar A	No	2	73	2134	73	2135	Sentence needs a relook	Thanks for this suggested change. We have included it in the second order draft.
Kühn, Ingolf	No	2	75	2200	75	2215	Yes, SDMs have been widely (mis)used for alien species. Since they are not in equilibrium with the environmental conditions (most importantly, not all potentially suitable conditions are colonized especially in early and mid periods of the invasion process, SDMs tend to underestimate potentially suitable regions. Given the limited transferability (Liu C, Xian W, Jeschke JM (2020) Species distribution models have limited spatial transferability for invasive species. <i>Ecol Lett</i> . doi: 10.1111/ele.13577. Capinha C, Essl F, Seebens H, Pereira HM, Kühn I (2018) Models of alien species richness show moderate predictive accuracy and poor transferability. <i>NEOBIOTA</i> 38: 77-96. doi: 10.3897/neobio.38.23518.). I have severe doubts on the credibility of SMD results of alien species (incl. my own older work). Moreover, it seems important not only which species or algorithm used, but also which environmental data source (e.g. which specific database on climate) was used, independent of the chosen predictor variables: Datta A, Schweiger O, Kühn I (2020) Origin of climatic data can determine the transferability of species distribution models. <i>NEOBIOTA</i> 59: 61-76. doi: 10.3897/neobio.59.36299	Thank you for this suggestion. We have chosen to include it in the second order draft.
Catford, Jane	No	2	78	2319	78	2319	Refer to section at the back of the chapter where other methods are discussed (e.g. mechanistic models etc). I missed that info here, but think that a reference to that section/figure is all that is needed here.	Thanks for this suggested change. We have included it in the second order draft.
Volpedo, Alejandra	No	2	78	2319	78	2332	The authors should include methodological gaps, and sampling difficulties in particular deep marine environments as well as the high mountain area, where studies are scarce.	Thanks for this suggested change. We have included it in the second order draft.
Jeschke, Jonathan	No	2	113	4199	113	4199	Delete "evolutionary" after "eco-evolutionary".	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	113	4210	113	4213	I suggest changing to 'Furthermore, higher genetic variation may promote successful invasions. A successful invasion may be either due to a fortuitously timed arrival of a particular genotype or the emergence of new genetic combinations.'	Thank you. We have revised this box in the second order draft.
Heger, Tina	No	2	113	4220	113	4220	Add 'However, in alien populations'	Thank you. We have revised this box in the second order draft.
Jeschke, Jonathan	No	2	113	4254	113	4258	Empirical support for the phenotypic plasticity hypothesis was analyzed by Torchyk & Jeschke (2018) based on a review of the literature. This study found high support for the hypothesis overall: 70 out of the identified studies 115 addressing the hypothesis supported it. The meta-data collected for this study are accessible here: https://hi-knowledge.org/invasion-biology/ (click on PH - Phenotypic plasticity hypothesis). Reference: Torchyk, O.; Jeschke, J.M. 2018. Phenotypic plasticity hypothesis. Pages 133-139 in: Jeschke, J.M.; Heger, T. (eds.) <i>Invasion Biology: Hypotheses and Evidence</i> . CAB, Wallingford, UK.	Thank you. We have incorporated these references in the second order draft.
Heger, Tina	No	2	114	4239	114	4240	I suggest changing to 'lag phase - a time in which a species has arrived in a region but is not spreading and did not become invasive yet'.	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and more convenient for us to maintain it
Rius Viladomiu, Marc	No	2	114	4263	115	4285	This section should specifically cover the importance of intraspecific hybridization (or genetic admixture) on the success of invasive species: Drake, J.M. (2006) Heterosis, the catapult effect and establishment success of a colonizing bird. <i>Biol. Lett.</i> 2, 304-307; Keller, S.R. and Taylor, D.R. (2010) Genomic admixture increases fitness during a biological invasion. <i>J. Evol. Biol.</i> 23, 1720-1731; Rius, M., & Darling, J. A. (2014). How important is intraspecific genetic admixture to the success of colonising populations? <i>Trends in Ecology & Evolution</i> , 29, 233-242	Thank you. We have incorporated these references in the second order draft.
Heger, Tina	No	2	115	4289	115	4295	Please clarify: I do not understand the meaning of these three sentences. Why indigenous species in the first sentence? Second sentence: maybe 'while IAS are frequently suggested to have...'? Third sentence: Which meta-analytic studies does this refer to?	Thank you. This section has been completely rewritten and revised for clarity in the second order draft.
Heger, Tina	No	2	115	4297	115	4314	These paragraphs need to be revised. The line of argumentation is not clear to me, and they contain grammar and other mistakes.	Thank you, we have revised this box in the second order draft
Rius Viladomiu, Marc	No	2	115	4309	115	4314	This section should highlight the potential of the use of molecular tools in the era of genomics, citing relevant literature (e.g. McCartney, Mallez, Gohl (2019) Genome projects in invasion biology. <i>Conservation Genetics</i> 20: 1201-1222) and when mentioning ports of entry (e.g. Holman LE, de Bruyn M, Creer S, Carvalho GR, Robidart J, Rius M (2019) Detection of introduced and resident marine species using environmental DNA metabarcoding of sediment and water.	Thank you. We have incorporated these references in the second order draft.
Rebelo, Alanna	No	2	117	4382			Extent not "extend".	Thank you. This has been corrected in the second order draft.
Rebelo, Alanna	No	2	118	4393			What is each panel in this graph? Different regions?	Thank you. In the second order draft, this has been clarified in the caption. This figure shows global changes.
Marchante, Elizabete	No	2	119	4402	119	4402	Please verify species shown on the photos - at least the one shown in d) is not <i>Acacia dealbata</i>	Thank you, we have corrected and harmonized the style of the citations and references in the second order draft
Kudelska, Theresa	No	2	120	4414	120	4414	An excellent conference was held in 2017 about the impact on invasive species on islands, this may be a good source of papers and references for the supplementary 'box' section relating to islands: Veitch, C.R.Clout, M.N. Martin, A.R. Russell, J.C. West, C.J. 2017. Island invasive: scaling up to meet the challenge. Proceedings of the international conference on island invasive 2017. IUCN Species Survival Commission. Available on : https://portals.iucn.org/library/node/48358	Thank you. We have incorporated these references in the second order draft.

Jeschke, Jonathan	No	2	120	4433	120	4437	The cited reference (Jeschke and Genovesi 2011) is not really relevant here. I assume that another reference was meant. Also, I'd suggest to revise the sentence, e.g. as follows: "Historically, the large number of introduced species established on islands was believed to be due to an innate vulnerability to IAS establishment (island susceptibility hypothesis), but more recent evidence suggests there is no strong difference in the establishment success of IAS introduced to islands as compared to continents (Jeschke et al. 2018). Therefore, higher invasions on islands are usually due to disproportionate introductions to islands in larger numbers ..." Full reference to Jeschke et al. 2018: Jeschke, J.M.; DeBille, S.; Lortie, C.J. 2018. Biotic resistance and island susceptibility hypotheses. Pages 60-70 in Jeschke, J.M.; Heger, T. (eds.) 2018. Invasions Biology: Hypotheses and Evidence. CAB, Wallingford, UK. If you'd like to avoid citing book chapters, a journal publication you can alternatively use would be (however, this one is a bit older): Jeschke, J.M. 2008. Across islands and continents, mammals are more successful invaders than birds. Diversity Distrib. 14, 913-916.	Thank you. This section has been completely rewritten and revised in the second order draft.
Reshi, Zafar A	No	2	121	4199	121	4199	eco-evolutionary dynamics	Thanks for this suggested change. We have included it in the second order draft
Jeschke, Jonathan	No	2	121	4447	121	4458	Bellard et al. (2016a) and Bellard et al. (2016b) are cited in this paragraph, but I only saw one Bellard et al. (2016) included in the reference section. The missing reference is probably this one: Bellard, C.; Cassey, P.; Blackburn, T.M. 2016. Alien species as a driver of recent extinctions. Biol. Lett. 12, 20150623.	Thank you, this has been corrected in the second order draft.
Jeschke, Jonathan	No	2	121	4460	121	4460	I could not find Bellard et al. (2017), which is cited here, in the reference section.	Thank you, this has been corrected in the second order draft.
Jeschke, Jonathan	No	2	121	4466	121	4471	These sentences implicitly refer to major invasion hypotheses, but the names of these hypotheses are not explicitly mentioned. Is that by intention? Personally, I'd name these hypotheses, i.e. enemy release hypothesis (Keane and Crawley 2002), eco-evolutionary naivety (Diamond and Case 1986, Ricciardi and Atkinson 2004), empty niche hypothesis (MacArthur 1970). References: Diamond, J.; Case, T.J. (1986). Overview: Introductions, extinctions, exterminations, and invasions. Pages 65-79 in: Diamond, J.; Case, T.J. (eds.) Community ecology. Harper and Row, NY. Keane, R.M.; Crawley, M.J. 2002. Exotic plant invasions and the enemy release hypothesis. Trends Ecol. Evol. 17, 164-170. MacArthur, R. (1970). Species packing and competitive equilibrium for many species. Theoretical Population Biology, 1, 1-11. Ricciardi, A.; Atkinson, S.K. 2004. Distinctiveness magnifies the impact of biological invaders in aquatic ecosystems. Ecol. Lett. 7, 781-784.	Thank you. We have incorporated these references in the second order draft.
Catford, Jane	No	2	122	4234	122	4234	see Leishman, M. R., Gallagher, R. V., Catford, J. A., Morgan, J. W., Grice, A. C. & Setterfield, S. A. (2017) Invasive plants and pathogens in Australia. Australian Vegetation. (ed. by D. A. Keith). Cambridge University Press.	Thanks for this suggested change. We have included it in the second order draft.
Kühn, Ingolf	No	2	122	4240	122	4240	This term and phenomenon was described first by Kowarik I (1995) Time lags in biological invasions with regard to the success and failure of alien species. In: Pysek P, Prach K, Rejmánek M, Wade M, Eds Plant invasions: general aspects and special problems. SPB Academic Publishing (Amsterdam): 15-38.	Thanks for this suggested change. We have included it in the second order draft.
Heger, Tina	No	2	122	4485	122	4508	This paragraph should be renamed to 'Status', and should be moved to start after the section 'Trends'.	Thank you. We have made this correction in the second order draft.
Heger, Tina	No	2	125	4553	127	4660	It is not really clear why this box should be necessary, since in the main text (section about future), scenarios are only of marginal importance, and also other types of models except SDMs are not really important there. SDMs are explained in the text well enough, in my opinion.	Thanks for this suggestion. The box on scenarios and models is no longer part of Chapter 2. The content was moved to Chapter 1 and cross chapter links will be established in the second order draft.
Peterson, Garry	No	2	125	4553	127	4660	This text on models and scenarios should be connected with discussions of models and scenarios in other chapters. In particular it is important to assess priority needs for improving IAS models and scenarios and to what extent lack of IAS in important climate, economic development, health or other scenarios is a	Thanks for this suggestion. The box on scenarios and models is no longer part of Chapter 2 of the second order draft. The content was moved to Chapter 1 and cross chapter links will be established in the second order draft.
Jeschke, Jonathan	No	2	126	4622	126	4622	The reference Termeer et al. (2019), which is cited here, is missing in the reference list.	Thanks for highlighting this. We have included it in the second order draft.
Regpala, Maria Elena	No	2	all	all	all	all	There are very few documented case studies of ILK on IAS.	Thank you, we have included more content on ILK in the second order draft based on the
Catford, Jane	No	2	general	all	all	all	Are hybrid (e.g. native/alien) species dealt with anywhere?	Thank you. Yes, they are included in the box on evolution.
Marchante, Elizabete	No	2	General				List of references need to be checked as at least one study cited in the text is not in the list (Turbelin et al. 2017) - I've spotted this by chance, but have not checked all references	Thank you for catching this. We have made the correction in the second order draft.
Reshi, Zafar A	No	2		27	8	27	While data mobilization.....word 'mobilizaiton' may be replaced with a more easily understandable word.	Thank you very much. Authors have edited it in the second order draft
Government of Portugal	Yes	2		1024		1024	The phrase "plant diversity" should be substituted by something else. Even if these species have become naturalised, they are not part of the original native flora and should not be viewed as contributing to the region's plant diversity.	Thank you but, as explained in Chapter 1 and 3, invasive alien species are both part of Nature and a driver of change. We have therefore kept the sentence as is.
Government of Portugal	Yes	2		1151		1151	The phrase "plant diversity" should be substituted by something else. Even if these species have become naturalised, they are not part of the original native flora and should not be viewed as contributing to the region's plant diversity.	Thank you but, as explained in Chapter 1 and 3, invasive alien species are both part of Nature and a driver of change. We have therefore kept the sentence as is.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	3	0	0	0	0	Drivers are not segmented or dichotomised, with few clear linear paths of cause and effect; rather, constant dynamic change is happening on the ground. The assessment could recognise this complexity. More information and examples in IPBES (2020) Andreev, J.L., Batzin Chojoj, R., Black A., Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mullenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 Sept - 1 October 2020.	Thank you very much. We disagree, the ballast water convention is not 100% effective and compliance has been shown to less than perfect.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	3	0	0	0	0	Drivers are not segmented or dichotomised, with few clear linear paths of cause and effect; rather, constant dynamic change is happening on the ground. The assessment could recognise this complexity. More information and examples in IPBES (2020) Andreev, J.L., Batzin Chojoj, R., Black A., Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mullenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 Sept - 1 October 2020.	Thank you very much. We disagree, the ballast water convention is not 100% effective and compliance has been shown to less than perfect.
Buckley, Yvonne	No	3	0	0	0	0	General: I greatly appreciate the diversity of examples, depth of the literature review and considered discussion of the drivers in this chapter. It is an important piece of work.	All of the drivers examined could increase or decrease IAS, our assessment is primarily about the risk of increase just as the global assessment was not about possible increases in biodiversity.
Dannune, João	No	3	0	0	0	0	Invasive species is a concept on which there is no solid consensus. Following the Convention on Biodiversity, an invasive species will need that which, coming from a certain region, penetrates and acclimates in another where it was not previously found (introduced species), proliferates without control and starts to be a threat for native species, for human health and economy and/or the balance of ecosystem that it occupies and transform in its favor. The biological invasion process can be divided into four distinct phases: the arrival (or introduction) of the species, its establishment (or fixation), its expansion and the balance of the species in the community (Williamson 1996). Although invasions can happen naturally, and the fact have happened countless times in Earth's history, human activities and movement have played in historical times, the greatest role in the introduction, in practically all regions of the world, of species exotic species that has recently been accelerating so much that it has assumed the dimension of global crisis, generating extensive negative repercussions on ecological balance, on	Thank you very much for your comment. We now mention horticulture in the second order draft
Feest, Alan	No	3	0	0	0	0	End of English text editing here but there continue to be many (hundreds of) errors to be corrected	Thank you very much. Yes, this text has been revised in the second order draft
Feest, Alan	No	3	0	0	0	0	From the beginning this chapter talks of biodiversity loss without explaining what this means. Since Diaz et al. (2015) refer to the deficient CBD definition this leaves the nature of what biodiversity loss is as an unknown. Reference to the paper by Feest et al. on Biodiversity Quality would clear up this problem by referring to each of the components of biodiversity that they identify.	Thank you, this section has been revised in the second order draft
Feest, Alan	No	3	0	0	0	0	Referencing seems erratic in that the order of the references varies and also the inclusion of initials/names.	Thank you very much. Now edited in the second order draft.
Government of Bulgaria	Yes	3	0	0	0	0	Clarity needed on the structure of the chapters as the sub headings for the direct drivers are confusing. A solution would be to address some of these issues at the beginning of the document like in the introduction and summary for policymakers	Thank you for the suggestion. As no references were included, we could not follow up further. We were not able to find literature backing the statement up.
Government of Germany	Yes	3	0	0	0	0	Impressive chapter altogether, quite comprehensive, a broad range of impacts are presented (and some prevailing knowledge gaps have been described).	Thank you very much for your comment. Well noted, this is in itself a big topic and can vary by species and ecosystem.
Government of Germany	Yes	3	0	0	0	0	In the entire chapter, references related to marine ecosystems are partly more detailed compared to references provided for terrestrial ecosystems. It is suggested to check this issue and consider further up to date references.	Thank you very much. This is noted, but not seen as especially relevant in the context of this sentence
Government of Germany	Yes	3	0	0	0	0	It is suggested to consider differentiating between "aid" as an action in an emergency situation, and "aid" in the sense of development assistance. Considering development assistance the problem of IAS will probably require a different set of actions (i.e., the transfer of plants and techniques from industrial nations to developing countries without considering the different ecological and cultural environment).	Thank you, we have clarified this in the second order draft.
Government of Germany	Yes	3	0	0	0	0	It isn't always clear whether the term "Introduction" is used consistently in the sense of bringing a species to a certain spot or introducing it to a certain ecosystem. Please cross-check for consistency in the use of the term.	Thank you, we are aware of the need to use our terms consistently and have gone through the chapter to ensure this is the case in the second order draft.
Government of Germany	Yes	3	0	0	0	0	It would be very useful to discuss here whether the concept of indirect and direct drivers is helpful in the context of IAS. For instance, it may be more useful to differentiate between physical and socio-economic drivers. Trade seems to be a much more forward and direct driver than biodiversity loss. The latter may only improve the condition for IAS to spread once they have been introduced. Pet trade is another direct factor. It is therefore suggested to expand the discussion regarding the classification used here. Physical drivers like climate change might be indirect drivers at least to a certain extent. Consequently, it would be more helpful to differentiate between socio-economic and physical/ecological drivers. F.e. urbanisation could also be defined as a physical driver as it is mostly considered under the category "land use change". Spencer note: the issue that the concept does not match the topic is also already clearly stated in the text: "The standard dichotomy of indirect and direct drivers	Thank you very much for your comment. We have now produced a better diagrammatic representation of the interactions among drivers in the second order draft.

Niemiec, Rebecca	No	3	0	0	0	0	I didn't see as much in this section on socioeconomic drivers of invasion in human dominated landscapes which is a growing area of research. For example, see: Niemiec RM, Asner GP, Brodrick PG, Gaertner JA, Ardoim NM. 2018. Scale-dependence of environmental and socioeconomic drivers of albizia invasion in Hawaii. Landscape and Urban Planning 169: 70–80., Decker KL, Allen CR, Acosta L, Hellman ML, Jorgensen CF, Stutzman RJ, Unstad KM, Williams A, Yans M. 2012. Land use, landscapes, and biological invasions. Invasive Plant Science and Management 5:108–116. Aslan CE, Hufford MB, Epanchin-Niell RS, Port JD, Sexton JP, Waring TM. 2009. Practical challenges in private stewardship of rangeland ecosystems: yellow starthistle control in Sierra Nevada Foothills. Rangeland Ecology & Management 62:28–37. Niemiec, R. M., Asner, G. P., Gaertner, J. A., Brodrick, P. G., Vaughn, N., Heckler, J., ... & Matsumoto, T. (2020). Using spatially explicit, time - dependent analysis to understand how social factors influence conservation outcomes. Conservation Biology, 34(2), 505-514. Manier, D. J., Aldridge, C. L., O'Donnell, M., & Schell, S. J. (2014). Human infrastructure and invasive plant occurrence across rangelands of Southwestern Wyoming, USA. Rangeland Ecology and Management, 67(2), 160–172. http://dx.doi.org/10.2111/remd-12-00056.1 .	Thank you very much. It is certainly discussed later, this section simply summarises the ideas but perhaps it is now more explicit in the second order draft
Papadopoulou, Paraskevi	No	3	0	0	0	0	Check the figure and table legend formatting.	Thank you very much. The driver definitions and framework has been revised in second order
Papadopoulou, Paraskevi	No	3	0	0	0	0	Overall a well written chapter. Some editing is necessary.	Thank you very much. Because of the wide variety of perceptions, we have only added a word of emphasis in the second order draft.
Papadopoulou, Paraskevi	No	3	0	0	0	0	The diagrams could perhaps improve in terms of resolution.	Thank you very much. The reference is added in the second order draft.
Peterson, Garry	No	3	0	0	0	0	The assessment of direct and indirect drivers of IAS should be used to inform the evaluation of IAS models & scenarios, especially whether important drivers are included in models and strategies to include such drivers in analysis if they are missing from models and scenarios.	Thank you, please refer to section 3.7 for more on scenarios and models and drivers
Renault, David	No	3	0	0	0	0	The citation of the references is inconsistent over the text of chapter 3	Thank you, this is added in the second order draft.
Santoul, Frédéric	No	3	0	0	0	0	Nice chapter, however there should be more details on fish stocking practices by angling especially in freshwater.	Thank you very much. This is the idea and we have made it clearer in the second order draft
Tidbury, Hannah	No	3	0	0	0	0	I wonder in light of the current situation there is scope to touch on the potential impact of global events, such as pandemics, on drivers?	Thank you for this point. As none of these references deal with aid or war explicitly, we were not able to include them in this section.
Spehn, Eva	No	3	1	0	0	2	Add a brief paragraph of each of the drivers in the executive summary if possible to do within the cap on number of characters.	Thank you very much. The text has been revised in the second order draft to include this
Zuppingier-Dingley, Debra	No	3	1	0	0	2	Executive Summary point 6 could be moved up in the list as it would make everything else simpler and easier to understand points 2,3 and 4. Then a last paragraph could be a summary of all the points	Thank you very much. This is rephrased in the second order draft. The point of this section was to review literature explicitly linking war and aid to invasions, and we now clarify the stages of invasion affected. The trait-invisibility literature is outside scope.
Sarat, Emmanuelle	No	3	1	1	2	59	The executive summary is a bit too long. It concludes that today researchers, stakeholders and decision-makers do not have solutions to address the multiple interacting drivers leading to invasions, but it would be good to refer already to some options to solve that, even if those are then further developed in another	Thank you for your comment. We have revised it in the next draft.
Government of Germany	Yes	3	1	2	1	14	The conclusion that indirect drivers tend to play a stronger role in the earlier stages of the invasion process whereas direct drivers are more influential in the later stages seems to be rather vague and not really supported by the ample evidence on feedback loops discussed in the following subchapters. By definition of this assessment report, indirect drivers influence IAS not directly but through the direct drivers. So how can these two streams of effects and feedback loops even be clearly untangled in order to allow a conclusion like this? A clear argumentation is suggested.	Thank you very much for your comment. Our driver scheme has changed substantially since this original text was produced and we hope is now much clearer. We have also presented a synthesis section which addresses the issue of where particular drivers are more important in the second order draft.
Buckley, Yvonne	No	3	1	3	1	3	Should there be a phase here of population increase? to account for abundance based impacts	Thank you. This is certainly important in the management of IAS but as a driver, there is very little information on this topic.
Buckley, Yvonne	No	3	1	3	1	14	This is a very general and not well supported statement. I suggest that some attempt at quantification, visualisation and analysis of the relative influence of drivers at different invasion stages be done for each driver with presentation of a conceptual figure illustrating the influence of the driver on different invasion stages for each one. These can then be merged for an overview figure.	Thank you for your comment. We have edited the text accordingly in the second order draft.
Government of Germany	Yes	3	1	3	1	3	In ch. 1 the four stages are defined as "transportation, introduction, establishment and spread". Please ensure using a common framework throughout the	Thank you for pointing this out. Text revised to increase clarity.
Wang, Xiao-Yi	No	3	1	3	1	14	The classification of these factors may be not accurate	Thank you for your feedback. But in this context, including social values, we decided that the current case was appropriate.
Buckley, Yvonne	No	3	1	7	1	7	When you say "earlier stages" please be explicit about which stage/s you mean	Thank you very much. This is a very interesting case, but we have decided that this should be dealt with in the management chapters, not in the driver chapter.
Government of Germany	Yes	3	1	7	1	14	It is suggested to include a reference to the SPM of the Global Assessment of IPBES that states: "The direct drivers of change in nature with the largest global impact have been (starting with those with most impact): changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species." (Source: SPM of the IPBES Global Assessment, p. 12, 2019).	Thank you for the comments. The challenge is to find evidence (as in literature) making this point explicitly that we can cite in the second order draft.
Government of Ethiopia	Yes	3	1	10	1	11	'climate change (changes to the weather and sea level rise)?	Thank you. We agree and we have revised the assessment scheme of direct and indirect drivers in the second order draft
Government of Germany	Yes	3	1	10	1	14	If IAS are to include species relocated due to climate change (see previous comments), please consider rephrasing in order to list climate change as relevant both in early and in later stages of an invasion.	The chapter takes its lead from the previous IPBES assessments and uses the same terminology so as to be as consistent as possible so that policymakers are not introduced to too many new frameworks. We are not sure the proposed frameworks sit in Chapter 3 but we have taken this point on board and add additional text to clarify the IPBES driver framework we have adopted
Tidbury, Hannah	No	3	1	10	1	11	Does 'changes to weather and sea-level rise' really capture climate change? What about temperature and atmospheric CO2 increase, more frequent extreme weather events, sea-level rise, ocean acidification? Or is the phrasing standardised across IPBES and so cannot be changed?	Thank you very much. Yes, under hydrological resources
Wang, Xiao-Yi	No	3	1	10	1	13	There seems to be some conflict or repetition between these two factors: climate change and natural drivers (e.g. extreme event; weather)	Thank you very much. Specifically in relation to IPBES and we agree to make this more clear in the second order draft.
Government of Germany	Yes	3	1	19	1	19	Please consider a reflected way of using the term "developed" in grouping countries. Furthermore, Europe is not a nation. Is reference made to the continent or the EU (= European Union)? This remains unclear here.	Thank you. This is captured under international crises in the second order draft
van Kleunen, Mark	No	3	1	19	1	20	As there is lots of research on IAS in South Africa, I would also add South Africa to the list.	Thank you for your comment. We have revised the sentence with consistent terminologies in the second order draft.
Government of Germany	Yes	3	1	23	1	23	The term "developing" should be used in a reflected manner; it is suggested to make sure that the status of "development" does not explain the level of information available. Some of these "developing" countries are already more developed concerning digital information technologies (ICT) (number and use of smartphones, network coverage, quality of LTE...) - as an important part for information- than some so-called developed countries.	Thank you for your comment. We have revised the sentence in the second order draft.
Buckley, Yvonne	No	3	1	26	1	28	Throughout the chapter I was confused as to whether the "direct" and "indirect" drivers were those specified in previous IPBES work or whether these driver categories had been modified for IAS? I would prefer that the modified categories of drivers be used or acknowledgement that drivers can be direct or indirect, with perhaps some individualised analysis on whether something is an indirect or direct driver at each invasion stage as it may vary between taxa & invasion stage whether a driver is direct or indirect. I think there is an overemphasis on the separation between indirect and direct drivers which is not supported by the evidence. If the emphasis was put on just "drivers" of invasion stages with the discussion of direct or indirect within each I wonder if that would make this an easier read? For example you could talk about a driver having both indirect and direct effects on an invasion stage, rather than classifying drivers themselves as direct or indirect.	Thank you very much. Noted, sampling lags can be important but these mask the underlying lag
Takahashi, Yasuo	No	3	1	26	1	33	I wonder if the third paragraph is necessary. It does not add much to the explanation of IAS in relation to IPBES-CF in Chapter 1, and the specifics are provided in the following paragraphs.	Thank you very much for your comment. Ocean acidification is treated under climate change in the IPBES Global Biodiversity assessment and we aim for consistency between reports.
van Kleunen, Mark	No	3	1	26	1	28	Similarly, some of the direct ones, such as landuse change, can be considered indirect drivers of IAS, as they might reduce the native species diversity and abundance and thereby indirectly provide opportunities for IAS to establish.	Thank you very much. Driver definitions and framework has been revised in the second order draft.
Takehara, Mari (Government of Japan)	Yes	3	1	32	1	32	We request to delete the text 'ballast water or'. Because the International Convention for the Control and Management of Ship's Ballast Water and Sediments was adopted, entered into force in 2017, and appropriately implemented, it is not appropriate to state ballast water as present direct driver.	Thank you very much. This is corrected in the second order draft.
Lope-Alzina, Diana	No	3	1	34	1	40	Refer to the definition of indirect and direct drivers that is given in table 3.1 (page 4)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Dannunc, João	No	3	1	60	1	60	To conserve biodiversity and sustain the human livelihood by minimizing the dispersion and impacts of invasive alien species. To this end we must seek to: 1) improve the scientific basis for decision-making on invasive species; 2) develop the ability to employ early detection systems and rapid response and management; 3) increase the ability to manage invasive species; 4) reduce the economic impacts of invasive species and control methods; 5) develop better risk analysis methods, and strengthen international agreements. In addition, seek to: a) DEVELOP PUBLIC EDUCATION ON INVASIVE SPECIES; B) improve knowledge about the ecology of invasive species; c) examine the legal and institutional framework for controlling invasive species; d) develop new codes of conduct for the movement of species, and plan new tools to quantify the impact of invasive species. Finally, some definitions: EXOTIC SPECIES: a species that has been introduced to a location (or area, or region) when it does not occur normally; Invasive alien species (EII): an exotic species that causes (or has potential to cause) damage to the environment, or human health. This definition can also be used for "invasive species". An expanded definition is proposed in the Guiding Principles adopted in the Convention on Diversity Biological (CDB) that defines exotic species as a 'species, sub-species, or minor taxon, introduced out of its post or protected natural distributions, including any part, gametes, seeds, eggs, or propagules of these species that can survive and	Thank you very much. Yes, this text has been revised in the second order draft.

Government of Ethiopia	Yes	3	2	41	2	50	How climate change exacerbates or abates IAS did not come clear. Climate Change may also lead to declining IAS.	Thank you very much. All of the drivers examined could increase or decrease IAS, our assessment is primarily about the risk of increase just as the global assessment was not about possible increases in biodiversity.
van Kleunen, Mark	No	3	2	41	2	42	I would also mention horticulture. Depending on the definition used, it might already be included in agriculture, but it would be good to mention it then as 'agriculture (including horticulture)'. Clarification required: Please explain what is meant by "invasional meltdown".	Thank you very much. We now mention horticulture in the second order draft. Thank you, we have clarified the section on invasional meltdown in the second order draft.
Government of Germany	Yes	3	2	43	2	43	Unclear what this means "as well" sounds like repetition. Perhaps it can be simplified as "Few drivers act in isolation and the interactions between drivers appear to be crucially important...."	Thank you very much. This section has been revised in the second order draft.
Buckley, Yvonne	No	3	2	51	2	54	The conclusion that a "system" perspective of invasions is needed seems to be very relevant. Strong linkages to the current preparation of the IPBES assessment report on "biodiversity and transformative change" which also recognizes systemic perspectives on socio-ecological configurations are visible. It is suggested to allow strong linkages between these two assessments.	Thank you very much. This is corrected in the second order draft.
Government of Germany	Yes	3	2	51	2	59	An incomplete Sentence "Given that most drivers.....the introduction and spread of IAS is essential"	Thank you, this is added in the second order draft
Government of Ethiopia	Yes	3	2	54	2	56	The phrase "...completely unprepared for addressing and reacting to such emerging driver phenomena." seems a very strong claim. It undermines existing	Thank you for your comment. We have edited the text accordingly in the second order draft.
Government of Ethiopia	Yes	3	2	58	2	59	I think it would be helpful to have a final point in the summary that emphasizes the importance of knowing the effects of different drivers in order to determine potential invasion scenarios for different taxa in different regions under different climatic, land use, biodiversity change and socio-economic conditions. This will help to support policy development and implementation to reduce the impacts of invasions.	Thank you for your feedback. But in this context, including social values, we decided that the current case was appropriate.
Buckley, Yvonne	No	3	2	60	2	60	Given that policy and management solutions to reduce IAS impacts are different for the different stages of invasion it is important to get a strong understanding of the effects of drivers at each stage.	Thank you very much. This is now revised in the second order draft.
Yiu, Evonne	No	3	3	63	3	84	Will the chapter assess which drivers play a more significant role (or degree their impacts), or just discuss (list) all the possible drivers?	Thank you very much. But our unpreparedness for these emerging drivers is true
Buckley, Yvonne	No	3	3	66	3	69	An example of how you could rephrase to put the emphasis on drivers and their direct and indirect effects here: "The aim of this chapter is to assess evidence of how natural and anthropogenic drivers, singly and in combination, both directly and indirectly influence the introduction, establishment and spread of invasive	Thank you very much. We have revised the ES accordingly in the second order draft.
Wang, Xiao-Yi	No	3	3	66	114	4630	The format of references are different	This is a very useful clarification, thank you
Eckert, Sandra	No	3	3	70	3	70	"goods and people". There are IAS (e.g. Prosopis juliflora) where livestock or wildlife play an important role too.	Thank you. Following the GA model, we will use developed countries/developing countries in the second order draft.
Government of Germany	Yes	3	3	80	3	80	Please insert 'policy'. The sentence should read "... to contribute to informed policy- and decision-making ...". Rationale: Policies are plans, procedures and actions that should influence decision-making.	This is a useful clarification, thank you.
Buckley, Yvonne	No	3	3	81	3	84	This point needs to be in the summary.	Thank you, we follow the IPBES classification of drivers (please see IPBES conceptual framework and previous assessments).
Wang, Xiao-Yi	No	3	3	92	4	105	Similar problems exist just like those two mentioned above (There seems to be some conflict or repetition between these two factors: climate change and natural drivers (e.g. extreme event; weather))	Thank you, this is covered in Chapter 6
Government of Germany	Yes	3	3	97	3	98	Question: The IPBES Global Assessment informs that "Community-based conservation institutions and local governance regimes have often been effective, at times even more effective than formally established protected areas, in preventing habitat loss (established but incomplete)" (Source: SPM IPBES Global Assessment, 2019: 33). Against this background, could it be useful to also reflect on informal, non-government controlled governance structures as well?	Thank you very much. This did not appear to be a case of invasional meltdown though
Government of Germany	Yes	3	4	101	4	101	Urbanisation would also be an example of land use change. If it is intended not to discuss it here, then it should be discussed in another section of this chapter.	Thank you, we follow the IPBES classification of drivers and terminology (please see IPBES conceptual framework and previous assessments).
Buckley, Yvonne	No	3	4	104	4	104	Should this be "natural disturbance events"?	Thank you, this has been included in the second order draft
Buckley, Yvonne	No	3	4	105	4	108	And I would suggest that analysis be undertaken of which invasion stages they affect.	Thank you very much. Spelling mistake is corrected in the second order draft.
Government of Germany	Yes	3	4	112	8	213	The distinction between direct and indirect drivers is not entirely convincing. The conceptualisation is based on two publications (Diaz et al. 2015; Nelson et al. 2006) but have been adapted for specific relevance to IAS. The definition for this distinction, however, is rather abstract (p. 3, L71-73) and does not provide a clear-cut differentiation. The list of indirect drivers in table 3.1 on pages 4-5 is especially questionable because it mixes rather abstract concepts such as "social values" with very specific activities like "research". Furthermore, the examples show that the distinction between indirect and direct drivers does not unequivocally fit - why should e.g. economic and social drivers like "trade", "travel" or "migration" be less direct than "oil and mining activities"? I acknowledge that this discrepancy has been recognised in the analysis and conclusion but it is really irritating that it is even proposed in the beginning. The authors should consider to revise this conceptualisation by including more sources and adding depth or abolish it in favour of other perspectives (e.g. distinction between anthropogenic and non-anthropogenic drivers). A visualisation of the main drivers and their linkages based on arrow diagrams would be	Thank you for this suggestion. The case is now added in this paragraph in the second order draft.
Taki, Hisatomo	No	3	4	112	7	189	In the line 112, it is indicated as "direct and indirect drivers", yet the followings mention from "indirect" and to "direct". Why is the order mixed? To many, the order from "direct" to "indirect" could make sense, perhaps.	Thank you, this section has been revised in the second order draft but the focus on invasion stage has been retained for each driver.
Buckley, Yvonne	No	3	4	120	4	120	& on the invasion stage	Thank you, the classification of drivers has been clarified in the second order draft
Gupta, Himangana	No	3	4	122	4	122	Table 3.1: Invasive Alien Species is itself a direct driver here. It's a little confusing to have it here. IAS is one of the direct drivers for biodiversity loss. IAS management is an issue of control and monitoring of IAS just like conservation and curbing deforestation is for biodiversity loss. But does this make it a direct driver? Every major environmental problem has a feedback loop (invasional meltdown). Another issue is that GMOs do not figure in this list. Being extremely potent and resistant to diseases, they are more capable than the natives and thus, are potent IAS. It is important to have that in the list although they are	Thank you very much, we follow the IPBES classification of drivers (please see IPBES conceptual framework and previous assessments).
Karimov, Bakhtiyor	No	3	4	122	5	129	I believe that we have to include in table 1 direct drivers "Irrigation or water extraction"	Thank you very much. Agreed
Buckley, Yvonne	No	3	4	123	4	127	Does this mean that the categorisation of drivers into "direct" and "indirect" was done a priori based on general IPBES classification or has the assignment to the direct vs. indirect category been done with reference to IAS? It would be helpful to have this explicitly stated at this stage. I find that some of the indirect drivers can also act as direct drivers, e.g. social values can lead to intentional introduction of particular species (e.g. intentional release of farmed species such as mink), another example is "hitchhiker" introductions with migrating or travelling humans is a direct driver of introductions.	Thank you, we follow the IPBES classification of drivers (please see IPBES conceptual framework and previous assessments).
Camacho, Rulo A.	No	3	4	128	4	128	I feel like something may be missing here, but I'm unsure how to categorize it. There were extensive discussions following Hurricane Maria in 2017 about the need to not just send supplies between islands, but to ensure that all "relief items" are declared bio-safe first. I'm not sure if this is captured here, but it should be a highlighted be a direct/indirect driver. It is highlighted a bit in the paragraph beginning Line 595, but not sufficiently.	Thank you, we have improved the readability of this table in the second order draft.
Camacho, Rulo A.	No	3	4	128	4	128	Table headers need to be repeated. About the situation of making sure that relief supplies are biosecure, deployment of infrastructure does not fit the bill. That creates an IAS corridor. Rather, a new line should be created: cross-border deployment of relief supplies	Thank you, we follow the IPBES classification of drivers (please see IPBES conceptual framework and previous assessments).
Daguitan, Florence	No	3	4	128	5	186	Governance, institutions, policies can be direct drivers. Some IAS in the Philippines were brought in through dispersal projects of the government. This can attributed to lack of policies on effective safeguards on introduction and spread of IAS.	Thank you very much. Yes, this is under international resources
Government of Germany	Yes	3	4	128			Table 3.1.: please consider listing 'ocean acidification' under "pollution". Paragraph 3.3.4.4 treats ocean acidification as a sub-topic of climate change.	Thank you very much. Specifically in relation to IPBES and we agree to make this more clear in the second order draft.
Joshi, Chudamani	No	3	4	128			Can we consider a third type of drivers i.e. natural drivers (migrating animals, birds) as Factors that describe direct natural influence on the distribution and abundance of invasive alien species	Thank you very much. This is captured under international crises
Renault, David	No	3	4	128	5	128	Table 3.1, second column: I would suggest adding 'Pharmaceutical compounds' as potential pollutants	Thank you for your comment, we have now revised the section on externalities in the second order draft.
Buckley, Yvonne	No	3	5	128	5	128	Table 3.1.: I am not sure what you mean here by "externalities of negative effects". Can you clarify?	Thank you very much. This was captured under international crises
Tidbury, Hannah	No	3	5	128	5	128	Indirect drivers influence direct drivers -therefore I wonder whether it would therefore make more sense to discuss direct drivers prior to indirect drivers	Thank you very much. We agree and we have revised the assessment scheme of direct and indirect drivers in the second order draft
Government of Ethiopia	Yes	3	6	141	6	141	"especially through the effects of increasing urbanisation" this may be true for urban centers while most of the invasion occurs in the country side (in the developing world).	Thank you very much. This is a very interesting case, but we have decided that this should be dealt with in the management chapters, not in the driver chapter.
Government of Ethiopia	Yes	3	6	141	6	141	Can we take GDP as an indicator for IAS distribution? For instance, an aid economy is generally assumed to have led to IAS spread across Sub-Saharan Africa. Better to support the generalization with examples so as to substantiate.	Thank you for your comment. We have revised the sentence with consistent terminologies in the second order draft.
van Kleunen, Mark	No	3	6	141	6	141	This is an example of an indirect driver affecting another indirect driver. It would be good to also mention then how urbanisation affects some of the direct drivers. Also a diagram showing how all the drivers (major categories) are connected might help to better understand the distinction between direct and indirect	Thank you for your comment. We have revised the sentence in the second order draft.
van Kleunen, Mark	No	3	6	143	6	143	Another global reference on multiple taxa: Dawson W, Moser D, van Kleunen M, Krefl H, Pergl J, Pyšek P, Weigelt P, Winter M, Lenzen B, Blackburn T, Dyer E, Cassey P, Scrivens S, Economo E, Guénard B, Capinha C, Seebens H, García-Díaz P, Nentwig W, Garcia-Berthou E, Casal C, Mandrak N, Fuller P, Meyer C & Essel F (2017) Global hotspots and correlates of alien species richness across taxonomic groups. Nature Ecology & Evolution 1:Article No.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
van Kleunen, Mark	No	3	6	144	6	144	Another reference: Seebens H, Essl F, Dawson W, Fuentes N, Moser D, Pergl J, Pyšek P, van Kleunen M, Weber E, Winter M & Blasius B (2015) Global trade will accelerate plant invasions in emerging economies under climate change. Global Change Biology 21:4128-4140. (DOI: 10.1111/gcb.13021) (highlighted in Nature Plants)	Yes, thank you for your comment. It is revised in the second order draft.
Buckley, Yvonne	No	3	6	152	6	152	Add spread here.	Thank you very much. This is noted and revised in the second order draft.
Buckley, Yvonne	No	3	6	155	6	157	The phrasing here is not clear.	Thank you very much. This is noted and corrected in the second order draft.
Government of Ethiopia	Yes	3	6	155	6	156	Seems an incomplete sentence.	Thank you, reference is added in the second order draft.
Government of Germany	Yes	3	6	156	6	158	It is suggested to add references.	Thank you, these sections have been revised in the second order draft and we hope it clarifies the differences among policies, governance and institutions.
Government of Germany	Yes	3	6	158	6	159	The demarcation between "climate change" effects and "large scale disturbance" events should be elaborated because the latter could be the direct effect of climate change.	Thank you for your comment. We have clarified it in the second order draft.
Poulet Nicolas	No	3	6	158	6	160	Natural disturbance events cannot be a driver of introduction of IAS since they are natural driver that may induce a natural dispersal of species which therefore must be considered as native species. Difference should be made between introduction and naturalisation/spread: natural hazard cannot be a driver of introduction. However it can be a driver of spread in an already colonised area.	Thank you very much. The text is revised to include this point in the second order draft.
van Kleunen, Mark	No	3	6	158	6	158	As it is argued by some that IAS result in biodiversity gain, I would specify here and throughout the report that 'native biodiversity' is meant.	

Buckley, Yvonne	No	3	6	163	6	165	It might be worth clarifying that in this case the corridors are created as the modified "matrix", typically in landscape ecology we think of the corridors as the remaining fragments. See With 2004 https://onlinelibrary.wiley.com/doi/abs/10.1111/j.0272-4332.2004.00480.x	Thank you for the reference, we have considered it in the second order draft
Joshi, Chudamani	No	3	6	163	6	165	Forest canopy degradation is one of the major cause of species invasion- Good to be mentioned.	Thank you for your comment. We cannot add additional text to the chapter due to word length
Government of Ethiopia	Yes	3	6	167	6	167	"... trophic cascades than (that) facilitate ..."	Thank you for your comment. We have revised it in the second order draft.
van Kleunen, Mark	No	3	6	169	6	169	Is exploitation of abiotic resources then not an indirect driver, when it acts through the direct driver 'changes in disturbance regime'?	Thank you for your comment. We have clarified it in the second order draft.
Poulet Nicolas	No	3	6	173	6	178	The fact that climate change should be considered as a direct driver of introduction of IAS should be discussed: is species that will migrate by their own (i.e. without direct or indirect human help) to escape warning should be considered as IAS? My concern is only about the introduction step: climate change can be considered as a driver of establishment and colonisation of IAS already present in the area.	Thank you for your comment. We follow the categorization of drivers as introduced by previous IPBES assessments (and the conceptual framework) and assess their effect on IAS
Government of Germany	Yes	3	6	175	6	177	The sentence is not phrased clearly: does this only refer to species translocated by humans in preservation efforts, or does it also refer to species shifting their distributional range in order to populate more habitable environments when the original habitat is impacted by climate change? Please clarify.	Thank you for your comment. We have clarified it in the second order draft.
Tidbury, Hannah	No	3	6	176	6	176	Rather than 'ensure survival' would it be better to phrase in terms of conservation?	Thank you for making this point. It does not seem to require changes to the text.
Buckley, Yvonne	No	3	7	181	7	181	See also Vitousek's work on ecosystem engineers, N-fixing invaders can alter nutrient regimes. There may also be literature on altered water regimes (pines in South Africa) but I'm not sure if these have led to invasional meltdown (subsequent invasion by drought tolerant invaders). Vitousek, P. M., and Walker, L. R. (1989). Biological invasion by Myrica faya in Hawai'i: plant demography, nitrogen fixation, ecosystem effects. <i>Ecol. Monogr.</i> 59, 247–265. doi: 10.2307/1942601 Vitousek, P. M., Walker, L. R., Whiteaker, L. D., Mueller-Dombois, D., and Matson, P. A. (1987). Biological invasion by Myrica faya alters ecosystem development in Hawaii. <i>Sci. New Ser.</i> 238, 802–804. doi: 10.1126/science.238.4828.802	Thank you for the comments. The challenge is to find evidence (as in literature) making this point explicitly that we can cite.
Government of Germany	Yes	3	7	182	7	183	Clarification required: a driver of what?	Thank you very much. Alien species can still be introduced in this way e.g. myrtle rust to NZ
Poulet Nicolas	No	3	7	184	7	186	As already mentioned, this kind of natural events should not be considered as driver of introduction of new IAS but may be as driver of acclimation and dispersal of IAS already present.	Thank you very much. There are too many possible interactions, we have decided to show some examples in the second order draft
Taki, Hisotomo	No	3	7	188	7	208	Adding or listing types of the interactions may be helpful for readers.	Thank you very much. There are too many possible interactions, we may decide to show some examples in the second order draft
Government of Ethiopia	Yes	3	7	189	7	200	The interaction among the drivers did not come clear. Specific examples or references may aid better grasping of the message intended.	Thank you very much. Too many possible interactions, we have decided to show some examples in the second order draft.
Government of Ethiopia	Yes	3	7	193	7	195	How climate change leads to land-use change (a shift to intensive agriculture) is not clear. An example may be help here.	Thank you very much. Noted
Government of Germany	Yes	3	7	196	7	198	After "(...) expanding urbanisation" it is suggested to mention 'agriculture' in this context as well.	Thank you. This is a good example. It is considered in the second order draft.
Kühn, Ingolf	No	3	8	3	8	3	Traditionally (or rather following Blackburn et al. 2011), the steps distinguished are transportation, introduction, establishment, spread. I see good reasons to additionally include "uptake", but then you still miss introduction. It would also be good to stick to the same steps throughout the chapter.	Thank you very much. It is certainly discussed later, this section simply summarises the ideas but perhaps it is now more explicit in the second order draft.
Buckley, Yvonne	No	3	8	209	8	209	Fig. 3.1 It is unclear to me why IAS are an indirect driver while "biodiversity loss" is a direct driver. Arguing from fundamental ecology principles IAS are a component of biodiversity. I would suggest that a more nuanced view is taken of biodiversity "change" rather than loss. Sub-categories of biodiversity change would consist of: IAS, native species loss, other introduced species (e.g. biocontrol agents, crops, naturalised species). General biodiversity loss is too coarse a category here. Biodiversity change as a driver can act to increase or decrease IAS introduction, establishment, increase and spread depending on the interaction of the IAS with different elements of biodiversity (natives, other IAS, biocontrol agents). For example the addition of an ecosystem engineer or mutualist IAS could act to increase IAS, loss of native species within the same guild as the IAS could lead to reduced competitive pressure & enhanced establishment of IAS. Biodiversity loss throughout should be more explicitly defined as native biodiversity loss as that is what is implied. Technically IAS are part of general biodiversity, which is why sometimes the debate about biodiversity change and invasions gets heated. If we are more explicit about what components of	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	3	8	209	8	209	Figure 3.1 The figure is not detailed enough to be informative. Is it possible to adjust the width and direction of arrows to indicate which indirect/direct driver contributes about how much (by thinner or wider arrows that is) at each stage?	Thank you for your comment. We have revised the figure in the second order draft.
van Kleunen, Mark	No	3	8	209	8	209	Figure 3.1: By having direct arrows from the indirect drivers to the invasion process, it suggests that they are actually direct drivers. I think the arrows of the indirect drivers box should go to the direct drivers box.	Thank you for your comment. We have revised the figure in the second order draft.
Wang, Xiao-Yi	No	3	8	209	8	209	"Invasive alien species" is also in the list of "Indirect drivers"? Why?	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	8	210	8	210	The figure needs improvement (the link between Drivers and the mentioned stages).	Thank you for your comment. We have revised the figure in the second order draft.
Government of Germany	Yes	3	8	210	8	210	Please cross-check Figure 3.1: At a first glance Figure 3.1 suggests a linearity which might be misleading.	Thank you for your comment. We have revised the figure in the second order draft.
Gupta, Himangana	No	3	8	210	8	211	Figure 3.1: This figure does not show the interactions between various direct and indirect drivers but just shows an integrated effect. Is it possible to draw linkages between various direct and indirect drivers exhibiting which drivers are most interlinked with each other?	Thank you for your comment. We have revised the figures in the second order draft.
Tidbury, Hannah	No	3	8	210			Figure 3.1. I like this figure but I wonder whether there is scope to create something slightly more detailed to illustrate the links and feedbacks between the drivers and invasion processes? Perhaps this is planned for the interactions section?	Thank you for your comment. We have revised the figures in the second order draft.
Eckert, Sandra	No	3	8	212	8	212	"The outcome will be..." The outcome of what?	Thank you for your comment. We have revised the figure caption in the second order draft.
Daguitan, Florence	No	3	8	214	9	252	Whether caused by direct of indirect drivers, attention is given to IAS if impacts becomes significant. There is a need to review the categorization of governance, policies, socio-cultural / humans as indirect drivers. There has something to do with direct introduction of invasive species.	Thank you for your comment. The drivers categorization has been clarified in the second order draft. This assessment looks at the effects of direct and indirect drivers of biodiversity change (as defined by IPBES) on IAS
Feest, Alan	No	3	8	221	8	221	Considerable what data?	Thank you. Is considerable information?
Renault, David	No	3	8	222	8	223	Please consider adding these two references: https://doi.org/10.1111/geb.13082 ; https://doi.org/10.1146/annurev-ento-020117-043315	Thank you for your comment. We have added one reference in the second order draft.
Buckley, Yvonne	No	3	8	227	8	227	See also Catford et al 2016 https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2745.12627 which separately assesses traits that correlate with the four different demographic dimensions of invasiveness (local abundance, geographic range, environmental range, spread rate).	Thank you very much for your comment. Indeed, it is rarely observed, according to the literature. The text revised in the second order draft.
Kühn, Ingolf	No	3	9	51	9	52	I do not understand the sentence, especially after "as well". Do you mean individual drivers in the first part of the sentence and several in combination in the second?	Thank you for your comment. Because of the wide variety of perceptions, we have only added a word of emphasis in the second order draft.
Mowery, Monica	No	3	9	234	0	236	More information on lag period - how long is the lag? What does it depend on?	Thank you very much. This is corrected in the second order draft
Tidbury, Hannah	No	3	9	234	0	236	What about the lag in quantification as well as lag in actual rate?	Thank you for pointing this out. The text is revised to increase clarity in the second order draft.
Feest, Alan	No	3	9	235	0	235	increases	Thank you for your comment. We have revised this in the second order draft.
Buckley, Yvonne	No	3	9	236	0	236	"unlikely to be fully realised yet"	Thank you for your comment. We have revised it in the second order draft.
Tidbury, Hannah	No	3	9	236	0	236	Fully realized ever? Or in the short term?	Thank you for your comment. We have revised it in the second order draft.
Faulkner, Katelyn	No	3	9	237	9	237	A useful reference: Rouget, M., Robertson, M. P., Wilson, J. R. U., Hui, C., Essl, F., Renteria, J. L., & Richardson, D. M. (2016). Invasion debt - quantifying future biological invasions. <i>Diversity and Distributions</i> , 22, 445-456.	Thank you for your comment. This is certainly important in the management of IAS but as a driver, there is very little information on this topic.
Government of Germany	Yes	3	9	244	9	245	Please cross-check: This statement may contradict the following statement taken from the chapter summary: "The standard dichotomy of indirect and direct drivers widely adopted by IPBES breaks down when examining IAS since many traditional indirect drivers affecting biodiversity are direct drivers of IAS."	Thank you for your comment. We have revised it in the second order draft.
Gupta, Himangana	No	3	9	244	9	245	Trade (Economic driver) has been considered as one of the major global drivers for unintentional IAS introduction. In the case of IAS, economy, especially trade, is somehow a direct driver as more than just influencing an indirect driver, trade itself drives new introductions. The problem of trade and its potential of spread IAS has been covered throughout the chapter also referring to it as "most important route". Therefore, it will be good clarify its more direct effect in this case even if it is kept in the indirect list of drivers. This will help policy makers strengthen their quarantine systems, trade being the major route. There are already quarantine centres at major world airports and sea ports and checks at the border for any unwanted plant and animal import, but still this has not stopped new introductions. This problem needs to be emphasised. For reference: https://link.springer.com/article/10.1007%2Fs10530-007-9138-5 .	Thank you for your comment, but the assessment follows the IPBES classification of drivers.
Renault, David	No	3	9	244	9	252	In this introductory section, the information provided repeats some of the points that have been presented before. In general, the structure of the sections is repeated several times, which makes the reading less fun.	Thank you for your comment, we have reduced the repetitions in the second order draft
Pan, Xubin	No	3	9	251	9	251	Please delete the ""?	Thank you for your comment. We have revised it in the second order draft.
Taki, Hisotomo	No	3	9	251	9	251	Delete "" after management.	Thank you for your comment. We have revised it in the second order draft.
Wang, Xiao-Yi	No	3	9	251	9	251	An extra ""?	Thank you for your comment. We have revised it in the second order draft.
Kühn, Ingolf	No	3	10	67	10	67	Here you start with introduction and use different steps (terminology) than on p 8(1), 13. I suggest to harmonize this throughout.	Thank you very much. We have now produced a better diagrammatic representation of the interactions among drivers in the second order draft.
Buckley, Yvonne	No	3	10	268	10	272	I would suggest that the decision on whether or not to introduce a non-native organism very much depends on the balance of costs and benefits. We very often do not know that a non-native will go on to become an IAS prior to introduction, establishment and spread. I would suggest more nuance in the blanket use of the term IAS. All IAS start as non-native introductions, some go on to establish, increase, spread and have negative impacts on ecosystems or human society, these are the IAS. I suggest a rephrasing of this sentence "... the introduction of non-native species that will progress to become IAS should be prevented, particularly if the potential harms will outweigh the potential benefits of introduction...". A useful reference here may be Yokomizo et al 2011 https://link.springer.com/article/10.1007/s10530-011-0120-x which outlines a framework for making decisions about whether or not to introduce a potential	Thank you for your comment. We have added the reference and revised the sentence in the second order draft.
Government of Australia	Yes	3	10	268			Suggest you start the section on social values with a definition of what social values are. For example, The impacts of vertebrate pest or weed species are perceived differently by various groups (Estévez et al. 2015), as well as over time (Simberloff et al., 2013), because of what they value. Values can be defined as enduring mental constructs that represent people's key needs and that transcends different situations (Estévez et al. 2015; Zengeya et al. 2017). It can be seen as the extent to which someone or a group want or need something (Tadaki et al. 2017) and why (Rawluk et al. 2019). Values help people weigh different beliefs in terms of their relative importance. Different value systems is a key contributing factor to divergent ideas about the type, extent and significance of weed and vertebrate pest impacts (Shackleton et al. 2019c)	Thank you for your comment. We have revised it in the second order draft.

Government of Ethiopia	Yes	3	10	268	10	282	What makes species IAS? Isn't it their novelty to certain area where they are introduced? One may posit 'Social Value' comes after introduction. This seems circular. In this section, it seems pertinent to highlight how a given society attaches values to IAS and then discuss some case examples.	Thank you for your comment. We have clarified it in the second order draft.
Government of Germany	Yes	3	10	268	10	269	Question: Shouldn't the demand for medicine be defined as a direct driver?	Thank you for your comment. We have clarified it in the second order draft.
van Kleunen, Mark	No	3	10	268	10	269	A possible reference: van Kleunen M, Xu X, Yang Q, Maurel N, Zhang Z, Dawson W, Essl F, Krefl H, Pergl J, Pyšek P, Weigl P, Moser D, Lenzner B & Fristoe TS (2020) Economic use of plants is key to their naturalization success. <i>Nature Communications</i> 11, Article Number 3201. (DOI: 10.1038/s41467-020-	Thank you for your comment. We have added the reference in the second order draft.
Government of Ethiopia	Yes	3	10	269	10	270	"On the other hand, the..... from a scientific point of view."???	Thank you for your comment. We have revised it in the second order draft.
Tidbury, Hannah	No	3	10	270	10	270	Prevented from a scientific point of view" - could be argued that medicine (and food) are scientific. Would the term conservation or biological be better than	Thank you for your comment. We have revised it in the second order draft.
van Kleunen, Mark	No	3	10	270	10	270	I do not think that there is a scientific point of view. Maybe what is meant is a conservation point of view that is informed by science.	Thank you for your comment. We have revised it in the second order draft.
Buckley, Yvonne	No	3	10	274	10	275	This sentence is somewhat detached from the examples given in the paragraph.	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	10	274	10	282	This paragraph is very limited with respect to the role of social values for animal rights and welfare activists. The paragraph suggests that these actors are opposed to the control of IAS (in contrast to landowners which are mentioned in the context of successful control of IAS). This might be true in these specific examples but should not be confused with a general description of these actors and their underlying values.	Thank you for your comment. We have revised it in the second order draft.
Alaux, Christine	No	3	10	275	10	275	replace "the Galapagos" with "in the Galapagos"	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	10	275	10	275	in the Galapagos	Thank you for your comment. We have revised it in the second order draft.
Pan, Xubin	No	3	10	275	10	275	Change "he" to "The"?	Thank you for your comment. We have revised it in the second order draft.
Renault, David	No	3	10	275	10	275	T' Missing (The Galapagos)	Thank you for your comment. We have revised it in the second order draft.
Tidbury, Hannah	No	3	10	275	10	275	Typo - he should be The?	Thank you for your comment. We have revised it in the second order draft.
Wang, Xiao-Yi	No	3	10	275	10	275	"the Galapagos"?	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	10	278	10	278	the eradication	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	10	279	10	280	In ".....in the successful eradication of an invasive alien plant" Helpful to indicate the plant's name.	Thank you for your comment. We have revised it in the second order draft.
Buckley, Yvonne	No	3	10	280	10	280	Another example is Robinson et al 2005 https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2005.00196.x where indigenous people's values for different feral animal species were assessed and contrasted with IAS management objectives.	Thank you for your comment. We have added the reference in the second order draft.
Buckley, Yvonne	No	3	10	282	10	282	Also see Coutts et al. 2013 which shows that agents within an invaded landscape who are not motivated to control an IAS can jeopardise landscape scale control. https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/12-0599.1	Thank you very much. Ocean acidification is treated under climate change in the IPBES Global Biodiversity assessment and we aim for consistency between reports.
Daguitan, Florence	No	3	10	284	10	285	Regarding IAS role in human life is less known.. Among many IPLCs, the role of IAS in human life is known because of their close inter-action with nature. In some parts of Cordillera, Philippines, the disappearance of species that are part of the food system or diet of communities; the decreased yield of food crops and animals; or the added work that they have to do to manage/control IAS are perceived to directly relate to life and health of the people. It is viewed to effect life because indigenous peoples have established relations to nature. People easily connect invasion to their environment as invasion in their lives.	Thank you. Chapter 1 covers the aspect on perceptions and values.
Government of Ethiopia	Yes	3	10	284	10	288	The generalization is questionable.	Thank you for your comment. However, we did not adopt because it was not clear what generalization do you meant.
Buckley, Yvonne	No	3	10	285	10	285	More detail on what aspects of "human life" you are referring to here would be useful. Health, livelihoods, cultural & aesthetic values etc.	Thank you, these sections have been revised in the second order draft and it hopefully clarifies the differences among policies, governance and institutions
Castaño Arboleda, Nicolás	No	3	10	290	10	300	I miss an allusion about national delusions that have allowed invasive species to enter for economic reasons. It is important to emphasize more clearly that the economic decisions that support the introduction of some AIS have been stronger than reviewing the achievements of its introduction.	Thank you, values and perceptions are also mentioned in Chapter 3. Please see chapter 6 for more information on this theme
Government of Germany	Yes	3	10	291	10	291	As GOL is mentioned for the first time in the text, it is suggested to change to "Good Quality of Life (GQL)"	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	10	302	11	316	The concept used by Kellert 2009 seems rather complex. It is suggested to reconsider how the introduction of this concept could be made more comprehensive.	Thank you, we have revised this section in the second order draft and now align with Chapter
Takahashi, Yasuo	No	3	10	305	10	306	The authors may be interested to cite the following paper which clarified different perceptions of IAS among people and their management implications, particularly to back up the sentence in lines 305 and 306: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy</i> . https://doi.org/10.1016/j.envsci.2020.06.014 .	Thank you, we have shortened this section and now cross-reference to Chapter 1 in the second order draft.
van Kleunen, Mark	No	3	10	305	10	306	A complicating factor is that in advance it is not known whether the alien species will become an IAS.	Thank you for your comment. We have clarified it in the second order draft.
Tidbury, Hannah	No	3	10	307	11	311	Impacts or effects? Impact often carries negative connotation and here I understand that both positive and negative impacts (effects) are being referred to?	Thank you, impacts are indeed both positive and negative (please see chapter 4)
Catford, Jane	No	3	11	100	general		I felt that this chapter launched in too quickly, and was a bit overwhelming regarding the number of drivers considered. It seems important to first establish a framework highlighting why these various drivers would be important. It would seem appropriate and useful to first introduce the fundamental/underlying drivers of the process of invasion (i.e. propagule pressure, abiotic and biotic features), upon which the direct and indirect drivers discussed here relate. Introducing a hierarchical-type framework would also help to address the issue about the relatively high number of indirect/direct drivers considered in this chapter (which I suspect will be overwhelming for many readers unless they have a simpler framework upon which to ground/contextualise these drivers). A conceptual framework is not presented in C1 or C2 either at the moment, so seems important to include here at the beginning of this chapter (does not need to be long - perhaps just a page). Catford, J. A., Jansson, R. & Nilsson, C. (2009) Reducing redundancy in invasion ecology by integrating hypotheses into a single theoretical framework. <i>Diversity & Distributions</i> , 15, 22-40. Enders, M., Havemann, F., Ruland, F., Bernard-Verdier, M., Catford, J. A., Gómez-Aparicio, L., Haider, S., Heger, T., Kueffer, C., Kühn, I., Meyerson, L. A., Musseau, C., Novoa, A., Ricciardi, A., Sagouis, A., Schitto, C., Strayer, D. L., Vilà, M., Essl, F., Hulme, P. E., van Kleunen, M., Kumschick, S., Lockwood, J. L., Mabey, A. L., McGeoch, M. A., Palma, E., Pyšek, P., Saul, W.-C., Yannelli, F. A. & Jeschke, J. M. (2020) A conceptual map of invasion biology: Integrating hypotheses into a consensus network. <i>Global Ecology and Biogeography</i> , 29, 978-991. Latombe, G., Richardson, D. M., McGeoch, M. A., Altwegg, R., Catford, J. A., Chase, J. M., Courchamp, F., Esler, K. J., Jeschke, J. M., Landi, P., Measey, J., Midgley, G. F., Moinarivelo, H. O., Rodger, J. G. & Hui, C. (in press) Mechanistic reconciliation of community and invasion ecology. <i>Ecosphere</i> .	Thank you, we have revised the introduction to address this comment in the second order draft
Buckley, Yvonne	No	3	11	313	11	313	See also Chan et al 2016 for a discussion of relational values as an additional class of values for nature https://www.pnas.org/content/113/6/1462	Thank you, we have shortened this section and now cross-reference to Chapter 1 (please see sections on perceptions and values) in the second order draft.
Takahashi, Yasuo	No	3	11	313	11	315	Relational values are an additional class of values to instrumental (utilitarian) and intrinsic values.	Thank you very much. We refer here to the classification of Kellert as a simple type. Kelsch (2020) is quoted in the previous paragraph.
Takahashi, Yasuo	No	3	11	313	11	315	In the IPBES context, it'll be worthwhile to relate the value categories in Table 3.2 to the NCP reporting categories as exemplified in this paper: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy</i> . https://doi.org/10.1016/j.envsci.2020.06.014 .	Thank you very much. We refer here to the classification of Kellert as a simple type. Kelsch (2020) is quoted in the previous paragraph.
Caplat, Paul	No	3	11	591	11	593	Akward phrasing, it makes it sound like invasiveness is either "reproductive capacity", or at best the interaction between two traits. It is multidimensional, and the definition should be more explicit (intrinsic capacity of the species to spread, driven by life-history traits). HUGE body of literature on traits conferring invasiveness, and recent studies emphasizing the role of trait x environment to explain invasiveness. Must be explained!	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Caplat, Paul	No	3	11	593	11	593	Invisibility! Invisibility is another, quite rare trait.	Thank you, this has been corrected in the second order draft.
Volpedo, Alejandra	No	3	12	108	12	109	Table 3.1 Categories of indirect and direct drivers should incorporate the implementation of Economic Productive Policies (e.g. incentives for aquaculture production of non-native species)	Thank you for this point. As none of these references deal with aid or war explicitly, we were not able to include them in this section.
Government of Ethiopia	Yes	3	12	326	12	328	Consider reversing the clauses: "The movement of organisms associated with human economic activities has increased in recent years, as alien species are used in agriculture, forestry, fishery, livestock farming, aquaculture and horticulture."	Thank you for your comment. We have revised it in the second order draft.
van Kleunen, Mark	No	3	12	328	12	328	Note that here horticulture is listed separately from agriculture. See my comment at Chapter 3, page 2, lines 41-42.	Thank you, we have edited the executive summary and the main chapter (where appropriate) in the second order draft.
Government of Germany	Yes	3	12	330	12	330	Please check: The expression "to improve wild stocks" might be misleading. It is assumed that IAS cannot improve wild stock but might enhance production. Is	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	12	336	12	339	What about the introduction of Nile Perch in Lake Victoria? "The replacement of native crayfish in crayfish in"	Thank you, but this has been deleted and the comment no longer applies in the second order
Mowery, Monica	No	3	12	344	12	344	Aborigine is a dated word and isn't commonly used. Better to use "Aboriginal Australians" or "Indigenous Australians"	Thank you for your comment. We have revised it in the second order draft.
Buckley, Yvonne	No	3	12	347	12	347	See also Robinson et al. 2005 https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2005.00196.x where indigenous people's values for different feral animal species were assessed and contrasted with IAS management objectives.	Thank you. This is added in the second order draft.
Feest, Alan	No	3	13	350	13	350	an eradication	Thank you for your comment. We have revised it in the second order draft.
Pan, Xubin	No	3	13	378	13	378	Change "clinks" to "links"?	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	13	382	13	388	It is suggested to compare these numbers with the numbers stated in IAS_FOD_Chapter2 (Ch. 2.4.4.1 page 61 L1968)	Thank you for your comment. The chapter has since been updated and reference to human populations have been removed.
Tidbury, Hannah	No	3	13	382	17	510	Link between human population size and need for sustainable food source - therefore link with aquaculture and potential use of IAS in this context. For inclusion in the interactions section?	Thank you for your comment. Although we feel this is addressed in line 365-379. We added some text and links to other parts of the chapter to highlight the role of food and fibre production for growing human populations
Tidbury, Hannah	No	3	13	382	17	510	Suggestion addition of Copp et al 2010 to discussion of human population as a driver (Copp GH, Vilizzi L, Gozlan RE (2010) The demography of introduction pathways, propagule pressure and occurrences of non-native freshwater fish in England. <i>Aquat. Conserv. Mar. Freshw. Ecosyst.</i> 20(5): 595-601. doi: 10.1002/aqc.1129)	Thank you for your comment. We have added the reference in the second order draft.
van Kleunen, Mark	No	3	13	384	13	384	I do not think Pysek et al is the primary reference for this.	Thank you for your comment. We feel the Pysek reference provides the latest synthesis for the factors underpinning invasion. We have left the reference.
Government of Ethiopia	Yes	3	14	390	15	433	Human Population Density concept seems to be unfit. Why not just increasing human population instead of Density? It is the number that is important, instead of density.	Thank you for your comment. Most papers use human population density as a proxy for propagule pressure of socio-economic impacts. This variable is easier to find evidence for. The comment has not been incorporated in the text.

Tidbury, Hannah	No	3	14	391	14	392	Movements outside their range (spread following intro) or movement to locations outside their range?	Thank you for your comment, this has been corrected in the second order draft.
Tidbury, Hannah	No	3	14	400	14	402	Check sense... is the use of the word introduction correct? I would not expect the establishment to affect introduction. Perhaps introduction should be replaced with invasion? Or is the context invasion meltdown?	Thank you for your comment. These are the results from the reference. The sentence has been clarified to convey the intention.
van Kleunen, Mark	No	3	14	400	14	402	It is not clear why one would expect the introduction of alien mammals to be affected by a species ability to establish (as the latter happens after the introduction).	Thank you for your comment. These are the results from the reference. The sentence has been clarified to convey the intention in the second order draft.
Tidbury, Hannah	No	3	14	406	14	407	Separating these trends - perhaps worth clarifying? Do you mean separating introduction and establishment trends?	Thank you for your suggestion, this has been clarified in the second order draft.
Tidbury, Hannah	No	3	14	406			suggest remove 'pools'.	Thank you, this sentence has been revised in the second order draft.
Kühn, Ingolf	No	3	15	209	15	211	This is yet a slightly different terminology (or separation into stages) than the aforementioned ones (8/3, 10/6).	Thank you for your comment. We have revised the draft with consistent terminologies in the second order draft.
Kühn, Ingolf	No	3	15	217	15	218	And this differs again, now lumping transport and uptake rather than transport and introduction (as in the figure). Both can work, but please decide what you want and then be consistent!	Thank you for pointing this out, we have harmonized the invasion stages across the chapter and assessment in the second order draft.
Feest, Alan	No	3	15	429	15	429	appear to be more important	Thank you suggestion. This has been corrected in the second order draft.
van Kleunen, Mark	No	3	15	431	15	431	Occurrence of what? IAS?	Thank you suggestion. This has been added for clarification in the second order draft.
van Kleunen, Mark	No	3	15	439	15	439	Population growth is not equivalent to population density, so, clarify what is meant here.	Thank you for your comment. Since that was the message of the sentence, we have chosen not to change it in the second order draft.
Taki, Hisatomo	No	3	15	444	15	445	It is too small and hard to see the figure.	Thank you for your comment, we have improved the quality of this figure in the second order draft.
Mowery, Monica	No	3	15	445	15	445	This figure is difficult to read. Can it be enlarged?	Thank you for your comment, we have improved the quality of this figure in the second order draft.
Tidbury, Hannah	No	3	15	445	15	445	Does the sampling effort effect (illustrated in figure 3.3.) need to be brought out more?	Thank you very much, design can be improved when finalizing the chapter
Eckert, Sandra	No	3	15	447	15	454	The entire paragraph contains 3-digit numbers and it is totally unclear what they mean. The entire paragraph needs to be improved.	Thank you for your comment, the caption has been corrected in the second order draft.
Tidbury, Hannah	No	3	16	165	16	470	Need to mention the interaction between direct drivers also? Migration may be linked to climate change as areas of the globe become more inhospitable? Again, for the interactions section?	Thank you for your comment. We have made the revision in the second order draft.
Faulkner, Katelyn	No	3	16	465	16	470	South African medicinal plant trade is a useful example here. Immigrants have brought into the country their own medicinal plants and have created a market for them. Useful reference: Faulkner, K. T., Burness, A., Byrne, M., Kumschick, S., Peters, K., Robertson, M. P., ... Weyl, O. L. F. (2020). South Africa's pathways of introduction and dispersal and how they have changed over time. In B. W. van Wilgen, G. J. Measey, D. M. Richardson, J. R. Wilson, & T. A. Zengeva (Eds.), <i>Biological invasions in South Africa</i> (pp. 311–352). Cham, Switzerland: Springer.	Thank you for this excellent suggestion, and reference. This example is now included in the second order draft.
van Kleunen, Mark	No	3	16	465	16	467	It is hard to prove with data, but my expectation is that migrating humans were mainly important vectors until about 100 years ago, and that the effect of the current migrants is negligible compared to other components of globalization.	Thank you for this suggestion. We decided not to include this point in the assessment, as supporting evidence was not provided for this specific statement (Indeed, you point out in the comment it is possibly true, but will be hard to assess with data).
Buckley, Yvonne	No	3	16	472	16	472	See recent review by Bullock et al. 2018 on Human Mediated Dispersal (HMD) https://www.sciencedirect.com/science/article/pii/S0169534718302283	Thank you for this suggestion, and reference. As the paper is conceptual, rather than empirical, we have not found a suitable place to include it in the review.
Pan, Xubin	No	3	16	472	16	477	Same as the P17L516-P17L522.	Thank you for your comment. The repeated wording is rephrased in the second order draft.
Government of Germany	Yes	3	16	476	16	477	It is suggested to insert 'abandonment of land management'. The sentence would read: "e.g., fragmenting landscapes, abandonment of land management, ..." The abandonment of land management (as a consequence of emigration of farmers) may also facilitate the establishment of IAS.	Thank you for this comment. The link to abandonment was covered in the previous sentence (line 469), and under the reference to chapter 3.3.1.6 in the same sentence (changes in land-use regimes). The section has been rephrased to improve clarity in the second order draft.
van Kleunen, Mark	No	3	16	486	16	486	Is this also in line with migration?	Thank you for this comment. Unfortunately, the literature we cite to support this pattern is not clear on this explicit link. We can therefore not make this strong causal statement.
Eckert, Sandra	No	3	16	496	16	498	I disagree with the statement that "the role of human migration per se is likely to be reduced." Migration, from Southern continents to Northern continents has increased enormously in the past few years. In fact it is one of the biggest issues the EU for example have been dealing with in the last 5-10 years. (South America -> North America; Africa -> Europe)! COVID-19 has led to substantial migration of people back to their hometowns/home countries (particularly in Africa, and Asia).	Thank you for your comment - COVID-19 has indeed had various impacts that we were not anticipating when writing the first order draft. In the second order draft, we have now revised to specify that the *relative* importance of migration vs. other modes of travel in driving invasions has decreased, on centennial timescales. See also below for future prospects.
Kühn, Ingolf	No	3	17	275	17	275	"the Galapagos": Start of sentence missing!	Thank you for your comment. We have revised it in the second order draft.
Catford, Jane	No	3	17	299	17	300	Also ornamental plants or those used in agriculture. Dehnen-Schmutz, K. (2011) Determining non-invasiveness in ornamental plants to build green lists. <i>Journal of Applied Ecology</i> , 48, 1374-1380. Dehnen-Schmutz, K., Touza, J., Perrings, C. & Williamson, M. (2007) A century of the ornamental plant trade and its impact on invasion success. <i>Diversity and Distributions</i> , 13, 527-534. Dehnen-Schmutz, K., Touza, J., Perrings, C. & Williamson, M. (2007) The horticultural trade and ornamental plant invasions in Britain. <i>Conservation Biology</i> , 21, 224-231. Driscoll, D. A., Catford, J. A., Barney, J. N., Hulme, P. E., Inderjit, Martin, T. G., Pauchard, A., Pyšek, P., Richardson, D. M., Riley, S. & Visser, V. (2014) New pasture plants intensify invasive species risk. <i>Proceedings of the National Academy of Sciences</i> 111, 16622–16627. van Kleunen, M., Essl, F., Pergl, J., Brundu, G., Carboni, M., Dullinger, S., Early, R., González-Moreno, P., Groom, Q. J., Hulme, P. E., Kueffer, C., Kühn, I., Mignaus, C., Maurel, N., Novoa, A., Pareda, M., Pyšek, P., Seebens, H., Tanner, R., Touza, J., Verbrugge, L., Weber, E., Dawson, W., Krefth, H., Weigelt, P., Winter, M., Klomler, G., Talluto, M. V. & Dehnen-Schmutz, K. (2018) The changing role of ornamental horticulture in alien plant invasions. <i>Biological Reviews</i> 93, 1421-1437. van Kleunen, M., Xu, X., Yang, Q., Maurel, N., Zhang, Z., Dawson, W., Essl, F., Krefth, H., Pergl, J., Pyšek, P., Weigelt, P., Moser, D., Lenzner, B. & Fristoe, L. (2018) Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently reclassified to include Eichhornia species (Marco O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commeliniales) sheds light on the necessity of its reclassification and synopsis of Pontederia L. <i>Phyto Keys</i> 108: 25–83. doi: 10.3897/phytokeys.108.27652	Thank you for your comment. We have added the references in the second order draft.
Mc Kay, Fernando	No	3	17	499	17	539	Line 528. Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently reclassified to include Eichhornia species (Marco O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commeliniales) sheds light on the necessity of its reclassification and synopsis of Pontederia L. <i>Phyto Keys</i> 108: 25–83. doi: 10.3897/phytokeys.108.27652	Thank you. Taxonomic revisions have been done in the second order draft
van Kleunen, Mark	No	3	17	506	17	510	Would this result in major introductions of new species or rather increased cultivation of species that have already been introduced by earlier migration waves?	Thank you for this question. As we do not have data to resolve this issue, it needs to be remain as a relatively general observation.
Mowery, Monica	No	3	17	529	17	529	It's -> its	Thank you, this is corrected in the second order draft
van Kleunen, Mark	No	3	17	533	17	533	Mention that this is an island state in the South Pacific.	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	17	536	18	540	"The thorny legume (Prosopis juliflora) was introduced to Kenya". Its effect in Ethiopia (about two million ha) seems not to have been captured?	Thank you, impacts are covered in Chapter 4
Government of Ethiopia	Yes	3	18	546	18	549	The sentence needs rectification "Lake Victoria has been described as one of the greatest evolutionary and ecological disasters precipitated by mankind....."	Thanks you for the comment. Text now modified to reflect facts.
Girod, Christophe	No	3	18	565	19	587	Obsidional species might be interesting to mention. In Europe, there have been several introductions due to military camp, and in Japan, for instance, there is a high number of alien plant species near US military camp, some of which (Gamochaeta coarctata or pennsylvanica, for instance) are IAS	Thank you very much for the comment, but due to length restrictions, we are not able to add more examples.
Feest, Alan	No	3	18	575	18	575	Pearl Harbour	Thank you, this has been corrected in the second order draft.
Government of Australia	Yes	3	18	575	18	575	Pearl should be Pearl Harbor (typo)	Thanks for this suggested change. We have corrected it in the second order draft.
Girod, Christophe	No	3	18	580	18	587	The case of Diabrotica virgifera, might be worth mentioning introduced in Europe (inSerbia, 1992) via an airport, either due to war or to human travel	Thank you, but due to length restrictions, we are not able to add more examples.
Catford, Jane	No	3	19	324	general		Example of biofuels might be useful, including seaweed e.g. Czymek-Delétré, M. M., Roca, S., Agostini, A., Giuntoli, J. & Murphy, J. D. (2017) Life cycle assessment of seaweed biomethane, generated from seaweed sourced from integrated multi-trophic aquaculture in temperate oceanic climates. <i>Applied Energy</i> , 196, 34-50. Hager, H. A., Sinasc, S. E., Gedalof, Z. e. & Newman, J. A. (2014) Predicting potential global distributions of two Miscanthus grasses: implications for horticulture, biofuel production, and biological invasions. <i>PLOS ONE</i> , 9, e100032. Lewis, K. C. & Porter, R. D. (2014) Global approaches to addressing biofuel-related invasive species risks and incorporation into U.S. laws and policies. <i>Ecological Monographs</i> , 84, 171-201.	Thank you, these examples do not bring new points that are not covered elsewhere and we have chosen not to include them in the second order draft.
Buckley, Yvonne	No	3	19	593	19	593	Are there examples of militarised zones providing disturbances that can be colonised by IAS? Bomb craters for example. I would expect that war zones would also have reduced management of IAS.	Thank you, we have added an example of this (Krawczyk et al., 2019) in the second order draft.
Feest, Alan	No	3	19	612	19	612	is a beetle	Thank you, we have corrected this in the second order draft
Bennett, Jonathan	No	3	19	618	19	620	I find this statement confusing. Adapt them how?	Thank you, this term has been deleted for clarification in the second order draft.
Mowery, Monica	No	3	19	619	19	619	Define "live barrier"	Thank you, this term has been deleted for clarification in the second order draft.
Renault, David	No	3	19	622	21	695	Here maybe, the concept of Urban Heat Island, and its effects on Biological Invasions could be presented. See for instance the recent paper from https://doi.org/10.3897/mebiota.62.50661	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We think our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Kühn, Ingolf	No	3	20	385	20	386	"currently ... by 2030". Currently? Or by 2030?	Thanks for this suggested change. We have included it in the second order draft.
Kühn, Ingolf	No	3	20	386	21	387	Clarify that the 2 billion refer to global population, not the one within 100km from the coast.	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	20	624	20	624	2018, and it s	Thank you, this is corrected in the second order draft.
van Kleunen, Mark	No	3	20	633	20	643	Another potentially relevant paper on urbanisation and aliens: Aronson MFJ et al. 2014 A global analysis of the impacts of urbanization on bird and plant diversity reveals key anthropogenic drivers. <i>Proc. R. Soc. B</i> 281: 20133330. http://dx.doi.org/10.1098/rspb.2013.3330	Thanks for this suggested reference, although it mentions some key drivers it does not consider urbanization itself as a driver, thus we did not include it in the section.
Feest, Alan	No	3	20	635	20	635	and is predicted	Thank you very much. This is corrected in the second order draft
Faulkner, Katelyn	No	3	20	643	20	643	Intentional plant introductions in urban areas will also play a role in determining plant richness in urban areas, for example ornamentals, street trees	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.

Faulkner, Katelyn	No	3	20	645	20	660	A useful reference for this section: Padoyachee, A. L., Irllich, U. M., Faulkner, K. T., Gaertner, M., Procheş, Ş., Wilson, J. R. U., & Rouget, M. (2017). How do invasive species travel to and through urban environments? <i>Biological Invasions</i> , 19(12), 3557–3570.	Thanks for this suggested reference. We have included it in the second order draft.
Buckley, Yvonne	No	3	20	654	20	654	Is this also because urbanisation increases invasibility? Urbanisation represents a huge change in abiotic and biotic conditions for native species. Urbanisation can select against the pre-existing species and provide opportunities for introduced species with traits that are adapted to the new conditions. See Buckley & Catford 2015 https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2745.12501	Thanks for this suggested reference, although it is relevant for invaders in urban areas it does not consider urbanization itself as a driver, thus we did not include it in the section.
Tidbury, Hannah	No	3	21	665	695	669	As suggested, artificial connectivity of water ways can enhance spread of IAS - the need for connectivity is increased with climate change as droughts and extreme weather events lead to divergence in water stores between locations - is this worth touching on?	Thank you very much. The information is relevant, however, given the length of the section, and that the information already included is more relevant, this was not included in the second order draft.
Tidbury, Hannah	No	3	21	685	21	695	Offshore hard substrate can facilitate introduction and spread of IAS. Such substrate is commonly associated with offshore energy production which is linked to human population size.	Thank you. Agreed, but could not find a reference that linked the offshore energy production as a vector for the introduction of IAS. The link between energy production and human population size was added in a sentence after offshore platforms and energy installations are mentioned.
Government of Germany	Yes	3	21	703	21	703	Further evidence on economic drivers from a macro-perspective is presented in this article: Dalmazzone, Silvana; Giaccaria, Sergio (2014): Economic drivers of biological invasions: A worldwide, bio-geographic analysis. In <i>Ecological Economics</i> 105, pp. 154–165. DOI: 10.1016/j.ecolecon.2014.05.008.	Thank you, we have revised the section following your comment but chose not to include this specific reference in the second order draft.
Shimura, Junko	No	3	21	703	34	1216	Trade commodity should include alien species as pets, aquarium and terrarium species as live food and live bait. See also the following references: https://esajournals.onlinelibrary.wiley.com/journal/15409309 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0161130#sec006 https://doi.org/10.1371/journal.pone.0161130#sec006 https://www.researchgate.net/profile/Nitya_Mohanty/publication/335929193_The_global_pet_trade_in_amphibians_species_traits_taxonomic_bias_and_future_directions/links/5d91ef6ee458515202b74e32d/The-global-pet-trade-in-amphibians-species-traits-taxonomic-bias-and-future-directions.pdf	Thank you, we have edited it in the second order draft accordingly
Government of Ethiopia	Yes	3	21	710	21	713	The relationship between GDP and IAS seems correlational instead of causal. Specific examples may be necessary.	Thank you for your comment, we have included examples in the subsequent sections in the second order draft.
Buckley, Yvonne	No	3	22	704	22	704	Give precise reference - do you mean chapter 2?	Thank you, we have revised this sentence in the second order draft
Gupta, Himangana	No	3	22	704	22	705	many of which will act as indirect drivers: Are there some direct drivers out of these?	Thank you for your comment. Driver scheme has been revised in the second order draft.
Government of Germany	Yes	3	22	707	22	707	It should be 3.2.3.2 instead of 3.2.2.2	Thank you, this has been corrected in the second order draft
Buckley, Yvonne	No	3	22	709	22	709	Explain what you mean by externalities here, it doesn't seem to relate to the following sentence.	Thank you for your comment, we have revised it in the second order draft.
Tidbury, Hannah	No	3	22	710	22	713	Does this account for biases in monitoring and reporting effort? Likely a positive correlation between GDP and effort?	Thank you very much. This difference in monitoring and reporting based on economic and political factors is true for most (environmental) research, including monitoring and reporting of IAS, and is hence discussed in the gaps in knowledge section.
Dool, Serena	No	3	22	725			Section 3.2.3.1 mentions the pet trade but only very briefly. Considering the outsized role this has played in IAS introductions, these aspects could be greatly expanded. Pet trade: Maceda-veiga, Alberto, et al. "What's next? The release of exotic pets continues virtually unabated 7 years after enforcement of new legislation for managing invasive species." <i>Biological Invasions</i> 21.9 (2019): 2933-2947. Patoka, Jih, et al. "Invasive aquatic pets: failed policies increase risks of harmful invasions." <i>Biodiversity and Conservation</i> 27.11 (2018): 3037-3046. Mohanty, Nitya Prakash, and John Measey. "The global pet trade in amphibians: species traits, taxonomic bias, and future directions." <i>Biodiversity and Conservation</i> 28.14 (2019): 3915-3923. O'Hanlon, Simon J et al. "Recent Asian origin of chytrid fungi causing global amphibian declines." <i>Science (New York, N.Y.)</i> vol. 360,6389 (2018): 621-627. doi:10.1126/science.aar1965	Thank you, we have added more content on pet trade in the second order draft.
Government of Germany	Yes	3	22	725	22	725	The paragraph on trade is rather short and misses a more elaborate discussion of region-specific information. For a macro-approach consult e.g. Costello, Christopher; Springborn, Michael; McAusland, Carol; Solow, Andrew (2007): Unintended biological invasions: Does risk vary by trading partner? In <i>Journal of Environmental Economics and Management</i> 54 (3), pp. 262–276. DOI: 10.1016/j.jeem.2007.06.001. A case study on the Asia-Pacific, for example, identifies that Japan might be the riskiest trading partner for the US: Countryman, Amanda M.; Warziniack, Travis; Grey, Erin (2018): Implications for U.S. Trade and Nonindigenous Species Risk Resulting from Increased Economic Integration of the Asia-Pacific Region. In <i>Society & Natural Resources</i> 31 (8).	Thank you, we have revised the paragraph in the second order draft.
Takehara, Mari (Government of Japan)	Yes	3	22	726	23	775	In Japan, container ships are considered to account for a large proportion of unintentional invasion routes for alien species due to their large logistics volume. While efforts under Ballast Water Management Convention are progressing, maritime containers are still considered to be one of the main routes for unintentional invasion of non-native species. If such a fact can be confirmed, it is desirable to describe it.	Thank you, this is now covered in the second order draft.
Eckert, Sandra	No	3	22	732	22	732	"step", probably a "steep chance" is meant here.	Thank you for your comment. We have revised it in the second order draft.
Wang, Xiao-Yi	No	3	22	736	22	736	The citations in the text should be listed in order by published years.	Thank you for your comment. The citations have been revised in the second order draft.
Girod, Christophe	No	3	22	741	23	751	In France there had been a similar study, based on introductions near wool washhouses in Montpellier, in the second half of XIXth century, but only a few of these species managed to naturalize and expand. I 1950, only 10 species were still recorded (Rioux J. & P. Quezel, 1950 -La "Flora juvenalis" en 1950. <i>Monde</i> vol. 272, 73-74, cited in Graves, R., & Di Castri, F. (Eds.). (1991). <i>Biogeography of Mediterranean Invasions</i> . Cambridge: Cambridge University Press.	Thank you, this is very interesting but Wool aliens are well known as past introductions and our section looks at current issues rather than those so far back in the past
Government of Australia	Yes	3	22	744	22	744	Invasive lionfish would be a stronger example Hixon, M. A., et al. (2016). "Lionfish: a major marine invasion." <i>Marine Ecology Progress Series</i> 558: 161–165.	Thank you for your comment. We have added it in the second order draft.
Eckert, Sandra	No	3	23	771	23	771	"The recent global economic slowdown (Constantinescu et al., 2016) "Which global economic slowdown do you mean? The global financial crisis in 2008/2009? Or the one that happened just now, this year due to covid-19? Please be more precise in formulating which period you mean with "recent".	Thank you for your comment. We have revised the sentence in the second order draft for clarification.
van Kleunen, Mark	No	3	23	773	23	773	It were the rates of establishment, not the rates of introduction.	Thank you for your comment. We have revised the sentence in the second order draft.
Government of Germany	Yes	3	23	777	23	777	Further economic evidence on tourism can be found here: Warziniack, Travis W.; Finnoff, David; Shogren, Jason F. (2013): Public economics of hitchhiking species and tourism-based risk to ecosystem services. In <i>Resource and Energy Economics</i> 35 (3), pp. 277–294. DOI: 10.1016/j.reseneeco.2013.02.002.	Thank you very much for your comment, but we do not think it adds more to the references currently included in the second order draft.
Gya, Ragnhild	No	3	23	777	23	816	In addition to mentioning Africa, Asia and South America as exposed because they might not have the resources and experience to deal with their increasing number of travels and potential invasive species, it might be good to mention areas of the world that are more sensitive to these invasions. Such as islands (2), national parks, the arctic (1) and antarctic (which you already mention). I am sure there are some hotspots in marine systems that should be mentioned to which I will not do since I am a terrestrial ecologist. Here are some references for that: (1) Wasowicz, P., Sennikov, A. N., Westergaard, K. B., Spellman, K., Carlson, M., Gillespie, L. J., ... & Ickert-Bond, S. (2020). Non-native vascular flora of the Arctic: Taxonomic richness, distribution and pathways. <i>Ambio</i> , 49(3), 693–703. (2) Berglund, H., Jørgen, J., & Bengtsson, G. (2009). Endemism predicts intrinsic vulnerability to nonindigenous species on islands. <i>The</i>	Thank you very much for your comment. This chapter is about drivers more than how sensitive some sites are to invasions, this is more the focus of chapter 2 on trends
Renault, David	No	3	24	788	24	795	Please consider adding this reference: https://doi.org/10.1073/pnas.1119787109	Thank you for your comment. We have added the reference in the second order draft.
Dool, Serena	No	3	24	799			Likewise, visitors to caves are known to be a risk factor in moving fungal spores of <i>Pseudogymnoascus destructans</i> , currently devastating bats in north America (Puechmaille, Sébastien J., et al. "White-nose syndrome: is this emerging disease a threat to European bats?" <i>Trends in Ecology & Evolution</i> 26.11 (2011): 570–576. & Zhelyazkova, Violeta, et al. "Did you wash your caving suit? Cavers' role in the potential spread of <i>Pseudogymnoascus destructans</i> , the causative agent of White-Nose Disease." <i>International Journal of Speleology</i> 49.2 (2020): 7).	Thank you for your comment. We have added the reference in the second order draft.
Government of Germany	Yes	3	24	800	24	804	Related to "(e.g. winery visits) ... relatively free of invasive alien species": The epidemic of phylloxera (<i>Daktulosphaira vitifoliae</i>), a small insect and neo-zoon in Europe (from North-America), destroyed most of the European vineyards (end of 19th, beginning 20th century). It is still a pest in European vineyards. Of course, that's only one species, but with a high impact. So I wouldn't say that vineyards are areas "relatively free of invasive species".	Thank you for your comment. We have revised the sentence in the second order draft.
Hughes, Kevin	No	3	24	806	24	810	The tourism industry has expanded greatly since the numbers recorded in the 2012 reference used by the authors. See graph. The number of tourists for the 2019/20 season was 74,401. See: IAATO. 2020. IAATO Antarctic visitor figures 2019–2020. Available at https://iaato.org/wp-content/uploads/2020/07/IAATO-on-Antarctic-visitor-figures-2019-20-FINAL.pdf	Thank you, this is updated in the second order draft.
van Kleunen, Mark	No	3	24	819	24	823	I read these two sentences a couple of times but still do not understand what is meant with "externalities". It is also not clear why this is considered a driver. Should it not be an impact?	Thank you, we have revised the section to clarify it in the second order draft.
Government of Germany	Yes	3	25	842	26	884	The connection between some of the sentences and also some of the conclusions in this section are rather difficult to grasp. Please consider reformulating.	Thank you, we have revised this section in the second order draft.
Government of Germany	Yes	3	25	846	25	848	Is this still true (nearly twenty years later)? Now there are some regulations, like the EU 1143/2014 (on the prevention and management of the introduction and spread of invasive alien species).	Thank you for your comment, we have revised it in the second order draft.
Government of Germany	Yes	3	25	848	25	851	Maybe this is still true. But efforts have also been undertaken during the past 20 years, which should not be overlooked. Please check for newer publications.	Thank you very much for your comment. Negative externalities are a common issue in environmental issues, but while there have been moves to assess the investment in Corporate Social Responsibility (CSR) with environmental externalities associated with Germany's transition to renewable energy in the context of climate change, there have been no new reports on IAS. We collect information on recent social initiatives such as CSR, ESG investment and SDGs. We will continue to collect information until the last minute to provide
Eckert, Sandra	No	3	25	850	25	850	"the government funding"; which countries' government? Please improve precision by adding the specific country government you mean.	Thank you very much for your comment. It was not specified in the reference.
van Kleunen, Mark	No	3	26	874	26	875	Or even over 100 years for some trees in Germany. See: Kowarik I. 1995. Time lags in biological invasions with regard to the success and failure of alien species. In <i>Plant Invasions: General Aspects and Special Problems</i> , ed. P.Pyšek, K.Prach, M.Rejmánek, M.Wade.	Thank you for your reference. However, we have not adopted it because the reference is old (before 2000).
Eckert, Sandra	No	3	26	877	26	877	"previous four policy tools" which policy tools? They have not been mentioned or been introduced.	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	26	886	26	888	Cost internalization system is not well addressed and unclear how it relates to the topic.	Thank you for your comment. We have revised it in the second order draft.
Hughes, Kevin	No	3	26	891	26	891	I will look forward to seeing this case study during the next round of review. I would be happy to help if considered useful.	Thank you for your feedback.
Feest, Alan	No	3	26	896	26	896	cost internalization systems need	Thank you for your comment. We have revised it in the second order draft.

Kühn, Ingolf	No	3	27	565	27	658	In this context, the experiments and observations of von der Lippe & Kowarik are important, showing traffic as important means of dispersal. e.g., von der Lippe M, Kowarik I (2007) Long-distance dispersal of plants by vehicles as a driver of plant invasions. Conservation Biology 21: 986-996. doi: 10.1111/j.1523-1739.2007.00722.x.; von der Lippe M, Kowarik I (2008) Do cities export biodiversity? Traffic as dispersal vector across urban-rural gradients. Diversity and Distributions 14: 18-25. doi: 10.1111/j.1472-4642.2007.00401.x.; von der Lippe M, Bullock JM, Kowarik I, Knopp T, Wichmann M (2013) Human-Mediated Dispersal of Seeds by the Airflow of Vehicles. Plos One 8. doi: 10.1371/journal.pone.0052733.	Thank you, this is already covered by current references (selected through literature search).
Catford, Jane	No	3	27	656			Might be helpful (paper shows trait-based changes in urban floras by examining native extinct, native extant and exotic extant species): Palma, E., Catford, J. A., Corlett, R. T., Duncan, R. P., Hahs, A. K., McCarthy, M. A., McDonnell, M. J., Thompson, K., Williams, N. S. G. & Vesik, P. A. (2017) Functional trait changes in the floras of 11 cities across the globe in response to urbanization. Ecography, 40, 875-886.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Feest, Alan	No	3	27	914	27	914	evidence points	Thank you for your editorial comment. This typo has been amended in the second order draft.
Government of Germany	Yes	3	27	927	27	929	Does this still hold true? Surely, in the past 20 years awareness concerning invasive species has significantly increased, especially in the scientific community; Blackwell & Linklater only contribute to " Exotic Mammals in Australasia". There is no mention about the frog nor about the clawed frog. Kindly check again. You may wish to consult additional publication.	Thank you for your comment. That reference was misplaced. The improper reference has been replaced by the correct one in the second order draft.
Buckley, Yvonne	No	3	27	939	27	939	Was it the parental stock (African sub species) or the hybrids that escaped?	Thank you for your positive feedback. This example has been removed from the second order draft.
Kühn, Ingolf	No	3	28	665	28	669	Although mainly wind dispersed, Ailanthus altissima, Acer negundo and Acer platanoides, alien to Germany, benefit from dispersal along rivers and canals. Stümel I, Kowarik I (2010) Urban rivers as dispersal corridors for primarily wind-dispersed invasive tree species. Landscape and Urban Planning 94: 244-249. doi: http://dx.doi.org/10.1016/j.landurbplan.2009.10.009.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it in the second order draft.
Volpedo, Alejandra	No	3	28	703	29	723	This section should incorporate more detail of the economic policies of incorporation of exotic species for different productions such as aquaculture.	Thank you, we have added more information on aquaculture in the second order draft.
Dunn, Christopher	No	3	28	949	28	961	There is debate about the true role (or blame, some might say) of aquaria, botanic gardens, etc. in the release of IAS. Some examples are misinterpreted; some are outright wrong. This section, and others referring to botanic gardens, needs to be carefully written, properly reviewed by other experts, and agreed to. I notice that not a single author or editor is affiliated with any of these kinds of NGOs. This is a big omission. One of your authors has a vendetta against botanic gardens, claiming that all plants could "jump the fence." This is ludicrous.	Thank you for your suggestions regarding the need to include the perspective of some expert from a Botanical Garden. Our report is based on published evidence ensuring any conclusions we draw about specific sectors are justifiable and free from personal bias. In the second order draft, we have incorporated an evidence-based study drawn from the peer reviewed literature to ensure a balanced appraisal of the role of botanic gardens in biological invasions.
Girod, Christophe	No	3	28	954	28	956	Concerning plant species, a new alien species has recently been recorded in France : Solanum chacoense, that is a wild relative of Potato. It is suspected that this species has been introduced accidentally, from places where it was used for agronomic research on potato. I don't know whether other examples exist concerning alien plant species	Thank you for your suggested example. In the second order draft, we have addressed the naturalization of potato relatives following Simon et al 2010. Wild and Cultivated Potato (Solanum sect. Petota) Escaped and Persistent Outside of its Natural Range. ipm 3, 286-293.
Feest, Alan	No	3	28	971	28	971	use of remote	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	3	28	976	28	977	A challenge or opportunity? "Therefore, the increasing access to this technology impose a challenge for future ocean invasions."	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Barbosa, Andres	No	3	29	1005	29	1007	There are data on this in Chown et al. 2012. Continent-wide risk assessment for the establishment of nonindigenous species in Antarctica. PNAS 109(13):4938-4943.	Thank you for your comment, we have added the reference in the second order draft.
Hughes, Kevin	No	3	29	1005	29	1007	The reference Measey et al 2012 is titled: Ongoing invasions of the African clawed frog, Xenopus laevis: A global review. It is not relevant to this sentence on Antarctica. The following reference might be more appropriate: Hughes, Kevin A., Perreira, Luis R. (2016) Evaluation of non-native species policy development and implementation within the Antarctic Treaty area. Biological Conservation, 200. 149-159. 10.1016/j.biocon.2016.03.011 and also: Kennicutt, M.C., Chown, S.L., Cassano, J.J., Liggett, D., Peck, L.S., Massom, R., Rintoul, S.R., Storey, J., Vaughan, D., Wilson, T.J., Allison, I., Ayton, J., Badhe, R., Baeseman, J., Barrett, P.J., Bell, R.E., Bertler, N., Bo, S., Brandt, A., Bromwich, D., Cary, C., Clark, M.S., Convey, P., Costa, E.S., Cowan, D., DeConto, R., Dunbar, R., Elfving, C., Escutia, C., Francis, J., Frieller, H.A., Fukushi, M., Gilbert, N., Gutt, J., Havermans, C., Hik, D., Hosie, G., Jones, C., Kim, Y.D., Le Maho, Y., Lee, S.H., Leppe, M., Leichenkov, G., Li, X., Lipenkov, V., Lochte, K., López-Martínez, J., Lüdecke, C., Lyons, W., Marensi, S., Miller, H., Morozova, P., Naish, T., Nayak, S., Ravindra, R., Retamales, J., Ricci, C.A., Rogan-Finnemore, M., Roper-Coudert, Y., Samah, A.A., Sanson, L., Scambos, T., Schloss, I., Shiraiishi, K., Siegert, M.J., Simões, J., Sparrow, M.D., Storey, B., Wall, D.H., Walsh, J.C., Wilson, G., Winther, J.G., Xavier, J.C., Yang, H., Sutherland, W.J., 2015. A roadmap for Antarctic and Southern Ocean science for the next two decades and beyond. Antarct. Sci. 27, 3-18.	Thank you for your comments. The improper reference has been removed. We have taken some of your suggested references into account in the second order draft.
Eckert, Sandra	No	3	29	1022	29	1027	"new online technologies such as social media". I do not see how social media can help facilitate legal trade and illegal trade of organisms. I think a more precise name of the tools you mean should be put here: e.g. "electronic communication tools".	Thank you for your comment, "social media" refers to services that enable two-way communication on the premise of Internet use.
Daguitan, Florence	No	3	29		29		People, organizations, government institutions promoting exotics can also be direct drivers of IAS.	Thank you for your comment. This assessment follows the IPBES classification of indirect and direct drivers, analysing their effects on invasive alien species.
Catford, Jane	No	3	30	757			Might be helpful: van Kleunen, M., Xu, X., Yang, Q., Maurel, N., Zhang, Z., Dawson, W., Essl, F., Krefl, H., Pergl, J., Pyšek, P., Weigelt, P., Moser, D., Lenzen, B. & Frisvold, T. S. (2020) Economic use of plants is key to their naturalization success. Nature Communications, 11, 3201.	Thank you for your comment. We have included the reference in the second order draft.
Alaux, Christine	No	3	30	1034	30	1034	replace "the current biosecurity system" with "the current biosecurity system"	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	30	1034	30	1034	route: the current	Thank you for your comment. We have revised it in the second order draft.
Mowery, Monica	No	3	30	1034	30	1034	he -> the	Thank you for your comment. We have revised it in the second order draft.
Pan, Xubin	No	3	30	1034	30	1034	Change "he" to "the".	Thank you for your comment. We have revised it in the second order draft.
Renault, David	No	3	30	1039	30	1039	samplings (and not saplings)	Thank you for your comment. As the wording was correct, we have not changed it in the second order draft.
Eckert, Sandra	No	3	30	1053	30	1053	change "social media" to "electronic communication tools"	Thank you for suggesting change of wording. However, the original wording is accurate, so we have not adopted it.
Eckert, Sandra	No	3	30	1061	31	1087	Driving away to other topics not part of this chapter, but rather part of chapter 5 or 6. Thus, I suggest shortening substantially to the most relevant messages needed in this chapter on drivers (a good example how it could be done you find on line 1198-1201, page 34; it's about new gene technologies here but the same could be written for new IT technologies)	Thank you for your comment. The new technology is certainly effective for management, but it also functions as a driver to reduce the introduction and spread of alien species, so we left it as it is in Chapter 3 and added an explanation that it will be a driver to control alien species.
van Kleunen, Mark	No	3	30	1067	30	1067	When talking about native species populations, clearly say that they are native.	Thank you for your comment. We have revised it in the second order draft.
Kühn, Ingolf	No	3	31	819	33	889	Would chapter 3.2.3.3, not better fit to chapter 4 (impacts) or even 5 (Management)?	Thank you for your comment, but this section is about drivers
Government of Germany	Yes	3	31	1098	31	1103	The tools available for genome editing and sequence cutting may as well be employed for control and even eradication. This could be mentioned for complementarity. Please consider to move passage from pages 33/34, 11193 -1201 up to this para.	Thank you for this suggestion. The use of these technologies for control of IAS is discussed in Chapter 5. We now highlight this importance in the opening paragraph while referring to this chapter for further information. We did not move the passage up to this first paragraph because it is specifically related to how management is related to gene technologies, which are discussed
van Kleunen, Mark	No	3	31	1112	31	1112	Admixture between different genotypes might also significantly boost performance of invasive plants. Li Y, Stift M & van Kleunen M (2018) Admixture increases performance of an invasive plant beyond first generation heterosis. Journal of Ecology 106:1595-1606. (DOI: 10.1111/1365-2745.12926)	Thank you for the reference, it has been added in the second order draft to highlight the importance of admixture in invasion success.
Catford, Jane	No	3	32	826	32	844	Bunch of papers from Franck Courchamp's InvaCost project are currently in prep/under review. These may be useful sources of info for later drafts.	Thank you, these papers are used in other chapters.
Feest, Alan	No	3	32	1125	32	1125	alien annual crops	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	32	1136	32	1136	higher chances of becoming established	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Feest, Alan	No	3	33	1164	33	1164	Miscanthus	Thank you for your comment, we have revised it in the second order draft.
Government of Germany	Yes	3	33	1196	33	1197	It is suggested to delete "still" and add at the end of the sentence: "because no gene drive organism and only a few genome edited crops have been released yet."	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft.
Kühn, Ingolf	No	3	34	924	34	932	I think that in this context it is most interesting to note that X. laevis is considered to be the origin of chytridiomycosis, caused by Batrachochytrium dendrobatidis, spread around the globe by amphibian trade with devastating effects on native amphibian populations. Weldon C, du Preez LH, Hyatt AD, Muller R, Speare R (2004) Origin of the Amphibian Chytrid Fungus. Emerging Infectious Disease journal 10: 2100. doi: 10.3201/eid10i030804. In addition, it seems that this complete topic is hardly dealt with in the report.	Thank you for your suggestion. In the second order draft, we have included this topic based on the recent review: Fisher, M.C., Garner, T.W.J., 2020. Chytrid fungi and global amphibian declines. Nature Reviews Microbiology 18, 332-343. https://doi.org/10.1038/s41579-020-0335-x
Singh, Baljinder	No	3	34	932	34	935	As I indicated above, I would urge caution in describing European honeybees that were introduced and managed in the Americas for centuries, as NOT becoming a major invasive in most of its introduced range. Depending on the way the term "invasive" is defined & used, such honeybees could easily be considered as being a "major invasive".	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. Considering the IAS definition which does not implicitly involve subspecies level as well as the invasive status of Apis mellifera somewhere else (e.g. Australia, North America) we decided to remove this example to avoid misleading conclusions in the second order draft.
Government of Germany	Yes	3	34	1200	34	1201	From a risk assessor's view there is only very limited knowledge on risk assessment tools for gene drives. COP-MOP-9 of the CBD established an Ad Hoc Technical Expert Group (AHTEG) on Risk Assessment that has identified that risk assessment of LMOs containing engineered gene drives need further guidance. Therefore, it is suggested to change the sentence to: "..., but first work has been done to identify knowledge gaps and first strategies to predict associated risks have been suggested (Moro, et al., 2018, Thresher et al., 2019, Dodezel et al., 2019)." Dolezel, Marion; Simon, Samson; Otto, Mathias; Engelhard, Margret; Zughard, Wiebke (2019): Gene Drive Organisms - Implications for the Environment and Nature Conservation. A joint report of the EPA/ENCA Interest Group on Risk Assessment and Monitoring of GMOs. Ed. Umweltbundesamt - Environmental Agency Austria. Vienna (REP-0704); Dolezel, Marion; Lüthi,	Thank you for this suggestion. We adopted the changes in the text and incorporated the new references in the second order draft.
van Kleunen, Mark	No	3	34	1209	34	1210	It is not clear what this figure is illustrating.	Thank you for your comment. We agree that a better contextualization of this figure is lacking and decided to remove it from the section as it is not specifically related to the focus of the section and other figures in the report show similar content.
Mowery, Monica	No	3	34	1211	34	1212	I find this figure confusing, especially the text in the gray boxes. It would be helpful to add more context and explanation in the text.	Thank you for your comment. In the second order draft, we agree that a better contextualization of this figure is lacking and decided to remove it from the section as it is not specifically related to the focus of the section and other figures in the report show similar
Dunn, Christopher	No	3	34	1216	34	1216	If Case Study 4 is, indeed, to focus on botanic gardens, it better be written by, or edited by, a botanic garden leader. And it is fair to focus on gardens at the exclusion of aquaria, home gardeners, etc.?	Thank you for your comment, aquaria are mentioned as examples in the main text

Girod, Christophe	No	3	34	1216	34	1217	Idea for Case study 4 : <i>Caulerpa taxifolia</i> in Mediterranean has been a widely documented case study (accidental introduction in 1984 by the Aquarium of Monaco), although the species seem now to be declining (see for instance Meinesz & Hesse, 1991 - Introduction et invasion de l'algue tropicale <i>Caulerpa taxifolia</i> end Méditerranée nord-occidentale. <i>Océanologica acta</i> 14 (4) 415-426)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here (but it is now included below in ...)
Taki, Hisotomo	No	3	34	1218	34	1328	Differences among policies, governance and institutions might be unclear. For instance, those in the texts and the subtitles on international policies (3.2.5.1), national policies (3.2.5.2), and national institutions (3.2.5.3) are mixed.	Thank you, we have revised the sections with your comment in mind in the second order draft
Barbosa, Andres	No	3	35	1227	35	1227	References to the Antarctic Treaty and Madrid Protocol should be included here as international regulations for avoiding the introduction of IAS in Antarctica.	Thank you for making this point. However, your suggested reference is suited to Chapter 5 because this treaty is not expected to promote invasion, but to avoid Introductions.
Government of Germany	Yes	3	36	1296	37	1328	National policies will have increasing importance. With bioeconomy strategies being developed around the world, those will sooner or later be translated into policies and regulatory framework. It is expected that those will primarily target the primary sectors.	Thank you for this interesting comment
Eckert, Sandra	No	3	36	1304	37	1306	"Large scale planting of biofuel species may lead to..." This statement is taken from a reference of 2009. 10 years ago. Is there newer evidence now in 2020 that would confirm or reject this?	Thank you for your comment, we were not able to find a newer reference for this specific example
Feest, Alan	No	3	36	1304	36	1304	species may lead to	Thank you for your comment. We have revised it in the second order draft.
Karimov, Bakhtiyor	No	3	37	48	49	1767	There is necessity to add new subsection "Irrigation". It leads to considerable changes in IAS diffusion between the various river basins. If necessary I can assist.	Thank you very much for your comment. Agreed
Feest, Alan	No	3	37	1317	37	1317	attempts	Thank you for your comment. We have revised it in the second order draft.
Renault, David	No	3	37	1319	30	1319	Remove space in between Hulme et al., 2018) and the ''	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	3	37	1323	37	1328	The Norwegian example is somewhat disconnected from the previous topics that focused on new biofuel species, new commercial species. Here it is abruptly changing to species to stabilise soils. So, the entire paragraph is a mix of topics and just listing example after example somewhat disconnected with each other.	Thank you for your comment. The examples are about published national policies that act as drivers. The paragraph has been improved to make it read better in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	3	38	1334	76	2832	Governments and government policy could be recognized as direct drivers, as they can directly lead to the introduction of alien species. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A., Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upan, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for your comment. This assessment follows the IPBES classification of indirect and direct drivers, analysing their effects on invasive alien species.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	3	38	1334	76	2832	Governments and government policy could be recognized as direct drivers, as they can directly lead to the introduction of alien species. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A., Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upan, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for your comment. This assessment follows the IPBES classification of indirect and direct drivers, analysing their effects on invasive alien species.
Feest, Alan	No	3	38	1348	38	1348	note the	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	38	1350	38	1350	Further evidence on land use and invasive species: Waldner, Leora Susan (2008): The kudzu connection: Exploring the link between land use and invasive species. In Land Use Policy 25 (3), pp. 399-409. DOI: 10.1016/j.landusepol.2007.09.006.	Thank you for your suggestion, we have completely re-written this section in the second order draft and have decided not to include this reference as it covers points that are already covered by our findings from the systematic literature review. Also, this example is somewhat older than what we are optimally adding at this stage. Links are explicitly addressed in section 3.4
Tidbury, Hannah	No	3	38	1350	38	1365	Land-use / sea-use change and pollution link need to be highlighted? Again, for the yet to be completed interactions section?	Thank you, this is addressed in section 3.4.2
Brundu, Giuseppe	No	3	38	1367	40	1433	In my opinion this paragraph should include more information. Intentional and accidental introduction from agriculture, forestry, fisheries, and aquaculture are very important processes. There are very little examples on Ornamental and on Forestry species. The only example for a forest/woody species is on <i>Prosopis juliflora</i> (cites outside this paragraph), on the contrary there is a huge literature on invasive trees and their voluntary introduction in Forestry and for other purposes. In addition agricultural areas are often first sites of new introduction of novel crops, GMOs, biofuel crops, and novel genotypes of cultigens. I also think that many parts of the paragraph should be rephrased, the meaning is unclear in my opinion (see the following).	Thank you, we have improved this paragraph in the second order draft
Dool, Serena	No	3	38	1367			Section 3.3.1.1 mentions the horticulture trade but only very briefly. This aspect could be greatly expanded. Horticulture: Richardson, David M., and Marcel Rejmánek. "Trees and shrubs as invasive alien species— a global review." <i>Diversity and distributions</i> 17.5 (2011): 788-809. Bell, Carl E., Cheryl A. Wilen, and Alison E. Stanton. "Invasive plants of horticultural origin." <i>Hortscience</i> 38.1 (2003): 14-16.	Thank you, we have expanded on this theme in the second order draft.
Government of Ethiopia	Yes	3	38	1367	38	1368	It seems not appropriate to put "3.3.1.1. Introductions intentionally or accidentally from agriculture, forestry, fisheries, and aquaculture" under "3.3.1. Land-use and sea-use changes".	Thank you for making this point. But we decided not to move this section to other place.
van Kleunen, Mark	No	3	38	1369	12	1369	Mention horticulture.	Thank you for your comment, yes, this has been added to the second order draft.
Buckley, Yvonne	No	3	38	1373	38	1378	Do you mean ease of cultivation or low input cultivation here? Growth is somewhat ambiguous as it can refer to incremental plant growth.	Thanks for this suggested change of wording, but this was a type of "commercially grown"
Feest, Alan	No	3	38	1376	38	1376	commercially grown organisms	Thank you for your comment. We have revised it in the second order draft.
Giuseppe, Brundu	No	3	38	1383	38	1384	In cultivated woody plants, the potential for escape depends on the strength of propagule pressure. This sentence is unclear in my opinion. The term "strength" should be rephrased or defined. The propagule pressure is of course very important, but also other factors may promote escape risk (e.g., luck of silvicultural adequate management), and woody alien species may also propagate vegetatively, e.g. along rivers.	Thank you for your comment. We have revised it in the second order draft.
Giuseppe, Brundu	No	3	38	1384	38	1385	High levels of reproductive 1384 pressure may eventually lead to the escape of woody species from cultivation - this is unclear in my opinion.	Thank you for your comment. We have revised it in the second order draft.
Buckley, Yvonne	No	3	39	1389	39	1389	See Cook & Dias 2006 https://www.publish.csiro.au/BI/BT05157	Thank you very much. We have checked the literature, but have decided that the case to be introduced is sufficient with the one described.
Feest, Alan	No	3	39	1389	39	1389	Such introductions	Thank you for your comment. We have revised it in the second order draft.
Giuseppe, Brundu	No	3	39	1389	39	1390	Such introduction could be considered a subset of invasive alien species because it may transform native plant communities and landscapes - Unclear in my	Thank you for your comment. We have revised it in the second order draft.
van Kleunen, Mark	No	3	39	1390	39	1390	Were all these pasture species grass species or did they also include grassland forbs?	Thank you very much. Some of the analysis seems to include forbs.
Eckert, Sandra	No	3	39	1393	39	1396	"The intentional introduction of African grasses as pasture..." Introduced where? In the USA? North America?	Thank you for your comment. We changed the description to "introduction to the Americas" in the second order draft
van Kleunen, Mark	No	3	39	1399	39	1400	A reference is missing.	Thank you for your comment. Reference has been added in the second order draft.
Eckert, Sandra	No	3	39	1406	39	1406	"Accidental introduction..." start on a new line as this seems to be a new topic.	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	3	39	1406	39	1411	The two sentences are a mix of topics and regions. Please improve the structure of the paragraph.	Thank you for your comment. We have revised it in the second order draft.
Giuseppe, Brundu	No	3	39	1406	39	1408	Accidental introduction through seed contaminants associated with the deliberate introduction of ornamental plants is regarded as the second most important source of invasive alien plants after deliberate introduction in the United States and has become This sentence is unclear, in my opinion, as it looks that "deliberate introduction" is counted two times.	Thank you for your comment. We have revised it in the second order draft.
Smith, Emily	No	3	39	1413	40	1433	This section refers to the introduction both intentionally and unintentionally via fisheries. However it is restricted to marine fisheries and aquaculture. Another route for introduction is the introduction into recreational fisheries (those not used for the purposes of producing food for the table but to allow anglers to go and enjoy catching fish for sport). Introduction can be intentional or unintentional e.g. top mouth gudgeon introduction that comes in accidentally during fish stocking. A reference to fisheries should also make reference to recreational fishing activities.	Thank you very much. In the second order draft, we have added a paragraph to the bottom of the section about angling.
Eckert, Sandra	No	3	39	1423	39	1423	Change "The Balkans are" to "The Balkans, for example, are..." and start it on a new line.	Thank you for your comment. We have revised it in the second order draft.
Bennett, Jonathan	No	3	40	1436	40	1464	I found this paragraph difficult to follow. There were multiple sentences that did not make sense to me.	Thank you, we have updated this paragraph in the second order draft
Government of Ethiopia	Yes	3	40	1436	41	1464	Habitat fragmentation does open an ecological vacuum which may be easily filled by IAS. It would make the section complete to add this topic. Mechanistic	Thank you, a section on habitat fragmentation has been added in the second order draft.
Feest, Alan	No	3	40	1437	40	1437	decrease in biodiversity; meaning what?	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	40	1440	40	1440	reproduction potential	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	40	1443	40	1443	2011); e.g. tropical forests the greatest of diversity hotspots	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	40	1457	40	1460	: This section would make more sense if it was understood that biodiversity has a number of different components <i>sensu</i> Feest <i>et al</i>	Thank you, the concept of invasive alien species/biodiversity is better explained in Chapter 1.
Government of Germany	Yes	3	40	1457	40	1459	It is suggested to verify the statement against more up to date references (the references which have been used may be too specific and too old (from 1992)).	Thank you for your comment. More recent reference has been added in the second order draft.
Bennett, Jonathan	No	3	40	1459	40	1460	Do invasive species ever have conservation value?	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	3	40	1460	40	1464	Start "On the other hand..." on a new line. It is an abrupt change in topic and was not introduced with a sentence. Also if write "on the other hand" I would expect previously a "on the one hand" which I did not see. I guess it is mostly a writing style issue but I still wanted to mention it as there are many of these in	Thank you for your comment. We have revised it in the second order draft.
Buckley, Yvonne	No	3	40	1464	40	1464	However, the presence of more edge effects around smaller fragments can promote invasion into the remaining habitat.	Thank you for your comment. We have revised it in the second order draft.
Feest, Alan	No	3	40	1467	40	1467	may slow down	Thank you for your comment. We have revised it in the second order draft.
Catford, Jane	No	3	41	1216			These might be helpful (research around botanic garden introductions in Indonesia): Junaedi, D. I., Guillera-Aroita, G., Vesik, P. A., McCarthy, M. A., Burgman, M. A. & Catford, J. A. (in review) Traits explain invasion of alien plants into tropical rainforests. <i>Ecology and Evolution</i> Junaedi, D. I., McCarthy, M. A., Guillera-Aroita, G., Catford, J. A. & Burgman, M. A. (2018) Traits influence detection of exotic plant species in tropical forests. <i>PLOS ONE</i> , 13, e0202254.	Thank you, but points made in this paper are already covered in the literature used in this box
Eckert, Sandra	No	3	41	1469	41	1469	"IS can induce opposite process than..." This is a mix of plural and singular. Either change to processes or insert an "a" before opposite.	Thank you, this sentence has been deleted in the second order draft
Feest, Alan	No	3	41	1469	41	1469	can induce the opposite to fragmentation.	Thank you. This is rephrased in the second order draft
Feest, Alan	No	3	41	1470	41	1470	South African fynbos	Thank you for your comment. We have revised it in the second order draft.
Bennett, Jonathan	No	3	41	1474	41	1476	How do you define intermediate and wouldn't this depend on the habitat and organism you are talking about? Habitats that are typically large and homogeneous would have a very different response to habitat fragmentation than those that are naturally heterogeneous. A similar argument can be made for differences between mobile and immobile organisms or among animals with variable home range sizes. I would be cautious of prescribing a solution that is	Thank you for your comment. We have revised it in the second order draft.
Faulkner, Katelyn	No	3	41	1496	41	1497	Increased abundance and diversity along roads is not necessarily the result of increased dispersal, and could also be the result of increased establishment opportunities, due, for example, to disturbance.	Thank you for your comment. We have mentioned this.

Girod, Christophe	No	3	41	1500	41	1502	Another example, although not documented in English language, is <i>Bothriochloa barbinodis</i> , an invasive species in France and Europe that spreads towards north via Railways and roadways (see Fried 2017, A propose de l'extension de <i>bothriochloa barbinodis</i> end France. Bulletin de la SBCO 48 : 119-127)	Thank you for your comment. We cannot add additional reference to the chapter due to word length restrictions.
Feest, Alan	No	3	41	1505	41	1505	Anthropogenic corridors also drastically	Thank you for your comment. We have corrected in the second order draft.
Feest, Alan	No	3	42	1515	42	1534	this section needs careful editing as it is so poorly written	Thank you for your comment. We have carefully revised these sentences in the second order
Feest, Alan	No	3	42	1523	42	1523	expanded	Thank you for your comment. We have removed this sentence in the second order draft.
Feest, Alan	No	3	42	1524	42	1524	in South Africa	Thank you for your comment. We have removed this sentence from the second order draft.
Feest, Alan	No	3	42	1525	42	1525	traded live	Thank you for your comment. We have removed this sentence from the second order draft.
Eckert, Sandra	No	3	42	1538	42	1538	"...in the near future (Ricciardi et al., 2017)." Is this still "in the near future" or already "done"?	Thanks for your comment. We have rephrased the sentence and have added a reference in the second order draft
Eckert, Sandra	No	3	43	1540	43	1551	both Table 3.3 and Figure 3.5 seem not to be referenced in the text	Thank you for your comment. We have removed Table 3.3 and have added the citation of Figure 3.5. in the second order draft.
Government of Germany	Yes	3	43	1540	43	1541	Table 3.3: The table should be updated with new data (cited data are from 2007/2009), also to provide verifiable data for figure 3.5 (data source is from	Thank you for your comment. We have removed Table 3.3. from the in the second order
Taki, Hisatomo	No	3	43	1543	43	1544	It may be better to use different colour or colour types for the figure, if possible.	Thank you for your comments. Figures have been revised where possible in the second order
Taki, Hisatomo	No	3	44	1553	44	1553	It is better to use different colours for inland and suex. Some may not be able to see red and green differently.	Thank you for your comment. We have removed Fig. 3.6. from the second order draft
Mowery, Monica	No	3	44	1554	44	1558	This figure is not helpful and I don't think it adds to the aims of the chapter, considering the vast majority of introductions are via the Suez Canal, which is explained in the text.	Thank you for your comment. We have removed Fig. 3.6. from the second order draft
Renault, David	No	3	44	1576	44	1576	double comma after the cited reference	Thank you for this observation, one comma has been removed in the second order draft.
Government of Australia	Yes	3	45	1583	45	1595	This section would be strengthened with some other examples, e.g. Glasby, T. M., et al. (2007). "Nonindigenous biota on artificial structures: could habitat creation facilitate biological invasions?" Marine Biology 151: 887–895 and Sinkanin, C., et al. (2012). "Anthropogenic structures and the infiltration of natural benthos by invasive ascidians." Marine Ecology.	Thank you, we have added this reference in the second order draft
Eckert, Sandra	No	3	45	1585	45	1585	"such as <i>Sabella spallanzanii</i> ..." please add something like "such as the marine invertebrate <i>Sabella</i> ..." as not every reader will be familiar with this species and know what it is and in which realm it is present.	Thank you for your comment. We have revised it in the second order draft.
Bennett, Jonathan	No	3	45	1600	45	1603	Are you talking about the animal or a name of a dame system? If the animal, is this the right section?	Thank you, this was the name of the dam.
Eckert, Sandra	No	3	45	1601	45	1601	"Their study further..." Whose study? Gibson et al., or Reaser?	Thank you, this has been revised accordingly in the second order draft
Eckert, Sandra	No	3	45	1618	45	1619	"...remain largely unassessed in most ecosystems (Fridge et al., 2012)." Is this still the case in 2020 or has there been new assessments in the meantime? 2012 is already eight years ago.	Thank you for the comment, we have included a more recent evidence from the literature as an update on this
Government of Germany	Yes	3	46	1625	46	1625	Besides referring to "UNCCD, 1994", you may wish to analyse the following more recent UNCCD publication as well: Global Land Outlook, 2017. UNCCD, first edition, https://knowledge.unccd.int/sites/default/files/2018-06/GLO%20English_Full_Report_rev1.pdf	Thank you for your suggestion. We have replaced the reference in the second order draft.
Bennett, Jonathan	No	3	46	1635	46	1638	Is there a specific example for this or are these the effects of different alien species? The vagueness seems out of place here given the specificity of many examples in the text.	Thank you for your comment. These show the effects of different alien species. We have added the specific information in the second order draft.
Eckert, Sandra	No	3	46	1658	46	1658	"...perennial herbaceous with..." what? Grasses?	Thank you for your comment. We have rephrased the word in the second order draft
Bennett, Jonathan	No	3	47	1661	47	1663	I don't think this is quite true. Erosion can increase <i>Bromus</i> cover, but <i>Bromus</i> itself causes many of these changes to the plant and microbial communities and to ecosystem functioning.	Thank you for your comment. We have revised the sentence in the second order draft.
Eckert, Sandra	No	3	47	1663	47	1664	"The impact of land degradation as a driver of invasion of animals and microbes seem to be lacking." What exactly is lacking? Research findings on impacts or on impacts as drivers? Unclear formulation.	Thank you for your comment. We have revised the sentence in the second order draft.
Government of Germany	Yes	3	47	1663	47	1664	The conclusion is unclear, it contradicts with the previous statements provided in the same section . It is suggested to consider whether " <i>seem to be lacking</i> " should be replaced by something according to 'seem to be obvious'.	Thank you for your comment. We have revised the sentence in the second order draft.
Poulet Nicolas	No	3	47	1686	47	1692	It is worth noting that habitat restoration may lead to biological invasion as the first step of restoration sometime start by a destruction or at least a necessary ecosystem perturbation that, if no precaution is taken, leave the place to IAS due to their efficiency to colonize new habitats.	Thank you for your comment.
Tidbury, Hannah	No	3	47	1696	47		What about designation of marine protected areas. Their success if often depending on their integration into a network to facilitate recruitment, gene flow etc. While protecting and restoring vulnerable species, such MPA networks may facilitate invasions.	Thank you for this comment. Protected areas are covered explicitly in sections 3.2.2.1, and 3.3.1.3. We now cross-reference in the second order draft.
van Kleunen, Mark	No	3	48	1706	48	1708	I think it is important to point out that this was an observational and not an experimental study. Experimental disturbance study indicate that it frequently provides an opportunity for alien species to establish. Kempel A, Chrobock T, Fischer M, Rohr RP & van Kleunen M (2013) Determinants of plant establishment success in a multispecies introduction experiment with native and alien species. Proceedings of the National Academy of Sciences 110:12727-	Thanks for this suggested change, and associated references. We have included it in the second order draft
Faulkner, Katelyn	No	3	48	1716	48	1720	This sort of information is discussed elsewhere in this chapter, e.g. there are sections on agriculture in the sections above	Thank you, we have reduced overlaps in the second order draft
Eckert, Sandra	No	3	48	1718	48	1719	"...also investigated though to a much lesser extent." investigated to a lesser extent or having less driving power? Unclear formulation.	Thank you. This statement is now reformulated in the second order draft.
Bennett, Jonathan	No	3	48	1723	48	1724	To me, this feels as though the document is trying to frame domesticated grazers in an entirely negative light. Certainly overgrazing an area can lead to invasion, but many regions require grazing (e.g. the North American Great Plains) and have lost their native grazers. As a consequence, biodiversity maintenance requires domesticated grazers. This should not be overlooked.	Thank you. We are aware of this, and will keep in mind for the assessment at large, but here it's a specific case for the paper cited.
Caplat, Paul	No	3	48	1742	48	1742	Shouldn't there be a line return there, to start a new paragraph on water? That one is about fire, it seems.	Thank you very much. You are correct. This is now revised in the second order draft.
Eckert, Sandra	No	3	48	1742	48	1742	"Aquatic invasive species may..." start sentence on new paragraph.	Thank you very much for your comment. New paragraph added in the second order draft
Feest, Alan	No	3	49	1744	49	1744	What is meant by low biodiversity?	Thank you very much. The text is revised for clarification in the second order draft.
Government of Australia	Yes	3	49	1749	49	1753	The role of anthropogenic disturbance in driving establishment of marine IAS has been widely reported e.g. Clark, G. F. and E. L. Johnston (2009). "Propagule pressure and disturbance interact to overcome biotic resistance of marine invertebrate communities." <i>Oikos</i> 118(11): 1679–1686 and Airoldi, L. and F. Bulleri (2011). "Anthropogenic Disturbance Can Determine the Magnitude of Opportunistic Species Responses on Marine Urban Infrastructures." <i>PLoS ONE</i> 6(8):	Thank you for this suggested change and associated reference. We have included in the second order draft.
Eckert, Sandra	No	3	50	1807	50	1807	"... such as <i>Ailanthus altissima</i> " add info what it is "... such as the tree <i>Ailanthus</i> ..." not every reader will know this.	Thank you for your comment. We have revised it in the second order draft.
Dudgeon, David	No	3	51	1831	51	1833	Some odd text here (reference cited in text?), also this example repeats one given in chapter 2 around line 311-3 and it reappears on Chapter 4 (L. 517 and L. 2342).	Thank you, we have revised the text. Common examples across chapters can help readers to understand the complexity of the issues
Dudgeon, David	No	3	51	1847	51	1847	I am doubtful about this: <i>L. fortunei</i> is a subtropical species, and it is not a problem along the Yangtze; I doubt it would become one further north. But <i>L. fortunei</i> has been introduced into S. America, and I've not noticed any mention of this in the text thus far. It has been spreading quite successfully. (It is mentioned in Ch 6 around line 3438.)	Thank you, kindly refer to Zhan et al., 2015
Dudgeon, David	No	3	51	1848	51	1849	Doubtful that water hyacinth and lettuce could spread further north as their distributions are already temperature limited in China. People have been moving them around for decades!	Thank you, kindly refer to Liu et al., 2017
van Kleunen, Mark	No	3	51	1859	51	1861	It might also agricultural run-off and increased amounts of waste water may also result in eutrophication, which might also affect IAS. Byers 2002 https://doi.org/10.1034/j.1600-0706.2002.970316.x	Thank you. Yes, agreed, but here we only present 2 main ways
Dudgeon, David	No	3	52	1874	52	1894	Just as an example, the citation style of references in this para' needs some attention, but there are problems in that regard scattered throughout the text.	Thank you for your comment, citation and reference styles have been harmonized in the
Poulet Nicolas	No	3	52	1877	52	1879	It is worth noting that not only large dams but also low head dams add weirs can ease the establishment of IAS. Baulet, N. (2007). Impact of weirs on fish community in a piedmont stream. <i>River Research and Applications</i> , 23, 1038–1047	Thank you, but due to length restrictions, we decided not to add this detail to the second order draft.
Poulet Nicolas	No	3	52	1879	52	1879	This reference would be more suitable Johnson, P. T., Olden, J. D., & Vander Zanden, M. J. (2008). Dam invaders: impoundments facilitate biological invasions into freshwaters. <i>Frontiers in Ecology and the Environment</i> , 6, 357–363.	Thank you for the suggested references, we have added this in our section as appropriate in the second order draft.
Dudgeon, David	No	3	52	1892	52	1892	The name given here is not the usual one for Asian clam; i.e. <i>Corbicula fluminea</i> . And perhaps I missed it, but this is an example of an invasive that might warrant more attention somewhere in the text of earlier chapters.	Thank you very much, please refer to Grosholz et al 2002 https://www.sciencedirect.com/science/article/pii/S0169534701023588?via=ih3DHub
Eckert, Sandra	No	3	52	1903	52	1903	Improve title 3.3.2.3	Thank you for your comment. The suggested title aligns with the drivers used in the IPBES global assessment "Mining (minerals, metals, oils, fossil fuels)"
Bennett, Jonathan	No	3	53	1919	53	1924	In my experience, abandoned mines that are not reclaimed are very poor habitat for most plants, including invasive species. I am sure there are examples of former mines becoming invasive hot spots, but I imagine its worth putting this in context. When most organic soil is removed that is quite a stressful environment. If you are referring to stored piles of topsoil, then I can certainly see that, but it is worth making it clear.	Thank you very much. The text has been updated in the second order draft to include context of mining activities.
Eckert, Sandra	No	3	53	1921	53	1921	Reference missing	Thank you for your comment, the following reference has been added: (Bell and Donnelly 2006) in the second order draft.
Girod, Christophe	No	3	53	1937	53	1944	<i>Acacia mangium</i> is another example of species widely used for restoration, but which proved highly invasive in some countries (Koutika, L., Richardson, D.M. <i>Acacia mangium</i> Willd: benefits and threats associated with its increasing use around the world. <i>For. Ecosystem. 6, 2</i> (2019). https://doi.org/10.1186/s40663-019-00663-0	Thank you. The reference has been added in the second order draft.
Bennett, Jonathan	No	3	53	1947	54	1949	I think it is worth explicitly stating that many of these benefits come from storing toxic metals, potentially as a result of phytoremediation efforts.	Thank you for this suggestion. In the second order draft, we have altered the sentence to include it "...removal of environmental pollutants and toxic metals..."
Bennett, Jonathan	No	3	54	1957	54	1961	Most species that are good in these harsh environments are not really good competitors in better conditions. Is there evidence that they escape the area that they are seeded?	Thank you for the comment. The likelihood of introduced species spreading has been added to the paragraph above in the second order draft.
Government of Germany	Yes	3	54	1981	54	1983	It is suggested to specify the actual sources of eutrophication which link to the economic and demographic drivers in order to prepare for the policy options in ch. 5 and 6.	Thank you. This chapter deals with pollution as a driver of IAS, and should not discuss drivers of the driver, which is beyond scope of the chapter. We now attempt to clarify this here, and

Catford, Jane	No	3	54		55		changes in flow regimes --> reduces natives --> facilitates invasion: Catford, J. A., Downes, B. J., Gippel, C. J. & Vesik, P. A. (2011) Flow regulation reduces native plant cover and facilitates exotic invasion in riparian wetlands. <i>Journal of Applied Ecology</i> , 48, 432-442. Catford, J. A., Morris, W. K., Vesik, P. A., Gippel, C. J. & Downes, B. J. (2014) Species and environmental characteristics point to flow regulation and drought as drivers of riparian plant invasion. <i>Diversity and Distributions</i> , 20, 1084–1096. Tilman and other papers showing diversity inhibits invasion, many including: Catford, J. A., Dwyer, J. M., Palma, E., Cowles, J. M. & Tilman, D. (2020) Community diversity outweighs effect of warming on plant colonization. <i>Global Change Biology</i> , 26, 3079-3090. Fargione, J. E. & Tilman, D. (2005) Diversity decreases invasion via both sampling and complementarity effects. <i>Ecology Letters</i> , 8, 604-611.	Thank you for your comment. We have added the reference and revised the text in the second order draft
Eckert, Sandra	No	3	55	1994	55	1994	"knock-on effects" define the term please.	Thank you very much. We have revised it in the second order draft
Bennett, Jonathan	No	3	55	2008	55	2010	I don't know if I would say this as definitively as you have here. There have been dozens of studies examining such relationships and about half of them come out with the answer that native and alien species don't differ significantly in their traits.	Thank you. Statement is qualified and references are added in the second order draft.
Catford, Jane	No	3	56	1749			But see: Brummer, T. J., Byrom, A. E., Sullivan, J. J. & Hulme, P. E. (2016) Alien and native plant richness and abundance respond to different environmental drivers across multiple gravel floodplain ecosystems. <i>Diversity and Distributions</i> , 22, 823-835. Greet, J., Cousens, R. D. & Webb, J. A. (2013) MORE EXOTIC AND FEWER NATIVE PLANT SPECIES: RIVERINE VEGETATION PATTERNS ASSOCIATED WITH ALTERED SEASONAL FLOW PATTERNS. <i>River Research and Applications</i> , 29, 686-706. Catford, J. A., Downes, B. J., Gippel, C. J. & Vesik, P. A. (2011) Flow regulation reduces native plant cover and facilitates exotic invasion in riparian wetlands. <i>Journal of Applied Ecology</i> , 48, 432-442. Catford, J. A., Morris, W. K., Vesik, P. A., Gippel, C. J. & Downes, B. J. (2014) Species and environmental characteristics point to flow regulation and drought as drivers of riparian plant invasion. <i>Diversity and Distributions</i> , 20, 1084–1096.	Thanks for this suggested change, and associated references. We have included them in the second order draft.
Wang, Xiao-Yi	No	3	56	2045	149	5884	carbon dioxide "CO2" should be changed into "CO ₂ "	Thanks for this comment. We have changed it in the second order draft
Bennett, Jonathan	No	3	56	2050	56	2051	Wouldn't this belong in the previous section? Maybe a better lead sentence than one focusing on nutrient enrichment (eutrophication)?	Thank you very much. A link to the previous section was added, but the sentence was kept as it contributes to explain how vegetation has changed to include invasive alien species as a result of these contaminants.
Eckert, Sandra	No	3	56	2050	56	2055	Is the first sentence of this paragraph part of the study that is presented in the second sentence? All very disconnected. Then on line 2054 the sentence starts with "The study..." which study? The same? All sentences miss references thus all is very unclear.	Thanks for this comment. We have revised the section to improve clarity in the second order draft.
Bennett, Jonathan	No	3	56	2056	56	2059	I wonder whether establishment of non-native species into these unnatural landscapes are really invasions if the native plants aren't really all that good at tolerating these conditions.	Thank you very much for your comment. In the second order draft, "Invasive" was removed and changed to "non-native", and "invasion" was changed to "establishment" to acknowledge that the species might not become invasive.
Tidbury, Hannah	No	3	57	2070		2071	Does this opening sentence need referencing? How does timber fit?	Thanks for this comment. We revised the section to improve clarity in the second order draft.
Tidbury, Hannah	No	3	57	2076	57	2076	Ocean currents and wind - As surface currents are largely driven by wind, suggest replace with ocean current speed and direction?	Thanks for this comment. We have changed it in the second order draft
Catford, Jane	No	3	58	1838	59	1901	see: Brummer, T. J., Byrom, A. E., Sullivan, J. J. & Hulme, P. E. (2016) Alien and native plant richness and abundance respond to different environmental drivers across multiple gravel floodplain ecosystems. <i>Diversity and Distributions</i> , 22, 823-835. Catford, J. A. (2017) Hydrological Impacts of Biological Invasions. <i>Impact of Biological Invasions on Ecosystem Services</i> . (ed. by M. Vilà and P. E. Hulme), pp. 63-80. Springer International Publishing, Cham. Catford, J. A., Downes, B. J., Gippel, C. J. & Vesik, P. A. (2011) Flow regulation reduces native plant cover and facilitates exotic invasion in riparian wetlands. <i>Journal of Applied Ecology</i> , 48, 432-442. Catford, J. A., Morris, W. K., Vesik, P. A., Gippel, C. J. & Downes, B. J. (2014) Species and environmental characteristics point to flow regulation and drought as drivers of riparian plant invasion. <i>Diversity and Distributions</i> , 20, 1084–1096. Dawson, S. K., Catford, J. A., Berney, P., Kingsford, R. T. & Capon, S. (2020) Land use alters soil propagule banks of wetlands down the soil-depth profile. <i>Marine and Freshwater Research</i> , 71, 191-201. Dawson, S. K., Kingsford, R. T., Berney, P., Keith, D. A., Hemmings, F. A., Warton, D. I., Waters, C. & Catford, J. A. (2017) Frequent inundation helps counteract land use impacts on wetland propagule banks. <i>Applied Vegetation Science</i> , 20, 459-467. Dawson, S. K., Warton, D. I., Kingsford, R. T., Berney, P., Keith, D. A. & Catford, J. A. (2017) Plant traits of propagule banks and standing vegetation reveal flooding alleviates impacts of agriculture on wetland restoration. <i>Journal of Applied Ecology</i> , 54, 1907-1918. Greet, J., Cousens, R. D. & Webb, J. A. (2013) MORE EXOTIC AND FEWER NATIVE PLANT SPECIES: RIVERINE VEGETATION PATTERNS ASSOCIATED WITH ALTERED SEASONAL FLOW PATTERNS. <i>River Research and Applications</i> , 29, 686-706. Ruih, A., Catford, J. A., Cross, W. F., Escoriza, D. & Olden, J. D. (2019) Understanding the Nexus Between Hydrological Alteration And Biological Invasions. <i>Multiple Stressors in River Ecosystems</i> . (ed. by S. Sabater, A. Elsegui and R. Ludwig), pp. 45-64. Elsevier. Catford, J. A. & Jansson, R. (2014) Drowned, buried and carried away: effects of plant traits on the distribution of native and alien species in riparian ecosystems. <i>New Phytologist</i> , 204, 19-36.	Thank you very much. We have added some of these references where relevant in the second order draft
Eckert, Sandra	No	3	58	2125	58	2125	"Large fish were found commonly below large plastic bags". I am tempted to say "so what" please elaborate what your message is with this sentence or delete it.	Thanks for this comment. We have revised the section to improve clarity in the second order
Eckert, Sandra	No	3	58	2140	58	2140	"Increased ocean rafting may intensify species invasions..." please adjust the statement to the previous text where is already discussed. The sentence is somewhat disconnected.	Thanks for this comment. We revised the section to improve clarity in the second order draft.
Daguitan, Florence	No	3	58	2145	73		Direct drivers of identified IAS were from human action. Recently in the Cordillera, Philippines (21st century) there are IAS that have no clear identified source or driver. Some people attributed their observations to climate change. An example is the increasing presence of giant earth worms and pin-like worms in the late 1990's in Mt. Province, Philippines. Good to include studies on the effectiveness of natural drivers as it relate to the state of the ecosystems. Is there a relationship between the state of biodiversity and the rapid spread IAS?	Thank you very much. A case study on the Japanese 2011 tsunami was added (Box 3.7) to further discuss natural disasters as vectors, and the section Natural (direct) drivers (3.3.7) discusses further other natural drivers. There is a section on how biodiversity loss contributes to IAS introduction and spread (3.3.6).
Government of Germany	Yes	3	58	2148	68	2506	Many references to climate change throughout the IAS report cite single publications while there are high quality assessments of the current state of knowledge available in recently approved IPCC reports (AR5, SRI 5, SRCLL, SROCC). We strongly recommend citing IPCC sources when making statements on climate change throughout the report. We have indicated such instances in an exemplary manner with comments in specific sections of this fod.	Thank you, we have updated this section in the second order draft
Government of Germany	Yes	3	58	2148	69	2561	The chapter only deals with the direct links between climate change and IAS. But there are also secondary/indirect effects of climate change on IAS which may be relevant to name here too: In order to adapt to climate change and / or as a strategy to mitigate climate change e.g. in forestry alien tree species are used which may become invasive, the same may hold true for agriculture, when e.g. alien grasses are cultivated for biofuel production	Thank you, but these issues are covered earlier in the chapter (governance drivers section for instance)
van Kleunen, Mark	No	3	58	2148	58	2148	In this section on Climate Change, I miss a subsection on the consequences of reduced ice sheets, both on land (Greenland, Antarctica) and the sea.	Thank you, it is covered in "see level rise"
Government of Germany	Yes	3	59	2149	59	2163	This paragraph should include a reference to the latest IPCC reports that gave information regarding the impact of climate change on biodiversity species range shifts: IPCC AR5 WGII, IPCC AR5 Synthesis Report, and IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC).	Thank you, we have updated this section in the second order draft.
Poulet Nicolas	No	3	59	2149	59	2151	The fact that climate change should be considered as a direct driver of introduction of IAS should be discussed: is species that will migrate by their own (i.e. without direct or indirect human help) to escape warming should be considered as IAS? My concern is only about the introduction step: climate change can be considered as a driver of establishment and colonisation of IAS already present in the area.	Thank you for your comment. We follow the categorization of drivers as introduced by previous IPBES assessments (and the conceptual framework) and assess their effect on IAS
Government of Germany	Yes	3	59	2158			It is suggested to replace "mitigation" with "adaptation", since "assisted migration" is considered to be an adaptation strategy and not a mitigation measure	Thank you, but we respectfully disagree and prefer to keep "mitigation" here
Barbosa, Andres	No	3	59	2165	59	2165	Considering that Polar Regions are the place in Earth where temperature increase more and more rapidly, references about the effect on temperature on IAS in these regions should be included.	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	59	2166	59	2184	In this context, you may wish to check whether the following article on the revitalization of soil microbiomes in the cryobiosphere due to thawing / climate change could also be relevant: https://www.frontiersin.org/articles/10.3389/fmicb.2019.00668/full	Thank you for your comment. We have added the reference in the second order draft.
Government of Germany	Yes	3	59	2166	59	2168	This sentence should cite the latest available IPCC assessment and therefore be rephrased as following: 'Global mean surface temperature as measure of climate change is projected to rise between 1.0°C-3.7°C by the end of the 21st century (2081–2100) relative to 1986–2005 depending on how greenhouse gas emissions develop (IPCC, 2014).'	Thank you for your comment. We have revised it in the second order draft.
Mowery, Monica	No	3	59	2166	59	2184	Increased thermal tolerance and plasticity could also be factors in higher invasive species success and reproduction in the face of climate change. Master of all trades: thermal acclimation and adaptation of cardiac function in a broadly distributed marine invasive species, the European green crab, <i>Carcinus maenas</i> Carolyn K. Tepolt, George N. Somero <i>Journal of Experimental Biology</i> 2014 217: 1129-1138; doi: 10.1242/jeb.093849	Thank you for your comment. We have added the reference in the second order draft.
Government of Germany	Yes	3	59	2168			Please remove this citation "IPCC. (2014a)". It is wrongly named "2014a" although published in 2007, and references to it should be replaced by references to the latest available IPCC Assessment Report (AR5) from 2014.	Thank you for your comment. We have revised it in the second order draft.
Gya, Ragnhild	No	3	59	2168	59	2169	I think using a newer references here would be an advantage. It is 11 years since 2009, and a lot has happened with climate change since then.	Thank you for your comment. More recent reference has been added in the second order draft.

Gya, Ragnhild	No	3	59	2169	59	2171	See also this new paper that argues the species richness might decrease with climate warming on a global scale. The author argues that we may be biased towards north-temperate alpine mountaintops where species richness will increase if the elevation gradient is steep enough that plants can migrate and track the climate, but that most other habitats will probably see a decrease in species and functional diversity. Harrison, S. (2020). Plant community diversity will decline more than increase under climatic warming. <i>Philosophical Transactions of the Royal Society B</i> , 375(1794), 20190106.	Thank you for your comment. We have added the reference and revised the text in the second order draft.
Government of Germany	Yes	3	59	2171	59	2173	The latest available IPCC assessment (IPCC, 2014) states low confidence in changes in tropical cyclone activity, therefore please rephrase as follows: 'The warming is associated with other changes of ecosystems as contraction of snow cover, permafrost areas, heat and precipitation extremes (IPCC, 2014) ...'	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	59	2173			Please replace "IPCC (2014b)" by "IPCC (2014)"	Thank you for your comment. All the citations and references have been updated in the second order draft.
Government of Ethiopia	Yes	3	59	2180	59	2184	Could this be range shift? This must apply the same to native species. How to untangle range shift from IAS spread?	Thank you for your comment. As this assessment focus on the invasive alien species, we have not expanded the text to include the range shift of native species.
Government of Germany	Yes	3	59	2180	59	2184	It is suggested to include the following aspect for a more balanced description: 'Climate change is destroying suitable habitat conditions and forcing species to shift their distributional range to now more suitable habitats' (see IPCC AR5 WGII SPM: Paragraph A-1, Figures SPM.5 and SPM.6).	Thank you for your comment. We have revised the text in the second order draft.
Caplat, Paul	No	3	59	2181	59	2181	The effect of temperature could go both ways, the uncertainty of climate effects should be emphasized ("cc enables spread" should be "cc may enable spread"), evidence suggests directional effect but is sparse	Thank you for your comment. We have revised the text in the second order draft.
Government of Germany	Yes	3	60	2185			Figure 3.7: this schematic lists climate change only as "opening new areas". It is therefore suggested to include the following aspect to ensure a more balanced illustration: 'Climate change destroys suitable habitat conditions and forces species to shift their distributional range to now more suitable habitats' (see IPCC AR5 WGII SPM: Paragraph A-1, Figures SPM.5 and SPM.6).	Thank you very much. The text was rephrased in the second order draft as suggested in the review.
Poulet Nicolas	No	3	60	2185	60	2185	Same concern: considering climate change through extreme events, as a direct driver of introduction of IAS implies the fact that species changing their behaviour (e.g. migration routes) to survive to climate change will be considered as IAS. This should be viewed as a natural response of species to a pressure.	Thank you for your comment. As we have a separate section on extreme events, we did not incorporate your comment here in the second order draft.
van Kleunen, Mark	No	3	60	2185	60	2185	Figure 3.7: Climate change may also affect the alien species introduced for cultivation. This is missing in the figure.	Thank you for your comment. As this assessment is based on existing studies and the figure was taken by one of the papers, we have decided not to change it in the second order draft.
Buckley, Yvonne	No	3	60	2186	60	2186	I would like to see schematics like this for each of the drivers indicating which part of the invasion process they influence and how. This would help to connect the sections together into a common framework. The addition of the schematics with associated references may indeed help to reduce the length of the text.	Thank you, a synthesis figure has been added in the second order draft.
Bennett, Jonathan	No	3	60	2193	60	2193	This sentence does not make sense.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
van Kleunen, Mark	No	3	61	2210	61	2211	Other studies, similar to the one of Petitpierre et al., showed climatic niche shifts. Early and Sax 2014 DOI: 10.1111/geb.12208	Thank you for your comment. We have added the reference and revised the text in the second order draft.
Bennett, Jonathan	No	3	61	2215	61	2216	Correct me if I am wrong, but efficiency of Rubisco declines greatly at higher temperatures, which results in poorer performance of C3 plants relative to C4 plants. Can you clarify what you mean here?	Thank you for your comment. We have revised the text in the second order draft.
Government of Germany	Yes	3	61	2215	61	2216	Please explain the difference between C3 and C4 plants (in a footnote).	Thank you very much. Note on the C3 and C4 plants was added to the text. "Terms C3 and C4 plants is used for classifying species that differ in a way of fixation of carbon during the photosynthesis. C3 pathway is less effective. C4 plants include highly productive crops and are common in the grasslands of tropics, subtropics, and warm temperate zones."
Government of Germany	Yes	3	61	2220	61	2221	Kindly check: This statement is not correct in its general phrasing (and the source is 18 years old!). According to the latest IPCC Assessment Report AR5, confidence in observed changes of precipitation is low to medium (IPCC AR5 WGI, SPM B.1); and precipitation changes with increasing temperatures projected for the rest of the century differ across regions (IPCC AR5 WGI, SPM E.2 and Figure SPM.8). Please rephrase in a more differentiated manner.	Thank you, it is rephrased in the second order draft
Bennett, Jonathan	No	3	61	2238	61	2240	I assume that this is because water is typically limiting of primary productivity in these systems, but it is worth stating explicitly.	Thank you for your comment. We have revised the text in the second order draft.
Catford, Jane	No	3	62	2005	62	2010	Seabloom, E. W., Borer, E. T., Buckley, Y. M., Cleland, E. E., Davies, K. F., Finn, J., Harpole, W. S., Hautier, Y., Lind, E. M., MacDougall, A. S., Orrock, J. L., Prober, S. M., Adler, P. B., Anderson, T. M., Bakker, J. D., Biederman, L. A., Blumenthal, D. M., Brown, C. S., Brudvig, L. A., Cadotte, M., Chu, C., Cottingham, K. L., Crawley, M. J., Damschen, E. I., Dantonio, C. M., DeCrappeo, N. M., Du, G., Fay, P. A., Frater, P., Gruner, D. S., Hagenah, N., Hector, A., Hillebrand, H., Hofmoeckel, K. S., Humphries, H. C., Jin, V. L., Kay, A., Kirkman, K. P., Klein, J. A., Knops, J. M. H., La Pierre, K. J., Ladwig, L., Lambrinos, J. G., Li, Q., Li, W., Marushia, R., McCulley, R. L., Melbourne, B. A., Mitchell, C. E., Moore, J. L., Morgan, J., Mortensen, B., O'Halloran, L. R., Pyke, D. A., Risch, A. C., Sankaran, M., Schuetz, M., Simonsen, A., Smith, M. D., Stevens, C. J., Sullivan, L., Wolkovich, E., Wrapp, P. D., Wright, J. & Yang, L. (2015) Plant species' origin predicts dominance and response to nutrient enrichment and herbivores in global grasslands. <i>Nature Communications</i> , 6.	Thank you for this suggested reference. We have included it in the second order draft.
Volpedo, Alejandra	No	3	62	2045	62	2045	The authors should correctly write the formulas of methane and carbon dioxide.	Thank you for your comment. We have revised it in the next draft.
Taki, Hisotomo	No	3	62	2252	62	2252	"Extreme climate events" could be better than "Extreme events"	Thank you for your suggestion. We have chosen to revise the section title in the second order draft.
Tidbury, Hannah	No	3	62	2252	62	2252	Is there controversy on what constitutes a climate event and what constitutes a weather event?	Thank you for your comment. "Weather" means the state of the atmosphere at any given time and place, and "climate" is the long-term average of the weather in a given place. Here, we cannot add additional text to the chapter due to word length restrictions.
Government of Germany	Yes	3	62	2253	62	2255	Please rephrase using the definition given in: Glossary [Weyer, N.M. (ed.)]. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In Press Annex II: IPCC, 2019: "An extreme climate event is the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as 'climate extremes' (IPCC, 2019)." It would be helpful to then consistently use "climate extreme"	Thank you for your suggestion. We have revised the definition and have rephrased 'extreme climate event' as 'climate extremes' throughout in the second order draft.
White, Michael	No	3	62	2253	62	2266	Also refer to IPCC Cryosphere and Oceans report	Thank you for your suggestion. We have added the reference in the second order draft.
Government of Germany	Yes	3	62	2256	62	2257	ENSO (El Niño Southern Oscillation) is a coupled atmosphere-ocean phenomenon, with preferred time scales of two to about seven years, not an extreme weather event per se (see Annex in IPCC 2014) - please delete.	Thank you for your suggestion. We have removed ENSO in the second order draft.
Government of Germany	Yes	3	62	2257	62	2259	Please correct this quote: "Changes in extreme events..." (IPCC, 2014)	Thank you for your comment. We have revised in the second order draft.
Poulet Nicolas	No	3	62	2260	62	2266	Even Though extreme events are expected to increase with climate change, they are natural events and should be not considered as a driver of introduction of IAS.	Thank you for your comment. We have chosen to hold this section because some of changes in extreme climate events have been linked to human activities. We have added this point in the second order draft.
Feest, Alan	No	3	62	2269	62	2269	these are vertebrates not invertebrates	Thank you for pointing out a typo. We have corrected in the second order draft.
van Kleunen, Mark	No	3	62	2269	62	2270	The examples are vertebrates, not invertebrates.	Thank you for pointing out a typo. We have corrected in the second order draft.
White, Michael	No	3	62	2285	62	2287	Mention Australian wildfires 2019 and USA wildfires 2020 (already in 3.3.4.5)	Thank you for your comment. We have added it to the second order draft.
Hughes, Kevin	No	3	63	2292	63	2294	The example of the kelp transported to the near shore Antarctic environment from lower latitudes is an example of natural dispersal, which has probably been occurring for thousands of years, probably much longer. It seems a little out of place here, with the examples provided before and after detailing the effects of extreme weather events on farmed and/or caged fish, which are presumably there due to human activities. If you want to use the kelp example, you could suitably well use the example of aerobiological transport of propagules to Antarctica from South America by storms - see Marshall, W.A. (1996) Biological Invasions: A Contradiction to state in one sentence, that an increase of CO2 leads to a preference of C4 alien plant species and in the next sentence "... the available CO2 favours species with C3 over C4 photosynthesis?" Maybe the sentence could be rephrased in order to make the essence more visible.	Thank you for your comments, but we have chosen to hold this reference. We feel this is important evidence.
Government of Germany	Yes	3	63	2309	63	2314	Isn't it a contradiction to state in one sentence, that an increase of CO2 leads to a preference of C4 alien plant species and in the next sentence "... the available CO2 favours species with C3 over C4 photosynthesis?" Maybe the sentence could be rephrased in order to make the essence more visible.	Thank you for your comment. We have revised it in the second order draft.
van Kleunen, Mark	No	3	63	2311	63	2312	The "preference of C4 alien plant species" contradicts the statement in the subsequent sentence, and is therefore confusing. I had a look at Nowak et al., and did not find support for the "preference of C4 alien plant species" statement there.	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	3	63	2313	63	2313	"... the available CO2 favours species with C3 over C4 photosynthesis..." this is contradictory to the statement in the previous sentence "...leading to preference of C4 alien plant species..."	Thank you for your comment. We have revised it in the second order draft.
Bennett, Jonathan	No	3	63	2315	63	2316	But most of these grasses are C3 grasses, which doesn't really work with the previous comment that increased CO2 should favour C4 plants. Why would these species do better?	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	3	63	2315	63	2316	Regarding fertilization effects in drylands, you may wish to analyse ch 3 of the recently approved IPCC special report on "climate change and land" (2019): https://www.ipcc.ch/site/assets/uploads/sites/4/2019/11/06_Chapter-3.pdf	Thank you for your comment. Due to the word limitation, we could not include enrichment here, however, it is dealt specifically in the nutrient chapters e.g. 3.3.3.1. of the second order draft.
White, Michael	No	3	63	2329	63	2332	Johnson J, Bell J, Gupta AS (2016) Pacific islands ocean acidification vulnerability assessment. <i>Apia, Samoa, SPREP</i> . 40pp.	Thank you for your comment. We have added the reference to the second order draft.
White, Michael	No	3	64	2338	64	2347	Lamb et al (2018) Plastic waste associated with disease on coral reefs. <i>Science</i> 359: 460-462	Thank you for your comment. Due to the word limitation, the suggested reference can not be included in the second order draft.
Girod, Christophe	No	3	65	2387	65	2393	Another well-documented example is Melaleuca quinquenervia, an IAS which favors and is favored by fire in savannas (for instance in French Guiana or in the USA)	Thank you for this suggestion. We added the references as another example of fire-feedbacks driving invasions in the second order draft.
Government of Germany	Yes	3	66	2423	66	2434	Climate-fire relationships are complex, as already mentioned in this subchapter's final paragraph. As an additional information, it would be possible to add a short remark about the positive feedback of peat fires accelerating climate change through the massive CO2-emissions from burning peatlands (see e.g. Global Peatland Initiative 2017, p. 30: https://url.grida.no/ZD46f). However, this might not be strictly related to invasive alien species.	Thank you for your comment. Given that this content is not strictly related to IAS and due to word length restrictions, we have decided not to mention this example.
Government of Germany	Yes	3	66	2437	66	2442	Please include a reference to the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC), Chapter 4 (https://www.ipcc.ch/srocc/) as the primary source on sea level rise and climate.	Thank you for your comment. The reference has been added to the text in the second order draft.
White, Michael	No	3	66	2437	66	2439	Melting permafrost?	Thank you for your comment. This additional cause has been added to the second order draft.
Eckert, Sandra	No	3	67	2490	67	2493	"Unfortunately, limited resources..." Previous to this sentence an introducing sentence might be needed. It is unclear what, who and where (globally)??	Thank you for this suggestion, an introductory sentence has been included in the second order draft.
Government of Germany	Yes	3	67	2490	67	2493	This sentence is not easily understandable. I assume it means that management of IAS on islands will focus on those less prone to inundation, but a clearer formulation would be appreciated.	Thank you for your comment, we have revised the paragraph in the second order draft.
Government of Germany	Yes	3	67	2495	67	2496	Here, it should be specified that primarily coastal and marine invasion pathways are affected by sea level rise, not "all aspects".	Thank you for this suggestion. We have clarified the sentence in the second order draft.
Catford, Jane	No	3	68	2210			see synthesis/review: Catford, J. A. & Jones, L. P. (2019) Grassland invasion in a changing climate. <i>Grasslands and Climate Change</i> . (ed. by D. J. Gibson and J. A. Newman), pp. 149-171. Cambridge University Press, Cambridge.	Thank you very much for such reference. Due to word limit, we were able to show only some main take home messages from the reference.

Zuppinge-Dingley, Debra	No	3	68	2508	2561	69	Section 3.3.4.7 Assisted Colonisation could be developed further, especially for policymakers. An e.g., of this could be the current COVID-19 pandemic and this could be used as a cross-cutting theme covering the importance of issues related to spread and control of diseases.	Thank you for the comment. We agree that this topic (like several others in this chapter) could potentially be expanded further, but cannot be done here, owing to word length restrictions.
Brooks, Thomas	No	3	68	2511	68	2511	Cite IUCN/SSC (2013) "Guidelines for reintroductions and other conservation translocations" here (https://portals.iucn.org/library/node/10386)	Thank you for the reference, but we do not think it is necessary to add it here.
Pan, Xubin	No	3	68	2516	68	2517	Same as the P69L2551-P69L2552.	Thank you for your comment. The text has been revised to removed this redundancy in the second order draft.
Kühn, Ingolf	No	3	69	2269	69	2270	Green Iguana and Cuban treefrog are vertebrates, not as stated invertebrates!	Thank you for pointing out a typo. We have corrected in the second order draft.
Bennett, Jonathan	No	3	69	2550	69	2552	This sentence is nearly identical to the one at lines 2516-2517.	Thank you very much. The text has been revised to removed this redundancy in the second order draft.
Tidbury, Hannah	No	3	69	2573	69	2573	Alien species rather than nonindigenous for consistency?	Thank you for our response. We have checked throughout chapters for consistency in the second order draft.
Buckley, Yvonne	No	3	69	2576	69	2576	What about plant-fungal mutualisms? e.g. Dickie et al 2010 https://nph.onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2010.03277.x	Thank you for your suggestion. We have added this relevant example in the second order draft.
Volpedo, Alejandra	No	3	70	2308	71	2347	The authors should correctly write the chemical formulas	Thank you for your comment. We have revised it in the next draft.
Kühn, Ingolf	No	3	70	2321	70	2321	Körner -> Körner	Thank you for your comment. We have revised it in the second order draft.
Girod, Christophe	No	3	70	2573	70	2588	An interesting study has been conducted on an invasive bird in Reunion Island, which facilitates the dissemination of some invasive plant species: Mandon-Dalger, I., Clergeau, P., Jacques Tassin, Jean-Noël Rivière, & Sylvain Gatti. (2004). Relationships between Alien Plants and an Alien Bird Species on Reunion Island. <i>Journal of Tropical Ecology</i> , 20(6), 635-642. Retrieved October 17, 2020, from http://www.istor.org/stable/4092109	Thank you for this suggestion. As we should keep each section succinct, after reading the article, we have decided to focus on overall patterns drawn from published reviews, and selecting only very high-profile case studies to illustrate biotic facilitation and invasional
Feest, Alan	No	3	70	2577	0	0	Fungi are not plants	Thank you for your comment. We have amended this error in the second order draft.
White, Michael	No	3	70	2590	70	2597	Can we mention covid-19 somehow?	Thank you very much. The concept of Kellert is certainly complex, but we just give a
Bennett, Jonathan	No	3	70	2599	70	2601	I don't understand this sentence.	The sentence was reword for clarity in the second order draft
Buckley, Yvonne	No	3	70	2599	70	2599	The first part of this sentence is very unclear to me.	Thank you very much. The sentence was reword to improve clarity in the second order draft.
Bennett, Jonathan	No	3	71	2630	71	2646	I find this section fails to take account for antagonistic interactions among invaders. Many invasive plants compete for the same set of limiting resources. They may also modify the environment in different ways. For example, invasive C3 grass and invasive forb species may have opposing effects on soil microbial community structure, whereas different invasive forb species may have similar effects (Lekberg et al. 2013 ISMEJ). Whether these changes actually limit or enhance invasion by either species is unknown; however, I think it is worth pointing out that interactions among IAS need not be either positive or neutral as again %s without the real data are not good practice.	Thank you for making this point. However, this subsection focuses on interactions that facilitate invasions, hence antagonistic interactions are not relevant.
Feest, Alan	No	3	71	2639	71	2639	Figure 3.8: Modifying the figure by adding + or -, or using different colours for positive and negative interactions would make it easier to see the directions of the interaction pathways.	Thank you, it is rephrased in the second order draft
van Kleunen, Mark	No	3	72	2647	72	2647	This part should also address others issues due to IAS management.	Thank you for this suggestion. The complete Figure was removed in the second order draft.
Poulet Nicolas	No	3	72	2659	72	2659	This is typically the case with overcompensation as a response of the population to the management. Many studies shows how harvest modifies the traits of invaders and how these changes could modulate their ecological impacts. Závorka, L., Lang, I., Raffard, A., Evangelista, C., Britton, J. R., Olden, J. D., & Cucherousset, J. (2018). Importance of harvest-driven trait changes for invasive species management. <i>Frontiers in Ecology and the Environment</i> , 16, 317–318. Broadly speaking, unsuitable IAS management has negative consequences with the maintain or the explosion of the population. E.g. many examples show how unsuitable transport and/or stocking of IAS green waste could lead to new invasions. Sarat, E., Mazaubert, E., Dutartre, A., Poulet, N. et Soubeiran, Y. (2015a). Invasive alien species in aquatic environments. Practical information and management insights. Volume 1. Practical information. Onema. Series Knowledge for action. 252 pp. http://especies-exotiques-envahissantes.fr/group-activities/best-practices-guide/?lang=en Finally, the use of IAS (e.g. commercial use) as control strategy should also be addressed since many examples suggest that it could increase the risk of invasion. See IUCN French Committee. 2018. Making use of invasive alien species settled in natural environments. An effective approach to management? An initial analysis and discussion of points requiring attention. France. 84 pages http://especies-exotiques-envahissantes.fr/wp-content/uploads/2019/07/mgmt-guide-	Thank you for your comment, management is addressed in Chapter 5 and impacts are covered in Chapter 4.
Eckert, Sandra	No	3	72	2660	73	2685	Please add the year of release for all examples of biocontrol releases to understand that these examples are rather dating back to the early days of biocontrol.	Thank you for your comment. Due to the word limitation, we have decided not to include the year of release for the examples.
Mc Kay, Fernando	No	3	72	2669	73	2679	At present, classical biological control is practiced under rigorous risk assessment procedures, and needs to be clearly distinguished from non-scientific "biological control" initiatives (e.g. vertebrates to control vertebrates; the cane toad to control the insect pest of sugarcane; snail to control snail). Personally, I think that citing all those historical cases under the term biological control, affect the reputation of the scientific biological control, especially among the general public and/or policy makers that read this wide distributed reports. I think that in Chapter 5 (Management: Lessons Learned), same examples are cited under Classical Biological control of invasive alien plants and invertebrates, but clearly defined (Chapter 5, page 81, lines 2843-45: "One of the key tenets of contemporary CBC (as opposed to the historical uses of generalist agents such as the cane toad) is that the agents are selected based on a very high degree of target specificity". Also in chapter 5, pages 132-133, lines 4591-4595 scientific biological control is clearly distinguished from releases of generalist predators "Historically there have been a small number of high profile early cases of negative direct impacts upon non-target native species from released generalist predatory 'biocontrol agents' (e.g. the release of cats and mongoose on islands and cane toads against agricultural pests). These were all at a time when the concept of biological control was applied in an unregulated way, that is there was no required risk assessment".	Thank you for the comment. This needs a cross chapter discussion to see what can be done
White, Michael	No	3	73	2676	73	2678	The snakes were also introduced (Hawaiian goose egg predation by rats)	Thank you, this has been revised accordingly in the second order draft.
Buckley, Yvonne	No	3	73	2685	73	2685	See Carvalho et al 2008 for an example of indirect impacts of an introduced and highly specific biocontrol agent through apparent competition with natives https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1461-0248.2008.01184.x	Thank you very much, impacts are covered in Chapter 4
Buckley, Yvonne	No	3	73	2700	73	2700	I would argue that there are examples of where other management practises (herbicide, physical control, fire etc.) create disturbances in an ecosystem that lead to reinvasion of the same or a different IAS - see Buckley et al. for a theoretical model https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1461-0248.2007.01067.x but which also includes examples of this effect. See Lindenmeyer et al 2015 for an example of where management of an IAS can lead to disturbances that promote reinvasion https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0128482	Thank you for the comment. The other types of management are addressed in other chapters.
Feest, Alan	No	3	73	2707	73	2707	What is meant by "biodiversity loss"? It needs explanation.	Thank you very much. IPBES defines biodiversity loss as the reduction of any aspect of biological diversity (i.e. diversity at the genetic, species and ecosystem levels) is lost in a particular area through death (including extinction), destruction or manual removal; it can refer to many scales, from global extinctions to population extinctions, resulting in decreased
Government of Ethiopia	Yes	3	73	2707	74	2763	This could also relate to ecosystems degradation. Indicating this link may be needed here.	Thank you, but we feel the current phrasing includes ecosystem degradation
Buckley, Yvonne	No	3	73	2709	73	2709	I would like to see a concentration in this section on the different functional mechanisms for how biodiversity affects the different stages of invasion, for example see Divisek et al 2018 https://www.nature.com/articles/d41467-018-06995-4 for how environmental filtering and extremes in trait space are important for establishment and increase of IAS. By "biodiversity" I think you implicitly mean native biodiversity, either make this explicit or you need to nest other drivers such as invasional meltdown within the biodiversity driver.	Thank you, we have added more details on each drivers at each invasion stage, in general.
Eckert, Sandra	No	3	73	2726	73	2727	"... which correlated with species richness" please specify if it correlated negatively or positively with species richness.	Thank you for your comment. Correlated "negatively" and added in the second order draft.
Catford, Jane	No	3	74	2491	74	2491	prioritised for what?	Thank you for your comment. We have revised the paragraph in the second order draft.
Bennett, Jonathan	No	3	74	2715	74	2721	This is an overly simplified perspective on how invasion relates to diversity. Diverse communities can represent communities where most niches are full and; however, they can also represent communities that have a greater number of potential niches. Without knowing what the potential diversity is for a site, correlations between species richness and invasion or biotic resistance can go in any direction (Shea and Chesson 2002 TREE, Fridley et al. 2007 Ecology, Bennett et al. 2016 Ecology Letters). Further, the potential for invasion is going to depend on which species are present in the community, perhaps more so	Thank you very much for your comment. The relationships between species richness, invasion potential, and biotic resistance are indeed diverse, but here we present examples of typical relationships between species richness and biotic resistance.
van Kleunen, Mark	No	3	74	2715	74	2717	A biodiversity-ecosystem functioning meta-analysis by Balvanera et al. 2006 also found that invasion resistance increased with diversity of the community. Balvanera et al. (2006) doi: 10.1111/j.1461-0248.2006.00963.x	Thank you, this is covered in Maron and Marler 2007
van Kleunen, Mark	No	3	74	2720	74	2720	What is community-wide abundance? Plant cover?	Thank you very much. This is changed to "plant cover in the community" in the second order
van Kleunen, Mark	No	3	74	2727	74	2729	This sentence is not clear. Note, that Feng et al. 2019 showed that in a mesocosm experiment the effects of alien-native phylogenetic and multivariate functional distance on performance of the aliens became stronger as diversity increased. Feng et al. 2019 DOI: 10.1111/1365-2745.13061	Thank you very much. The description was changed in more detail.
Caplat, Paul	No	3	75	2765	75	2765	check overlap with section 3.3.4.3 on CC-induced extreme events	Thank you, we have revised both sections in the second order draft
Poulet Nicolas	No	3	75	2765	75	2765	According to IPBES, IAS is defined as a species whose introduction and/or spread by human action outside their natural distribution threatens biological diversity, food security, and human health and well-being. By definition, "natural drivers" are not a "human action" and should not be considered as IAS introduction drivers.	Thank you for your comment. We follow a strict definition of invasive alien species that includes HUMAN ACTION in the introduction of a species to a new region outside of the species natural range. Therefore, we do not include species that have expanded or changed their natural range in response to climate change. However, we do consider the role of "natural drivers" e.g. extreme climate events as important in spreading invasive alien species to new regions from an existing invaded range. As an example the arrival of a new species of damselfly to the UK from its native range in mainland Europe as a consequence of being blown across the channel would not be defined as an alien species. In contrast a pet green iguana escaping from captivity on one Caribbean territory, which is not the natural range, and then arriving in another Caribbean territory as a consequence of movement during a hurricane
Tidbury, Hannah	No	3	75	2765	75	2765	Quite a bit of overlap between this section and the extreme events section.	The two sections have been rewritten in the second order draft. Some redundancies are inevitable given that climate (including extreme weather events) is a major 'natural' driver of species spread and colonisation success.

Eckert, Sandra	No	3	75	2766	75	2768	"Finally..." this 3-line sentence is a repetition and doesn't fit here. I suggest deleting it.	Thank you. The statement has been edited in the second order draft.
van Kleunen, Mark	No	3	75	2766	75	2768	It might be good to point out that these natural dispersal events are not invasions in that the species are not moved by humans. However, these events might still be invasion relevant when it helps IAS to extend their non-native ranges. Furthermore, one could argue that the frequency of some of these extreme events might increase as a consequence of human-caused climate change.	Thank you very much. The term 'invasion' has been changed to 'colonisation' in this section, and where appropriate in the second order draft
Barbosa, Andres	No	3	75	2778	75	2778	... and Antarctica (Hughes et al. 2020, Invasive non - native species likely to threaten biodiversity and ecosystems in the Antarctic Peninsula region. <i>Global Change Biology</i> 26: 2702-2716.	Thank you very much. This reference has been added in another section in the second order draft
Wang, Xiao-Yi	No	3	76	2814	76	2814	Are there any dependable evidence or cases on bio-invasion events by hurricanes?	Thank you for your comment. All the citations are from some of the existing studies on the
Hughes, Kevin	No	3	76	2824	76	2826	I wonder if it is fair to say "If temperate-adapted taxa disperse to Antarctic waters frequently, global warming could allow the region to become colonized by diverse new species delivered via ocean rafting, especially during storms". It might be an overstatement to say that the region will be colonised by diverse new species, as they will already have been selected by (i) being temperature adapted and (ii) being adapted to survive long periods rafting on, e.g. kelp. These factors are likely to severely limit the range of species able to get to Antarctica in a viable state as well as colonise the region.	Thank you for your comment. We have revised it in the second order draft.
Spehn, Eva	No	3	76	2832	2840	77	Section 3.4 Multiple, additive or interacting effects among drivers: Recommend looking at a study in Switzerland on harmful subsidies. Potentially split chapter 3.4 into two chapters. One looking at interactions between drivers and the second looking at feedback loops.	Thank you for your comment, we have chosen other case studies, minding regional balance in the choice of our examples
Government of Ethiopia	Yes	3	76	2834	77	2838	Not complete.	Thank you for your comment. We have updated them in the second order draft.
Rüegg, Simon	No	3	76	2853	78	2855	This figure is enlightening and in my view very important for effective policies. I think, it aligns very nicely with risks arising from emerging infectious diseases, where the spillover from wildlife to domestic or human would be interpreted as an "uptake" phase. An explanatory caption would be helpful to	Thank you, this section and figure have been updated and better explained in the second order draft.
Government of Germany	Yes	3	77	2845	77	2845	Please check if a reference to Figure 3.9 could be integrated in the text (esp. concerning the level of confidence).	Thank you, this has been fixed in the second order draft.
Rüegg, Simon	No	3	77	2853	78	2854	Table 3.4 is helpful, perhaps introduce table 3.4 earlier in the document as it clarifies some questions on the impacts of drivers on the different stages of	Thank you, this table (now figures) is a synthesis and emerges from the findings of previous
Buckley, Yvonne	No	3	78	2854	78	2854	These synthesis figures and tables are definitely needed. See my previous comment about perhaps using a schematic along these lines for each driver as you go through the sections. Given that the assessment of each driver is not completely systematic it needs to be emphasised that these will be qualitative assessments. Indeed some conclusions may be that systematic quantitative assessments are needed to resolve the influence of some drivers.	Thank you for your comment, agreed.
Kühn, Ingolf	No	3	80	2690	80	2700	In addition, biocontrol organisms released recently might not have had the chance to cause non-target impacts, while organisms of earlier biocontrol programmes had longer time to overcome a potential lag phase.	Thank you for your comment. As the assessment is based on the existing studies and evidences, without the paper, we could not incorporate this in the second order draft.
Catford, Jane	No	3	80	2707	80	2709	would be nice to have more recent papers in addition to Levine. There are many examples, including: Catford, J. A., Dwyer, J. M., Palma, E., Cowles, J. M. & Tilman, D. (2020) Community diversity outweighs effect of warming on plant colonization. <i>Global Change Biology</i> , 26, 3079-3090. (includes framework) Pinto-Ledezma, J. N., Villalobos, F., Reich, P. B., Catford, J. A., Larkin, D. J. & Cavender-Bares, J. (2020) Testing Darwin's naturalization conundrum based on taxonomic, phylogenetic, and functional dimensions of vascular plants. <i>Ecological Monographs</i> .	Thank you, but due to length restrictions, we decided not to add these references as we think the points are covered in Levine et al. 2004
Kühn, Ingolf	No	3	82	2770	83	2830	In this sub-chapter a clear distinction to genuine natural range dynamics based on genuinely natural dispersal events is missing. These have always occurred and will hopefully always occur, despite being rare (as mentioned). Therefore, I would argue that the examples given here are NOT examples of invasions, but those of natural range dynamics. A good exception is the one by Carlton et al. (2017); Bellingham et al. (2005) can count as natural, I would argue. More on the interface between the two extremes is the concept of neonatives, not mentioned at all: Eszl F, Dullinger S, Genovesi P, Hulme PE, Jeschke JM, Katsanevakis S, Kühn I, Lenzner B, Pauchard A, Pyšek P, Rabitsch W, Richardson DM, Seebens H, van Kleunen M, van der Putten WH, Vilà M, Bacher S (2019) A Conceptual Framework for Range-Expanding Species that Track Human-Induced Environmental Change. <i>BioScience</i> 69: 908-919. doi: 10.1093/biosci/biz101.	Thank you very much. The term 'invasion' has been changed to 'colonisation' in this section, where appropriate in the second order draft.
Feest, Alan	No	3	83	2808	83	2808	You might mention the work of Hannah Bonsey Suthers who showed repeated colonization by Dictyostelids each year via bird migration to the USA. They were eliminated each year by frost but that might change?	Thank you, we have added this reference in the second order draft.
Kühn, Ingolf	No	3	96	3363	96	3364	Check author names for diacritic letters (also throughout the text!), --> Jarošik, Kühn, Vilà, Pyšek	Thank you for your comment, diacritic letters have been corrected in the second order draft.
Kühn, Ingolf	No	3	99	3553	99	3553	Korner --> Körner	Thank you for your comment, diacritic letters have been corrected in the second order draft.
Kühn, Ingolf	No	3	111	4146	111	4147	Check author names for diacritic letters (also throughout the text!), --> Pyšek, Jarošik, Kühn, Vilà.	Thank you for your comment, diacritic letters have been corrected in the second order draft.
Kühn, Ingolf	No	3	112	4558	112	4559	Check author names for diacritic letters (also throughout the text!), --> Pyšek, Jarošik, Kühn, Vilà.	Thank you for your comment, diacritic letters have been corrected in the second order draft.
Kühn, Ingolf	No	3	119	4545	119	4548	Merge Vilà & Ibanez with Vilà & Ibanez	Thank you for your comment, citations have been revised and harmonized in the second order
Mc Kay, Fernando	No	3	123	4963	123	5005	Line 4968, Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently re-circumscribe to include Eichhornia species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commelinales) sheds light on the necessity of its re-circumscription and synopsis of Pontederia L. <i>Phyto Keys</i> 108: 25–83. doi: 10.3897/phytokeys.108.27652	Thank you, this has been harmonized in the second order draft.
Kühn, Ingolf	No	3	124	4775	125	4775	Kühn --> Kühn	Thank you for your comment, diacritic letters have been corrected in the second order draft.
Government of Portugal	Yes	3		173		175	Should not sleeper species also be mentioned in relation to climate change? According to Steven D. Frank and Michael G. Just (Can Cities Activate Sleeper Species and Predict Future Forest Pests? A Case Study of Scale Insects. <i>Insects</i> 2020, 11, 142: 1-16) "sleeper species" are defined as "(...) innocuous native or naturalized species that exhibit invasive characteristics and become pests in response to environmental change."	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Tidbury, Hannah	No	3		407		408	Is there a reference for the sentence starting 'information on already...?'	Thank you for your comment. We have updated the reference in the second order draft.
Tidbury, Hannah	No	3		872		878	Also lack of understanding and evidence with respect to the impacts of IAS. How do you attribute the effect seen to the IAS within constantly shifting environments and ecosystems?	Thank you for your comment. We think that the inability to accurately grasp changes in the environment itself is a driver for the introduction of IAS.
Government of Portugal	Yes	3		1402		1403	According to Steven D. Frank and Michael G. Just (Can Cities Activate Sleeper Species and Predict Future Forest Pests? A Case Study of Scale Insects. <i>Insects</i> 2020, 11, 142: 1-16) "Most herbivorous arthropods are not pests. They are background herbivores that contribute to the biodiversity and functioning of ecosystems. Yet, native and exotic sleeper species are a growing threat to forests and other ecosystems with continued warming." Should these sleeper species	Thank you for your valuable opinion. However, we were unable to reflect your opinion because we have decided not to address the issue of global warming here.
Government of Portugal	Yes	3		1458		1458	If you are speaking about the biodiversity of an area you can only take into consideration the native species of that area. It is incorrect to apply species diversity to the total number of species and include alien species, whether invasive or not.	Thank you for your comment. We have revised it in the next draft.
Government of Portugal	Yes	3		1467		1469	The barriers resulting from the artificial fragmentation of aquatic environments lead to changes in water flow and interruptions in the free movement of native species, that is, it has a negative (barrier) effect on these species.	Thank you for your comment. We have revised it in the next draft.
Government of Portugal	Yes	3		1979		1979	Occurrences of blooms of the red water fern <i>Azolla filiculoides</i> are driven, among other factors, by high concentrations of phosphorus in impounded rivers and in still waters. (Confederación Hidrográfica del Taño, 2009. Estudios sobre los crecimientos masivos de <i>Azolla filiculoides</i> en el embalse de Cedillo.	Thank you for this suggested change and associated reference. We have included it in the second order draft.
Rüegg, Simon	No	3					Current health challenges such as antimicrobial resistances and emerging infectious diseases (e.g. COVID), are being addressed primarily with direct mechanistic approaches, e.g. genetically modified phages, gm viruses, gm insect vectors which potentially result in unintended further loss of biodiversity.	Thank you very much. We refer here to the classification of Kellert as a simple type. Kolsch (2020) is quoted in the previous paragraph.
Rüegg, Simon	No	3					There is a gap in pointing out important financial drivers such as the way the WTO allows and prohibits economic action, the way globalised food chains channel finances towards land degradation, the way subsidies and laws frame agricultural practice and define what is profitable and what isn't. I.e. the set of rules driving human behaviour defines the impact on ias. Potential experts I could recommend would be Barbara Häslér, Royal Veterinary College, London (food chains); Maurizio Ararande, University of Bologna, Jonathan Rushton, University of Liverpool (agricultural economics); Erik Gomez-Baggethun, Norwegian University of Life Sciences (environmental economics).	Thank you very much. These are valuable points and appear important in driving biodiversity loss. However, the direct evidence for these acting SPECIFICALLY on biological invasions is very limited and would require a certain amount of speculation to include in Chapter 3.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	4	0	0	0	0	Impacts come from a complex web of interactions between environmental and social processes, including community adaptation and government regulations which can constrain adaptation. The assessment could recognize and discuss this complexity. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you. Chapter 1 now includes a section on social and ecological complexity in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	4	0	0	0	0	Impacts come from a complex web of interactions between environmental and social processes, including community adaptation and government regulations which can constrain adaptation. The assessment could recognize and discuss this complexity. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you. Chapter 1 now includes a section on social and ecological complexity in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	4	0	0	0	0	The chapter could consider if IAS are changing the relationship of IPLCs and nature in sacred landscapes.	Thank you, agreed
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	4	0	0	0	0	The chapter could consider if IAS are changing the relationship of IPLCs and nature in sacred landscapes.	Thank you, agreed

Dannunc, João	No	4	0	0	0	0	Human activities that result in introduction of exotic species and, in some cases, invasion of biological systems from different angles. A large number of laws sectors of agriculture, fisheries, forestry, industry, research, transport, trade (environmental management and nature conservation deal with different aspects of the subject, often from perspectives many different. Your country's policies and plans for economic development, regional cooperation, use water and soil welfare will be relevant along with in general tax regime, public spreading, administrative organizations property rights and also animal welfare. At the international level, the web of organizations and instruments that deal with some aspects of species invasive exotic species are equally extensive. The issue affects a country's relationship with its neighbors, the region in general and its trade partners because invasive species can trigger environmental, social or economic problems across borders. In the last decade, together with increasing awareness of the scale of the problem, there has been recognition in the international community of the need to develop healthy strategies, legal frameworks and management plans to deal with this shared threats. Existing national systems often do not work effectively due to the fragmented form in which that questions about invasive alien species are addressed. Despite many countries have made significant progress in the development of basic information services, very more needs to be done to equip each county with an efficient legal framework to deal with problem in a sustainable and efficient manner. THE TOOLS - the material provides a practical resource prepared for specific issues and associated legal challenges prevention and control of invasive alien species. Contain examples and background to support and inform real policies, planning and management. The main purpose of this material is to provide an easy-to-use-guide for strengthening national policies and institutional structures in this area. Provides a detailed guide on how to popularize species exotic invasions in planning an policies and the draft new ones include legislations for all prevention and management aspects. However, no plan is proposed. Countries need to find the best way forward for your own needs, depending on your biological situation, the status of invasive species science and the way in which the national legal systems already operates. The primary audience for this material should certainly include: a) Governments seeking to develop policies for invasive alien species and strengthen applicable legislation; b) National legislations charged with reviewing and formulating such legislations; c) Legislators, ministries, decision makers and others which need to understand and negotiate such legislation	Thank you for your comment. The assessment addresses the invasive alien species-related aspects raised in the comment
Dannunc, João	No	4	0	0	0	0	Humankind is at a crossroads, warn UN biodiversity Panorama report. The fifth UN Global Biodiversity report describes eight major transitions necessary to slow the halt nature's rapid decline. Final report on the Aichi Biodiversity Goals, defined in 2010, points out that six of 20 global goal were partially achieved by 2020; Towards a new post-2020 biodiversity framework: GBO-5 summarizes the scientific basis for urgent action; Highlights include: extinctions avoided by conservation, more land and protected areas, fish stocks recover with good fisheries management. Montreal, September 15, 2020- Despite advances in several areas, the natural world is suffering and its situation is getting worse, warns a new UN report that points to the urgency of implementing eighth transformative change to ensure human well-being and save the planet. The report is released as the COVID-19 pandemic challenges people to rethink their relationship with nature and to consider the profound consequences for their own well-being and survival resulting from the confirmed loss of biodiversity and the degradation of ecosystems. The fifth Global Biodiversity Panorama (GBO-5) report, published by the United Nations Convention on Biological Diversity (CBD), offers an overview of state of nature, summarizes progress towards the achievement of the 20 Aichi agreed in 2010, an offers lesson learned and good practices to improve performance. "This emblematic report highlights that humanity is at crossroads with regard the legacy it wishes o leave for future generation", said CDB Executive Secretary Mauma Mrema. "Many good things are happening around the world and they must be deliberated the encouraged. However, the rate of biodiversity loss is unprecedented in human history and pressure are intensifying. The living systems of the Earth as a whole are being compromised and the more humanity explores nature in unsustainable way an harms its contributions to people, the more we damage our own well-being, security and prosperity", added Mrema. "as nature is degraded, new opportunities arise for the spread of devastating diseases, such as COVID-19. We have little time available, but the pandemic has also shown that transformative changes are possible when needed". "The decisions and level of action we take now will have profound consequences- for better or worse- for all species, including ours", concluded Mrems. With to the Aichi Goals established in 2010, an analysis on the sixth set of national reports for the CBD and the latest scientific findings show that seven of the 60 elements - success criteria- that make up the 20 goals have been achieved and another 38 show progress or a detour from the target was indicated. In addition, the level of progress is unknown in two elements. The report concludes that, in the, of the 20 targets, six (9,11,16,17,19 and 20) were partially achieved within the 2020 deadline. The Global Biodiversity panorama considers as partially achieved those goals in which at least one element has been achieved. For example, the elements of Goal 11 on the proportion of habitat land and areas were met, but the elements related to quality of protected areas were not. Likewise, for Goal 19, knowledge of biodiversity, has improved, but	Thank you. This assessment is being developed in this context.
Dannunc, João	No	4	0	0	0	0	National reports to the CBD offer evidence that the necessary transitions to advance biodiversity protections have already begun and that virtually all countries are taking action. GBO5 cites several national actions and programs as an example, without which conditions would certainly be worse (extinction would be greater, for example). In addition, deforestation rates continue to fall, the eradication of invasive alien species from the islands is increasing and awareness of biodiversity appears to be increasing. "The actions that have been taken need to be significantly expanded, stopped being driven by projects and become systemic and expanded", says Mrema. "Furthermore, the gaps in national ambitions and action need to be filled. This report appeals for a change from business as usual in a series of human activities through eight transition that recognize the value of biodiversity, the need to restore the ecosystems on which all human activity depends and the urgency to reduce the negative impacts of such activity: 1) Land and forest transition: conserve ecosystems intact, restore ecosystems, combat and reverse degradation and explore spatial planning at the landscape level to prevent, reduce and mitigate land use changes; 2) Transition to sustainable agriculture: redesign agricultural systems using agro-ecological and other innovation approaches to increase productivity while minimizing negative impacts on biodiversity; 3) Transition to sustainable food systems: facilitate sustainable and health diets with a greater emphasis in food diversity, mainly of plant origin, and more moderate consumption of meat and fish, as well as drastically reducing the waste generated in the production chain and food consumption; 4) Transitions to sustainable fisheries and oceans: protect and restore marine and coastal ecosystems, reshape the management of fisheries, agriculture and other uses of the oceans to ensure sustainability and increase food security and livelihoods; 5) Transition of cities and infrastructures: to implement "green infrastructure" and make space for nature in urban landscape in order to improve the health and quality of life of citizens and reduce the environmental footprint of cities and infrastructure; 6) Transition to sustainable fresh water: promoting an integrated approach that guarantees the quality of water demanded by nature and people, improving water quality, protecting critical habitats, controlling invasive species and safeguarding connectivity to enable the recovery of fresh water systems from the front to the back; 7) Transition from sustainable climate action: employing nature-based solutions, along with a rapid elimination of the use of fossil fuels, to reduce scale and impacts of climate change, while generating positive benefits for biodiversity and other Sustainable Development Goals; 8) Transition to the One Health approach that include biodiversity; ecosystems management, including agricultural and urban ecosystems, as well as the use of widely through an integrated approach, to promote healthy ecosystems and healthy people. The uncontrolled consumption of natural resources has significant effects: (i), environmental: this disappearance of essential habitats for fauna and flora, that is, the extinction of species. There are about 30 million different animal and plant species on the world, and those, more than 31,000 species were threatened with extinction today, according to the International Union for Conservation of Nature (IUCN); (ii) Economy: 33% of the planet's soil is degraded at moderate to high levels by FAO. If the erosion of fertile soil continues at this rate, the prices of agricultural products will inevitably double. (iii) To health: If we do not take care of the	Thank you for your comment
Dannunc, João	No	4	0	0	0	0	Solutions to combat over exploitation of natural resources: the future , as stated by the United Nations 2030 Agenda for Sustainable Development, represents a twofold challenge to human beings: to conserve nature's multiple forms and functions and to create an equitable home for people in a finite planet. If we want to reverse this situation, among other, it will necessary: a) Preserving natural capital - restore deteriorated ecosystems and their services; significantly expand the global network of protected areas; b) Improving production systems - considerably reduce the objects, methods and resources used in the development of human life and the value of waste in production systems; c) Manage resources sustainably and d) Potentialize the production of renewable energies.	Thank you for your comment
Dinesen, Lars	No	4	0	0	0	0	General: Consider to include the case of <i>Ensis americanus</i> in the North Sea and impact on sea ducks. <i>E. americanus</i> replace other mussel species and then now also may constitute the main food item for some sea ducks now? Apologize for not being more references and provide references on this. https://epic.awi.de/id/eprint/82 , https://link.springer.com/article/10.1007/BF02908903	Thank you for your comment, but all showcased examples have been carefully chosen from the cases collected through a rigorous review of the existing literature.
Dinesen, Lars	No	4	0	0	0	0	Perhaps to consider consult with BirdLife on the many cases on depleted and extinct avifauna communities on islands due to invasions on IAS predators e.g. Sycchelles, NZ, Hawaii and many others. BirdLife in Cambridge must have information on this. Apologize again for not being more precise.	Thanks for this suggested change. We have included many reports on bird extinctions and population reductions on islands.
Dunn, Christopher	No	4	0	0	0	0	There are several reports and publications that, if considered and included here, would strengthen this chapter, and the report in general. For example: (1) "Local Biodiversity Outlooks 2" report, (2) Kothari and Neumann (2014) "ICCA and Aichi Targets" Policy Brief of the ICCA Consortium; (3) Kurashima et al. (2019) The potential of indigenous agricultural food production under climate change in Hawaii". Nature Sustainability 2: 191-199; (4) Reo and Ogden (2018) Anishnaabe Aki: an indigenous perspective on the global threat of invasive species. Sustainability Science 13: 1443-1452.	Thank you for this suggestion. We have chosen not to include it in the second order draft, as you have not provided any supporting evidence for this specific approach.
Feest, Alan	No	4	0	0	0	0	Does the fact that the list of Acronyms does not include IPCC say something about the insularity of the convention?	Thank you for this suggestion. However, we needed to group the few reports on microbial organisms for meaningful summaries.
Feest, Alan	No	4	0	0	0	0	Overall this chapter needs major editing effort.	Thank you for this suggestion. This analysis is based on our database (which was still incomplete in the first order draft) of documented evidence of impacts. We have discussed your suggestion with the author team and while we cannot integrate the Red List data into our database we have reported them in a separate paragraph/section taking into account other
Government of Ethiopia	Yes	4	0	0	0	0	The included contents do not sufficiently represent the chapter's title. It is important, therefore, either to modify the title or address additional issues (e.g. sustainable development) to make a proper match between the title and the contents.	Thank you, we have revised the content of Chapter 4 in the second order draft and hopefully addressed this concern
Government of Germany	Yes	4	0	0	0	0	This chapters contains a plethora of data with regard to the multidimensional impacts of IAS. Overall, the chapter seems quite extensive. Considering the many placeholders and the fact that a range of aspects will still have to be elaborated for SOD, it is suggested to shorten and streamline section 4.2. In comparison to 4.2, section 4.3 on "methodology to quantify impacts" and the synthesis are currently underdeveloped.	Thank you for your comment. We have restructured the chapter in the second order draft.
Government of Germany	Yes	4	0	0	0	0	Whilst preparing the SOD, kindly consider showing positive and negative impacts of IAS in graphs /tables. Currently, there are tables (e.g. Tables 4.3; 4.4; 4.7; 4.10; 4.15) using numbers to show positive and negative impacts, and then there is Figure 4.5 that uses two different colours to visualise positive and negative impacts. In conclusion, we encourage the standard display of "positive and negative" impacts.	Thank you, agreed. The second order draft now includes more figures
Gupta, Himangana	No	4	0	0	0	0	Although there is no direct discussion on socio-ecological production landscapes and seascapes (SEPLS) in the chapter, here are a few case studies to cite from the International Partnership for Satoyama Initiative on IAS and SEPLS: https://satoyama-initiative.org/case_studies/comdeks-project-lake-tabalak-niger/ ; https://satoyama-initiative.org/case_studies/enhancing-knowledge-of-socio-ecological-production-landscapes-and-seascapes-in-vavau-kingdom-of-tonga/ ; https://satoyama-initiative.org/case_studies/outline-of-wakasa-towns-fukui-prefecture-activities-relating-to-socio-ecological-production-landscapes-sepls/	Thank you for this suggestion. We have chosen not to include it in the second order draft, as you have not provided any supporting evidence for this specific approach.

Karimov, Bakhtiyor	No	4	0	0	0	0	General comment: The assessed "impact on nature" may be considered changed to impacts on "ecosystems and populations" because that might be more precise.	Thank you, we are following the IPBES conceptual framework
Papadopoulou, Paraskevi	No	4	0	0	0	0	Check the figure and table legend formatting.	Thank you very much. Legend formatting has been harmonized in the second order draft
Papadopoulou, Paraskevi	No	4	0	0	0	0	Overall a well written chapter. Some editing is necessary.	Thank you for your comment, agreed.
Papadopoulou, Paraskevi	No	4	0	0	0	0	The diagrams and tables could perhaps improve in terms of resolution.	Thank you, we have revised the tables in the second order draft.
Rüegg, Simon	No	4	0	0	0	0	I think it may be a benefit in framing humans as part of nature. Particularly synanthropic species have in past caused shifts in biodiversity.	Thank you perceptions are introduced in Chapter 1.
Schaffner, Urs	No	4	0	0	0	0	Both the list of Tables and the Titles of Tables in the main text should include more information, e.g. which region they cover etc.; also, numerous titles of tables need editing.	Thanks for this suggested change. We have corrected it in the second order draft.
Pisanu, Benoit	No	4	1	1	1	1	Executive Summary does not well reflects the essence of the conclusions - very informative and rich - developed in the Chapter.	Thank you for your comment, the executive summary has been revised in the second order
Feest, Alan	No	4	1	3	1	3	1. With the exception of the deep sea no area of the planet is free of Invasive alien species impacts	Thank you, this statement has been revised in the second order draft
Government of Germany	Yes	4	1	3	1	12	The executive summary does not seem to cover the content of the chapter and may need revision. We therefore look forward to reviewing the more mature version of the executive summary in the SOD.	Thank you for your comment, the executive summary has been revised in the second order draft.
Joshi Rijal, Srijana	No	4	1	3	1	12	Executive summary should start with key statement and then followed by bullet list. Under line 8 please check (2017 US dollars); this looks awkward.	Thank you for your comment, the executive summary has been revised in the second order
Sarat, Emmanuelle	No	4	1	3	1	12	The impact of IAS on zoonosis emergence should be mentioned in the executive summary. There are scientific evidence on the topic and the current sanitary crisis would help raise awareness on that type of impacts. It is only partially covered in Box 4.1 at the moment but could be much stronger in the text, including its executive summary. See for example Medina-Vogel, G. (2013). Emerging infectious diseases of wildlife and species conservation. Microbiology spectrum, 1(2). [OH-0004-2012]. https://doi.org/10.1128/microbiolspec.OH-0004-2012	Thank you, the executive summary has been revised accordingly.
Soubeyran, Yohann	No	4	1	3	1	12	The executive summary of Chapter 4 is too short and light, while underlining IAS impacts will be key to trigger action and engage society on the issue.	Thank you, the executive summary has been revised accordingly in the second order draft
Shin, Thant	No	4	1	3	1	4	What about polar regions	Thank you for your comment. We have updated it in the second order draft.
Soubeyran, Yohann	No	4	1	7	1	9	It would be good to mention that even if positive impacts of IAS exist, they are very rare. This would help avoiding ongoing debates and conflicting messages on IAS for the general audience.	Thank you for this suggestion, we have included it in the second order draft.
Soubeyran, Yohann	No	4	1	7	1	9	On top of the global cost estimate, it would be useful to have an assessment of IAS costs per sector, such as biodiversity, economy, health... to be compared with the inaction cost. There is already an example for agriculture page 143 line 3771 and following. This would be worth expanding this analysis and bringing it up in the executive summary.	Thank you for this suggestion. We have chosen not to include it in the assessment, because of space limitations.
Brooks, Thomas	No	4	1	9	1	9	It is important to provide quantification in this clause about positive impact of IAS in this key message: the relative prevalence of impacts is reported as 90% negative vs 10% positive for nature (based on 1,217 negative impacts vs 136 positive impacts; P112, L3114-3115), 60% negative vs 15% positive for NCP (P124, L3198), and 95% negative for GOL (P125, L3201).	Thanks for this suggested change. We have included it in the second order draft.
Heringer, Gustavo	No	4	1	10	1	12	As an executive summary, I would suggest a more specific approach. Cite the geographical regions with a gap of knowledge could be an alternative. I believe the policy-makers will want to know firstly the regions and taxonomic groups that need to be more studied.	Thanks for this suggested change. We have included it in the second order draft.
Soubeyran, Yohann	No	4	1	10	1	12	There are knowledge gaps on the costs of IAS impacts but an interesting proxy could be to show how much countries spend to manage IAS, disaggregating the data for prevention vs eradication costs, and by countries or regions. This would illustrate that prevention is more cost-effective compared to the costs associated with IAS impacts. The undergoing "Invacos" project led by Franck Courchamp could be an interesting source of information (papers are being	Thank you, economic costs and knowledge gaps have been updated in the second order draft.
Government of Ethiopia	Yes	4	2	15	3	69	The section "4.1.1. History of impacts" appears narrow. Better to expand the discussion on the historical development of impacts at the global scale.	Thank you for this suggestion, we have included it in the second order draft.
Daguitan, Florence	No	4	2	16	3	69	During the colonial period, when crops were introduced from one country to another, was the impact of IAS felt? Are there historical accounts of crop introduction resulting in IAS?	Thank you! Crops have undergone thousands of years of selection, and mostly are unable to establish wide-spread populations beyond human-care. However, animal husbandry did contribute some troubling invasive alien species - pigs, goats, horses, camels.
Pisanu, Benoit	No	4	2	27	2	27	change to 'jardin d'acclimatation'	Thank you! Tyvo corrected in the second order draft.
Government of Germany	Yes	4	2	36	2	37	This sentence says that "... impact studies were seldom undertaken ... for the majority of introduced biota". As a large majority of the introduced biota cannot establish in the new climate, it would not make sense to carry out such studies. The sentence should be revised (> add reason) and/or a citation should be added.	Thank you, this section has been revised in the second order draft.
Faulkner, Katelyn	No	4	2	39	2	51	This information is covered in Chapter 1, and I don't think that it is necessary to recap it here	Thank you, we have rewritten the introduction in the second order draft.
Rüegg, Simon	No	4	2	41	2	46	Looking at IAS from a conservation perspective is certainly relevant in the context of the biodiversity conversation. However, it may be worth to mention synanthropic species as a long-existing problem in agriculture and human settlements. Although they may not have received much academic attention, they are real threats to livelihoods in the context of subsistence farming, food storage and cities (e.g. rats as vectors of plague). The point is, that IAS have been around for a long time and are associated to human interactions with nature. This may not be eminently relevant for the current conversation on IAS, but it sets a different scene to the idea that IAS are a relatively novel problem (i.e. 1839) associated to global travelling. From my personal perspective it is a consequence of humans interacting with nature to be more efficient. This results in altered concentration and dissemination patterns. To a certain degree I appreciate it as a diffusion or osmosis process: if concentrations are high, the dilutant is attracted. I.e. concentrated crops will attract pests and alter the biodiversity. Today, we humans are just much more efficient in concentrating biomass than we were previously... that's why we observe an increase in these phenomena. This kind of	Thank you. Ch. 4 deals with both intentionally and unintentionally introduced sop of ALL taxa, but a sentence as to the synanthropic spp has been added.
Government of Germany	Yes	4	2	48	2	51	Does this hold really true? If yes, please add a literature source.	Thank you for your comment. Citations and references have been harmonized in the second
Heringer, Gustavo	No	4	2	55	2	56	I would say, this sentence could be removed. About 41% of the naturalized plants have a economic importance (van Kleunen et al. 2020 - DOI: 10.1038/s41467-020-16982-3).	Thank you. Ch. 4 deals with both intentionally and unintentionally introduced spp of ALL taxa, not plants alone.
Schaffner, Urs	No	4	3	68	3	69	Why focus on media? The same can be said about government agencies, NGOs etc.	Thank you for your comment. Present media messages reach the public incessantly and through multiple venues – and have been shown to sway opinions and habits. The media serves also for the members of public to share opinions in a more expansive manner than ever. When IAS have both positive and negative impacts – public opinion is an important matter.
Karimov, Bakhtiyor	No	4	3	72	3	96	suggest to change "Impacts to Nature" to "Impacts to Ecosystems and Populations	Thank you for your comment, we are following the IPBES conceptual framework and its
Government of Germany	Yes	4	3	84	3	87	What is the main reason for the fact that no statistically significant experimental research is carried out, not even for the most invasive species? It is suggested to add a sentence indicating a reason.	Thank you for your comment. We have revised it in the second order draft.
Schaffner, Urs	No	4	3	84	3	87	Shouldn't this statement be based on the review presented in this chapter?	Thank you for highlighting this in situ experiments, spatially and temporally extensive to support statistically significant results, and taking into account the many environmental drivers, have been supported only in cases of direct economic/health impacts. Funding is the
Alejandra Grez Villarreal, Audrey	No	4	3	87	3	87	Vila et al. (remove Montserrat, it is her first name)	Thank you for your comment. Citation and reference styles has been harmonised in the
Verbrugge, Laura	No	4	3	89	3	99	Using the wordings of 'formerly known as ecological impacts' and 'formerly known as ecosystem services' are nonsensical in my view. These terms will keep on existing and being used for describing IAS impacts.	Thank you, this has been revised accordingly in the second order draft.
Schaffner, Urs	No	4	3	90	3	90	I suggest changing to: '... that all introduced species can have an impact...'	Thanks for this suggested change. We have corrected it in the second order draft.
Dinesen, Lars	No	4	3	99	0	99	Do not think that NCP replace ecosystem service term. Perhaps you use NCP in the assessment, however in other contexts ES might be a useful term?	Thank you! This term is used by IPBES are defined in the glossary in the second order draft.
Government of Ethiopia	Yes	4	3	99	4	115	The definitions of NCP and GOL are overlapping. Good to look for clearer definitions that allow easier distinction.	Thank you! These terms are defined in the glossary in the second order draft.
Government of Germany	Yes	4	3	99	4	105	It is proposed to introduce the IPBES classification system for NCP as it is used for example in the Global Assessment. It differentiates between 18 categories of NCP.	Thank you. The NCP categories are introduced in Chapter 1, and we have added a cross-reference in the second order draft
Joshi Rijal, Srijana	No	4	4	112	4	112	Add Scientific name of Nile perch.	Thank you. This is corrected in the second order draft.
Das Gupta, Ashok	No	4	4	118	6	235	Kindly add some more examples like Eucalyptus causing negative impact of ground water level, damage caused by different snails in garden & caterpillars in tea gardens in North East India, invasion of bat in the guava plantation & possible disease spread, locust attack in India & Pakistan in 2020, side profit from the dirtweed grown in the cropfield & enriching the biodiversity, damage due to Parthenium in staple crop field, tarantula spiders in Indian subcontinent, scrub typhus spread through invasive chigger mites, hookworm & ringworm causing skin diseases, spread of mosquito born diseases in 21st century AD mostly dengue besides prevalent malaria in South Asia, mite attacks in vegetable gardening basically in summer season, fungus attack on betel vine in winter, potato leaf roll virus by green peach aphids, Fusarium related diseases including the Panama disease in banana plantain, spread of Citrus Greening Disease or Huanglongbing into the New World through mostly Asian spylids, invasive rabbits in the Kerguelen island hampering the native pungent cabbage population, the lonely Sitka spruce in the island of Campbell under New Zealand, mission to free the South Georgia island from IAS rodents, invasive wild species into the habitation region during flood or during food scarcities, invasive caterpillars in marshland jute harvest, silver leaf white fly, cotton mealy bug, etc. I am further	Thank you for your comment, it is well taken. All the examples showcased in this chapter are chosen on the basis of a rigorous review of the existing literature.
Dinesen, Lars	No	4	4	118	0	121	A species which have harmless impacts defined as an IAS because it might have an impact in the future? Perhaps consider to specify? Or maybe no species are harmless after all?	Thank you, the paragraph has been revised accordingly in the second order draft.
Government of Germany	Yes	4	4	118	4	121	It is suggested to revise the paragraph. A good point is addressed, however, it depends on the type of assessment and the definition of what an invasive species is whether or not an assessment is subjective. While the perception by the public might be subjective, a scientific assessment judging the negative impacts on biodiversity should not be subjective.	Thank you, the paragraph has been revised accordingly in the second order draft.
Brooks, Thomas	No	4	4	123	4	125	Recommend deleting this sentence and its un-cited, self-contradictory, and hypothetical argument; the IPBES conceptual framework is predicated on the fact that there is directionality of impact on "Nature".	Thank you for your comment. We have deleted the sentence from the second order draft
Daguitan, Florence	No	4	4	123	4	143	Changes to nature should be classified as negative or positive so a to determine appropriate actions. Line 142 to 143.. Impact should not only be assessed if they harm or benefit native species. There are also IAS, like the pine trees that make the soil acidic and decrease soil effectivity to provide nutrients to crops.	Thank you very much. We respectfully disagree with the position that consideration of damage or benefit be taken "so as to determine appropriate actions". In many (too many) cases attention is alerted only when the invasive population has spread/flourished and no action avails. As to introduced pine trees – these have both positive and negative impacts depending
Rüegg, Simon	No	4	4	135	5	152	Here perspectives at the same "hierarchical level" are considered for opposing detriments and benefits arising from IAS. I think, it would be important to think also across scales: while at one scale an IAS may be beneficial, it may disrupt the higher or lower systemic level. The higher the scale at which negative impacts are recorded the more alarming this should be from a system dynamic perspective. This would take away the focus on humans as determinants of valence but regard the system integrity as the highest function to maintain. Inevitably, humans are affected as part of the system.	Thanks for this suggested change. We have included it in the second order draft.

Government of Germany	Yes	4	4	136	4	139	It is suggested to put your definition of negative and positive impacts in relation to the definition of IAS which is being used for this assessment (see footnote 1 (p. 3) in ch 1 of this report). Rationale: The IAS definition speaks generally about "an impact" an IAS can have outside its natural range of distribution. Ch 3 now further differentiates the impact of IAS between negative and positive impacts. Showing this linkage between the IAS definition provided in ch 1, and your differentiation between negative and positive impacts in this chapter would support a more comprehensive narrative across chapters.	Thanks for this suggested change. We have included it in the second order draft.
Daguitan, Florence	No	4	4	145	5	177	Among the Teduray and Lambangan people of Mindanao, Philippines, their perspective is - "our land and nature is the extension of our body and life or 'rela lowo". Therefore, impacts on nature have direct effect on NCP and GQL. We should also include peoples' contribution to nature (PCN). For example, ricefields are manmade. While ricefields are intended as production sites, they also become habitats of many species through time, e.g. insects, snails, fish, frogs. When these were attacked by the IAS - golden snail, some fishes and snails, and edible weeds disappeared decreasing the sources of protein, minerals and vitamins for the peoples. This is also true for the muyong of Ifugao, Cordillera, Philippines. The muyong are created by people to assist the re-growth or growth of a forest to contribute to sustaining water for ricefields and others. Gmelina invaded some muyong and decreased in water was observed	Thank you for your comment. We are guided by the IPBES conceptual framework with regards to NCP
Government of Germany	Yes	4	4	145	5	160	It is suggested to add information to this chapter (or a reference to another chapter or another source) that explain the concepts of NCP and GQL. Reading this chapter, it does not become clear what both of those factors are and why both of them needed to quantify impacts of invasive species.	Thank you. Chapter 1 introduces these issues, and is now referred to in Chapter 4 in the second order draft.
Eckert, Sandra	No	4	5	148	5	149	"For example an increase in regulating NCP (e.g. more regulation on climate) does not necessarily benefit humans." I would argue that particularly with the example of climate humans always will benefit in the long term.	Thank you for your comment. We have updated it in the second order draft.
Government of Germany	Yes	4	5	148	5	150	Kindly ensure that the discussions about NCP are linked to the IAS topic. It is suggested to briefly describe the relationship between the concepts 'NCP' and 'ecosystem services'. Kindly insert a reference here, if this relationship has already been described in a previous chapter of this report.	Thank you, a reference to Chapter 1 has been added in the second order draft.
Schaffner, Urs	No	4	5	150	5	152	Constituents of human well-being also need to be carefully interpreted. E.g. an increase in gross income does not necessarily mean an increase in GQL; if the people experience a reduction in home-consumption of ES, they will become more dependent on supply of ES from elsewhere, which may decrease net income and/or destabilize the social-ecological system.	Thank you, while we agree, this chapter does not cover these categories in details. Please consult chapter 1 for more information.
Government of Germany	Yes	4	5	154	5	155	Kindly check, whether the sentence is complete, or should the "As" in the beginning be skipped?	Thank you, typo corrected in the second order draft.
Joshi Rijal, Srijana	No	4	5	165	5	166	Check the reference formatting.	Thank you very much. Reference and citation formatting has been harmonized in the second order draft.
Eckert, Sandra	No	4	5	173	5	173	It is "De Witt et al., 2001".	Thank you very much. Reference and citation formatting has been harmonized in the second order draft.
Takahashi, Yasuo	No	4	5	173	5	177	The evidence base of the statement "economic benefits are often gained by one sector while cost, often long-term ones, are borne by the wider public" can be strengthened by an additional citation: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy. https://doi.org/10.1016/j.envsci.2020.06.014 .	Thanks for this suggested change. It is included in the second order draft.
Rüegg, Simon	No	4	5	175	5	177	Maybe refer to what economists call "negative externalities". This is an elegant way to shift costs to the public and profits to the company.	Thank you – we prefer the blunt over the elegant when describing the blinking of the public.
Schaffner, Urs	No	4	5	187	5	190	I suggest rephrasing this sentence. If the IAS will/can not be eradicated and becomes dominant, IPLC are likely to adapt irrespective whether they can accommodate and integrate the IAS in their culture. IPLC may even adapt by abandoning their culture. Also, this statement needs to be reflected in the context of likelihood of sustainable management of IAS; what if people (not only IPLC) first wait to see what the impacts are and then the IAS will become widely established and management extremely expensive?	Thank you, this sentence has been deleted in the second order draft
Takahashi, Yasuo	No	4	6	197	6	197	The statement "contingent on the source of livelihood for the community" can be substantially strengthened by adding the following citation: Shackleton et al. 2019. The role of invasive alien species in shaping local livelihoods and human well-being: A review. J. Environ. Manage. 229, 145–157. https://doi.org/10.1016/j.jenvman.2018.05.007	Thank you, agreed
Schaffner, Urs	No	4	6	198	6	198	See my comment above; yes, impact is often context-dependent and negative impacts are likely to increase over time.	Thank you for your comment.
Dunn, Christopher	No	4	6	200	6	201	Same can be said for feral pigs in Hawai'i and other Pacific Islands	Thank you, we have edited the text accordingly in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	6	203	6	203	Perhaps mention the names of the native mammals that declined.	Thank you, we have decided to remove this part from the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	6	220	6	225	Please consider Montalva et al. (2020). The giant bumble bee (Bombus dahlbomii) in Mapuche cosmovision. Ethnoentomology.	Thank you very much. The bumblebee is a native species in the paper
Joshi Rijal, Srijana	No	4	6	220	6	220	Add "to" after due.	Thank you. This section has been revised in the second order draft.
Joshi Rijal, Srijana	No	4	6	220	6	235	May check additional reference on lantana camara - Jevon and Shackleton 2015; Sundaram et al. 2012, Bharath et al. 2012 might be relevant here focusing on integrating local knowledge to assess impact of lantana camara.	Thank you, this is added in the second order draft.
Joshi Rijal, Srijana	No	4	6	228	6	231	Rephrase the sentence.	Thank you. This section has been revised in the second order draft.
Dunn, Christopher	No	4	6	231	6	232	I agree completely with involving IPLCs. Has that been done here? I don't see it	Thank you for your comment. Please consult this page to see how IPLC and ILK experts are involved in the development of IPBES reports https://ipbes.net/indigenous-local-knowledge
Government of Germany	Yes	4	7	237	9	311	It is suggested to insert references in the methodological section which provide information on how certain classifications (e.g. units of analyses, impact mechanisms GQL components and NCP) were developed.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have included your suggestion within this section in the second order draft.
Schaffner, Urs	No	4	7	237	7	257	Maybe I missed something but looking at e.g. Table 4.24 makes me wonder what the unit of analysis is in this and in some of the other Tables. What is meant by cases? If the cane toad has 123 recorded cases of negative impacts to native species, does that mean that the review generated 123 studies documenting negative impacts on native species, or negative impacts on 123 native species? This should be explained in the section starting on L.333, as it obviously affects the synthesis of impact prevalence from Ch4 will yield severe underestimates.	Thank you for this suggestion. We have chosen to include an explanation about the unit of analysis used in second order draft (Chapter 1)
Government of Germany	Yes	4	7	241	7	241	On p. 3, L.79-82 you are concretely citing policy papers and legislation. It is therefore suggested to insert policy papers and legislation in the bracket as another information source.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have included your suggestion within the bracket in the second order draft.
Brooks, Thomas	No	4	7	242	7	242	GISD (http://www.iucnredis.org/gisd/) is another key source of information here, and should be cited accordingly. If this has not been done yet, it is important that it be undertaken as part of the development of the Second Order Draft, and the results throughout Ch4 updated accordingly. This is very important - without this, the synthesis of impact prevalence from Ch4 will yield severe underestimates.	Thank you, all sources are mentioned in the list of references OR in the data management report in the second order draft.
Brooks, Thomas	No	4	7	242	7	242	It would be useful to introduce EICAT here as providing the mechanism for standardised IAS impact assessment, citing Blackburn et al. (2014; https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001850) & IUCN (2020; https://portals.iucn.org/library/node/49101). This is subsequently discussed in detail P147-148, L3922-3943. Also SEICAT (Bacher et al. 2018; https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12844), also subsequently discussed at P148, L3954-3962.	Thank you very much. Agreed
Brooks, Thomas	No	4	7	242	7	242	The IUCN Red List of Threatened Species (https://www.iucnredlist.org/), which includes standardised documentation of threats from IAS (following the Classification Scheme established by Salafsky et al. 2008 Conserv Biol), should be listed here as a key source. Was comprehensive search of the RL for IAS impacts included in the preparation of Ch 4? If this has not been done yet, it is important that it be undertaken as part of the development of the Second Order Draft, and the results throughout Ch4 updated accordingly. This is very important - without this, the synthesis of impact prevalence from Ch4 will yield severe underestimates.	Thank you for this comment. We have listed this database as a key source for this assessment and we have updated and discussed the results throughout Ch4 considering this database in the second order draft.
Government of Germany	Yes	4	7	242	7	242	Isn't DAISAE offline because it is outdated? In addition, the typing of DAISIE in L.242 should be DAISAE.	Thank you, this is corrected in the second order draft. Please see the updated methodology
Joshi Rijal, Srijana	No	4	7	242	7	242	Correct "DAISAI" as DAISIE.	Thanks for your comment, we have typed this correctly in the second order draft.
Pagad, Shyama	No	4	7	242	7	242	This comment has reference to IAS databases and the example provided and examples missing. Firstly, there is an error in the acronym it is not DAISAE but DAISIE (Delivering Alien Invasive Species Inventories for Europe). Secondly, DAISIE is not an active database currently. Thirdly, there are other authoritative databases that are active for e.g. at the global level- CAB's Invasive Species Compendium and the knowledge products of the IUCN Invasive Species Specialist Group- Global Invasive Species Database (GISD) that will include reviewed EICAT (Environmental Impact Classification of Alien Taxa) assessments, and the Global Register of Introduced and Invasive Species (GRIS); FishBase that is taxon specific, and at the regional level PIFR- Pacific Island Ecosystems at Risk	Thank you. We have now clarified the Methodology and how DAISIE was used and other databases in the second order draft.
Pisanu, Benoit	No	4	7	242	7	242	DAISIE	Thanks for your comment, we have typed this correctly in the second order draft.
Government of Ethiopia	Yes	4	7	254	7	255	Good to look for the accuracy of the statement "Our current report contains information of 14,500 impacts generated by 1,729 IAS, which is comprehensive but not exhaustive."	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Alejandra Grez Villarreal, Audrey	No	4	7	259	7	277	I do not understand why the gaps are so early in the document, and not after results.	Thank you for your comment. It was necessary to mention the gaps we had in the database in order to improve it in the second order draft.
Rüegg, Simon	No	4	7	260	7	265	I think, in this context it is important to talk about antimicrobial resistance (AMR). There is a global effort to monitor the expansion of AMR, but the data acquisition is far from homogeneous. The data would be a solid illustration of where the microbiome is under observation and where not. Another source for (pathological) microbial surveillance are the OIE (PVS tool) and the WHO (in health regulation, IHR), where capacities for microbial surveillance are evaluated. I admit, this is far from comprehensive, but may present a starting point, particularly as the technology would be available to address a broader scope	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Pisanu, Benoit	No	4	7	261	7	261	Perhaps better define what a "microbe" is? Viruses, protists, protozoan or metazoan organisms that are parasitic, by opposition to free-living organisms.	Thank you for this suggestion. We have chosen to include it in the glossary in the second order draft.
Dunn, Christopher	No	4	7	263	7	263	Delete the word "but"	Thanks for this suggested change. We have included it in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	7	263	7	263	Replace "but it has been" by "they have been".	Thanks for this suggested change. We have included it in the second order draft.
Government of Ethiopia	Yes	4	7	266	7	271	The paragraph needs to be checked for accuracy of content as well as construction.	Thank you for your comment. We have checked and improved the paragraph in the second order draft.
Joshi Rijal, Srijana	No	4	7	266	7	267	The sentence seems to be incomplete.	Thank you for your comment. We have completed the sentence in the second order draft.
Rüegg, Simon	No	4	7	272	7	273	It may be useful to refer to the global burden of disease study of the WHO, particularly neglected tropical diseases and food borne diseases in order to attain a glimpse of the impact on GQL. A analogous study is underway for the Global burden of animal diseases, which may be even more insightful from an ecosystem perspective. However, this study is just beginning now.	Thank you for your suggestion. We have expanded significantly the information on diseases in the second order draft.
Pisanu, Benoit	No	4	8	281	8	289	You could also indicate that these sources are most probably influenced by a modern occidental point of view, meaning sociologically, economically, politically, and anthropologically influenced by modern occidental societies.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Alejandra Grez Villarreal, Audrey	No	4	8	282	8	286	Would this because of the composition of the Committee?	Thank you for your comment. It does not seem to require changes to the text.
Taki, Hisatomo	No	4	8	282	8	282	It could be good to include the date or month to check the evidence.	Thank you for this suggestion. We have included it in the second order draft.
Joshi Rijal, Srijana	No	4	8	290	8	290	This number on literature on chinese seems to be under represented although it is mentioned about the bias, may be because of the database, there are many record in other database in chinese language - on impacts.	Thank you for your comment. As part of restructure of the chapter, we have deleted the table from the second order draft.
Rüegg, Simon	No	4	9	304	9	310	In my view, the chapter would increase validity if it had co-authors responsible for each region, who are on site and thus can access pertinent grey literature (e.g. China).	Thank you, the expert group is composed of experts from different regions. Contributing authors are also involved to facilitate the access to pertinent literature (including grey literature)

Feest, Alan	No	4	9	308	9	308	This is an outdated classification undervaluing microbial organisms. Plants, invertebrates, vertebrates, bacteria and microbes, protists, fungi, archaea	Thank you for this suggestion. However, we needed to group the few reports on microbial organisms for meaningful summaries.
Butchart, Stuart	No	4	9	312			IAS are a particular concern on islands, but the current structure of the chapter does not allow this dimension to be easily determined. I strongly suggest the addition of a section on IAS impacts on islands. This can draw heavily on the data in the Threatened Island Biodiversity Database at http://tib.islandconservation.org/ which includes information on the distribution of all vertebrate IAS and native highly threatened species (Critically Endangered and Endangered) on each island, and the impacts of the former on the latter on each island. Plus the various papers based upon these data, including: Holmes et al. (2019) Globally important islands where eradicating invasive mammals will benefit highly threatened vertebrates. <i>PLoS ONE</i> 14: e0212128. Spatz et al. (2017) Globally threatened vertebrates on islands with invasive species. <i>Sci Advances</i> . doi:10.1111/cons.12 Dawson et al. (2014) Prioritising islands for the eradication of invasive vertebrates in the UK overseas territories. <i>Conserv. Biol</i> 29: 143-153. McCressell et al. (2016) Past and estimated future impact of invasive alien mammals on insular threatened vertebrate populations. <i>Nature Communications</i> 7: 12488.	Thank you very much. There are an infinite number of ways of structuring the chapter and the authors have chosen one.
Government of Germany	Yes	4	9	312	145	3860	There is a lot of repetition in great parts of the chapter. It is seriously questioned whether it is necessary to look at the very same dataset from all those different angles (regions, realms, taxa and impact types). It is suggested to consider choosing a different way to display the results of this analysis in order to avoid redundancy; kindly shorten where possible and/or move a significant part of it to the supplementary material.	Thank you for your comment. We have restructured the chapter in the second order draft.
Joshi, Chudamani	No	4	9	312	9	312	Apart from Impacts: regions, taxa, types it would be useful to include intensity of Impacts as well. Sometimes one single species may have a huge impact and in many cases large number of invasive species may hardly effect the recipient ecosystem. Intensity of impact is very important.	Thank you very much. Impact magnitudes on nature were classified in accordance with the Environmental Impact Classification for Alien Taxa (EICAT) from the International Union for Conservation of Nature (IUCN 2020), i.e. by assessing how much a native species suffers (i.e. reduced performance of native individuals, decline in local population size; local extinction).
Takahashi, Yasuo	No	4	9	312	15	443	It might be easier for readers to understand the trend if the numbers in a series of tables are presented with visual presentations, e.g. schematic diagrams.	Thank you for your comment, some table have been converted to graphs in the second order draft.
Takahashi, Yasuo	No	4	9	312	111	3106	It seems that the subsections under the sections 4.2.1, 4.2.2 and 4.2.3 repeat the presentation of the same data from different angles. Can the data be presented in a more structured and integrated manner?	Thank you for your comment. We have changed the structure in the second order draft.
Brooks, Thomas	No	4	9	314	9	314	GISD (http://www.iucngisd.org/gisd/) is another key source of information here, and should be cited accordingly. If this has not been done yet, it is important that it be undertaken as part of the development of the Second Order Draft, and the results throughout Ch4 updated accordingly. This is very important - without this, the synthesis of impact prevalence from Ch4 will yield severe underestimates.	Thank you, yes, the methodology section has been updated in the second order draft.
Brooks, Thomas	No	4	9	314	9	314	The IUCN Red List of Threatened Species (https://www.iucnredlist.org/), which includes standardised documentation of threats from IAS (following the Classification Scheme established by Salafsky et al. 2008 <i>Conserv Biol</i>), should be listed here as a key source. If this has not been done yet, it is important that it be undertaken as part of the development of the Second Order Draft, and the results throughout Ch4 updated accordingly. This is very important - without this, the synthesis of impact prevalence from Ch4 will yield severe underestimates.	Thank you, this is addressed in the second order draft.
Pagad, Shyama	No	4	9	314	7	315	The IUCN Invasive Species Specialist Group is completing a project focused on documenting impacts of known invasive species belonging to 4 taxon groups- Amphibians, Reptiles, Fishes and Aquatic Plants. This exercise is an expansion of the GRIIS database and is focused on species identified as 'invasive with evidenced impacts' in the global GRIIS dataset. Importantly the data is recorded as a species country record and includes the impact mechanisms, outcomes and a reference of the source information. The impact categorization is what has been used in the Global Invasive Species Database and the EICAT (Environmental Impact Classification of Alien Taxa) process, this will also include a flag to the NCP impacted. An Endnote library with keywords, references and notes will be created for each of the taxon groups and available to users. The dataset can be disaggregated by IPBES regions as well as environment/ systems. We hope that these data are incorporated into the chapter database and used to compile the Tables below. The timeline of this project is December 2020 after which the dataset and results will be available. These data will also be available through the GISD. Additionally, work will begin on documenting the impacts of invasive	Thank you very much, this is well noted.
Smith, Emily	No	4	9	314	9	314	Regarding the databases used to identify impacts to biodiversity - was the IUCN Red List of threatened species queried? Each individual species RL assessment has a citation and DOI, and under the threats section many species have named the IAS that is impacting the species (for example see <i>S. nitidus</i> EN impacted by <i>H. javanicus</i> & <i>Rattus rattus</i> https://www.iucnredlist.org/species/47103272/47103282#threats). See Smith (2020) for an analysis of the impacts posed by IAS to species listed on the IUCN Red List (v2016.3). It documents the threats posed by IAS in relation to other threat categories, impacts of IAS to threatened species and as a driver of extinctions across geographic regions and habitat types. A key finding is that while IAS are a major impact upon threatened species (ranked 4th highest of the categories of threat in terms of no. threatened species impacted), IAS are associated with more species extinctions than any other category of threat. In fact IAS are recorded as the only threat attributed to 16% of all species extinctions. The RL contains records of almost 800 named IAS impacting native species, and the report identifies the most common named IAS associated with threatened species and extinctions. Note that this analysis will be redone in early 2021 using data from the latest IUCN Red List data (v2020.2) and expanded to incorporate more detailed analysis of IAS impacts (incl. named IAS) upon individual taxa groups, and countries, and habitat types. It will also provide the full dataset on the native species impacted by each named IAS. Full ref = Smith, K. 2020. The IUCN Red List and invasive alien species: an analysis of impacts on threatened species and extinctions. IUCN. Access	Thank you, yes, the methodology section has been updated in the second order draft.
Government of Germany	Yes	4	9	317	9	319	This definition of IAS as species "considered invasive, i.e. causing impacts to Nature, NCP or Human Well-being and GQL" does not seem to be in line with the definition in Chapter 1.3.1 Lines 261-266 where "IAS are defined as... and generating an impact on local ecosystems and species". It is very important to decide upon one definition of IAS and use this throughout the entire assessment!	Thank you for your comment. We have revised it in the second order draft.
Pagad, Shyama	No	4	9	317	7	319	The consolidated Global Register of Introduced and Invasive Species GRIIS, global dataset of the national checklists of all parties to the CBD + United States will be made available (by the IUCN Invasive Species Specialist Group) for IPBES authors from the end of October. Annotations include, country name, higher taxonomy, environment/ system, provenance and impact evidence, date of first introduction or record and source information. We will also include powerpoint slides with basic statistics. The dataset can be disaggregated by IPBES regions as well as environment/ systems.	Thank you very much, this is well noted.
Schaffner, Urs	No	4	10	333	10	333	As mentioned above, the interpretation of the directionality of impact of an IAS on GQL may depend on the indicators used (and on the stakeholder group and social-ecological systems) and thus should be interpreted with caution. I therefore suggest that the authors describe how they classified an impact of IAS as positive or negative for GQL.	Thank you, this has been developed in the methodology section in the second order draft
Faulkner, Katelyn	No	4	10	338	10	346	Tables 4.2, 4.3 and 4.4 would be better as figures.	Thank you, this has been taken into account in the second order draft.
Hughes, Kevin	No	4	10	338	10	338	Tables 4.2 and 4.95 records no IAS in Antarctica, yet a positive record is mentioned in later tables (Table 4.4, Table 4.5, Table 4.7). Which is correct? Are the authors referring to <i>Poa annua</i> in Admiralty Bay as the invasive species? Also, given the title of section 4.2.1.5 'Antarctic continent and sub-Antarctic Islands', how have the authors defined 'Antarctica' in the Tables? Finally, where are the invasive species on the sub-Antarctic islands considered in the Table (mpologies	Thank you for your comment. As part of restructure of the chapter, we have deleted that table in the second order draft
West, Vicky	No	4	10	338	10	354	Table 4.4 indicates a negative impact from IAS in Antarctica, yet this species is not included in Table 4.2 above. If it is highlighted as having a negative impact I would expect it to fall under one of the three categories, even if only a low impact. Additionally, for example you have 879, global, negative, terrestrial IAS (Table 4.4) but when you add the negative terrestrial values from Table 4.3 (i.e. 662, 390, 322) you get 1374 sp.. How have the numbers in these tables been derived as they don't seem consistent	Thank you for spotting this mistake. Numbers have been updated in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	10	344	10	346	The one negative effect in the Antarctica was on nature, NCP, GQL?	Thank you for spotting this mistake. Numbers have been updated in the second order draft.
Government of Germany	Yes	4	10	347	75	2137	The section on regional impact of IAS is lengthy with a lot of anecdotal information. This could be shortened in order to improve readability and the emphasis of key messages and facts. Please use the same style of figures and tables for every region to ensure comparability.	Thank you for your comment, this section has been restructured and shortened in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	10	348	10	348	The 14,500 scientific reports of 1728 IAS. It seems not necessary to repeat in each section which is the database. Also, please be consistent in the numbers (here it says 1728 and before 1729 IAS. Additionally, here you refer to IAS and before to alien species.	Thank you for your comment. We have updated it in the second order draft.
Joshi, Rijal, Srijana	No	4	10	348	10	348	Correct the number in earlier page number of IAS is reported 1729. "The database compiled so far has over 14,500 scientific reports of 1728 IAS and their	Thank you, this statement has been revised in the second order draft
Alejandra Grez Villarreal, Audrey	No	4	10	349	10	349	"invasive species are reported from the Asia-Pacific region". This may be interpreted as species that are invading other places FROM Asia-Pacific (i.e., Asia-Pacific is their region of origin), but probably it means that most invasive species have invaded Asia-Pacific region. It would be interesting to analyze the origin	Thank you, this sentence has been removed from the second order draft.
Hughes, Kevin	No	4	10	357	10	358	See comment above. Is Table 4.2 incorrect?	Thank you for spotting this mistake. Numbers have been updated in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	10	358	10	358	"least studied region with only one species reported". I am curious which species is (afterwards, in table 4.7 I see it is a plant)	Thank you for your comment. We have updated it in the second order draft.
Faulkner, Katelyn	No	4	11	362	11	365	See Bailey, S. A., Brown, L., Campbell, M. L., Canning-Clode, J., Carlton, J. T., Castro, N., ... Zhan, A. (2020). Trends in the detection of aquatic non-indigenous species across global marine, estuarine and freshwater ecosystems: A 50-year perspective. <i>Diversity and Distributions</i> . 00(March), 1–18. doi:10.1111/ddi.12488	Thank you. This reference is added in Chapter 2 on trends in the second order draft.
Faulkner, Katelyn	No	4	11	367	11	381	Tables 4.5 and 4.6 or the results from them should be in Chapter 2 on trends and status. They don't include information on impacts	Thank you for your comment. As part of restructure of the chapter, we have deleted those tables from chapter 4 in the second order draft.
Faulkner, Katelyn	No	4	11	367	11	370	What is the definition used in Table 4.5 for IAS? As this table is different to the one above, I presume that this table includes species that have spread but have not had impacts, or impacts are not recorded. If these species haven't had impacts, then the term IAS as used here does not fit the definition outlined in Chapter 2	Thank you for your comment. As part of restructure of the chapter, we have deleted that table from the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	11	382	11	383	Already commented in line 325.	Thank you for your comment. We could not respond as we found no comment on line 325
Singheiser, Martin	No	4	11	383	11	385	From the text, the reference/link for the negative impact values is not clear. If they are extracted from Table 4.6, further explanation is needed, if they refer to table 4.7, it should be added for easier understanding and comprehensive reasons.	Thank you, the chapter has been restructures and this has been clarified in the second order draft
Volpedo, Alejandra	No	4	12	3	12	4	This phrase contradicts what is discussed in Chapter 2 on deep sea.	Thank you for your comment, we have rephrased this statement in the second order draft
Klotz, Stefan	No	4	12	7			Estimating the real impact of alien species on various ecosystem services is particularly problematic because 1. negative factors are overrepresented in the literature If no effects are found, they are not published. 2. the benefits of alien species are usually not considered in the ecological literature. 3 Negative impacts of native species on other native species are not discussed. Native pests are not compared with alien species in the general assessment of economic impacts. If you indicate costs, you must also indicate the benefits and then show the balance. Nor can a farm simply show the costs and leave out the benefits. Costs can also be caused by native species. Damage in the forests due to too large populations of herbivores!	Thank you, we discuss these issues in the methodology section and in the challenges section
Faulkner, Katelyn	No	4	12	393	12	399	Is Table 4.7 different from Table 4.2?	Thank you, these tables have been removed from the second order draft.
Government of Germany	Yes	4	12	393	12	398	The difference between table 4.7 and table 4.2 is not clear, the headings are very similar, but the numbers are not; there also seems to be some repetition in the text in this chapter.	Thank you for your comment. All the tables have been updated in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	12	400	12	402	This Figure should be located earlier in the document, before Table 4.2.	Thank you, this figure has been moved to Chapter 1 (Introduction) in the second order draft.

Takehara, Mari (Government of Japan)	Yes	4	12	400	12	400	Please ensure that the Northern Territories of Japan, namely the Habomai Islands, Shikotan Island, Kunashiri Island and Etorofu Island (See the map here: http://www.mofa.go.jp/territory/index.html) are shown as part of Japan(described in the color of Japan), not as part of Russia in this figure.	Thank you for your comment, agreed.
Taki, Hisotomo	No	4	12	400	12	401	This map could be used in the earlier chapter other than here, or as well as here.	Thank you, this figure has been moved to Chapter 1 (Introduction) in the second order draft.
Feest, Alan	No	4	12	402	12	402	Surely it should be Europe and Northern Asia!!!!!! Look at the map!	Thank you for your comment. We have applied the IPBES categorization on regions in the second order draft.
Government of Ethiopia	Yes	4	12	404	21	678	This section has not captured a lot of information, even for well documented IAS in the region. For example, water hyacinth (Eichhornia crassipes) has caused various types of harmful impacts in Africa (particularly eastern African), and aspects of this weed have been recorded (e.g. a number of studies in Ethiopia). It is good to enrich the section by incorporating some more information.	Thank you very much. By the time of writing we had not finished the review of documented evidence and we are aware there was a particular lack of studies on aquatic plants. We have now updated the database to close these gaps.
West, Vicky	No	4	13	405	13	417	Gaps section - suggest marine a large data gap (I know intimated earlier on but requires additional text). Although often identified the direct impact of marine IAS are often unknown. Despite this due to the nature of the marine realm eradication of IAS can be difficult and as such any impacts can be highly detrimental.	Thank you very much. By the time of writing we had not finished the review of documented evidence and we are aware there was a particular lack of studies on aquatic plants. We have now updated the database to close these gaps. Remaining gaps are described too.
Joshi Rijal, Srijana	No	4	13	408	13	409	Sentence seems incomplete.	Thanks for pointing this out. This is now corrected in the second order draft.
Government of Ethiopia	Yes	4	13	420	13	421	The number of IAS is 186 (144+38+4), not 185 (see table 4.8).	Thanks for pointing this out. All numbers have been updated with our increased number of records in the second order draft
Alejandra Grez Villarreal, Audrey	No	4	13	420	13	420	In Table 4.8, the figure is 186, and in text 185. Change 185 by 186.	Thanks for pointing this out. All numbers have been updated with our increased number of records in the second order draft.
Heringer, Gustavo	No	4	13	424	13	424	I would suggest "Nearly half of the impacts affects nature"	Thanks for pointing this out. All numbers have been updated with our increased number of records in the second order draft.
Joshi Rijal, Srijana	No	4	13	425	12	426	Please check the statement - negative impacts far outweigh the negative impacts.	Thank you for the comment, we have clarified this sentence in the second order draft.
Government of Ghana	Yes	4	13	425	13	425	What does (604) mean.	Thank you, this indicated a draft number of recorded impacts, but has been deleted from the second order draft.
White, Michael	No	4	13	425	13	426	Is this: even in these categories negative impacts far outweigh "positive" impacts?	Thank you for the comment, we have clarified this sentence in the second order draft.
Dinesen, Lars	No	4	13	426	0	426	The word "negative" is repeated thus the sentence does not make sense? Negative impacts far outweigh the negative impacts.	Thank you for the comment, we have clarified this sentence in the second order draft.
Eckert, Sandra	No	4	13	426	13	426	There is an issue with the logic in this sentence "...negative impacts far outweigh the negative impacts."	Thank you for the comment, we have clarified this sentence in the second order draft.
Faulkner, Katelyn	No	4	13	426	13	426	Unclear what categories are being referred to here	Thank you for the comment, we have clarified this sentence in the second order draft.
Kudjawa, Jewel (Government of Ghana)	Yes	4	13	426	13	426	Explain what the sentence mean.	Thank you for the comment, we have clarified this sentence in the second order draft.
Faulkner, Katelyn	No	4	13	428	14	435	Tables 4.8 and 4.9, would be better as figures.	Thank you, we have consolidated the tables but also added figures to illustrate the chapter and impact types across the regions and units of analysis in the second order draft.
Feest, Alan	No	4	13	428	13	428	Why does the order of groups keep changing?	Thank you, we have harmonized this in the second order draft, where appropriate
Government of Ghana	Yes	4	13	428	13	428	The source should be added to the table.	Thank you for your comment. We have clarified this in the second order draft.
Feest, Alan	No	4	13	431	13	431	why positive/negative not following the order in the description?	Thank you, we have revised the chapter to bring more consistency in the second order draft.
Government of Ghana	Yes	4	13	431	13	431	The source should be added to the table.	Thank you for your comment. We have clarified this in the second order draft.
Kühn, Ingolf	No	4	14	99	14	101	I think this should be extended by the notion that (negative) impacts can occur by the decrease of services or the increase of disservices, see e.g. Vaz AS, Kueffer C, Kull CA, Richardson DM, Vicente JR, Kühn I, Schröter M, Hauck J, Bonn A, Honrado JP (2017) Integrating ecosystem services and disservices: insights from plant invasions. Ecosystem Services 23: 94-107. doi: 10.1016/j.ecoser.2016.11.017. or Milanović M, Knapp S, Pyšek P, Kühn I (2020) Linking traits of invasive plants with ecosystem services and disservices. Ecosystem Services 42: 101072. doi: 10.1016/j.ecoser.2020.101072. This can easily be	Thanks for your comment. We have included it in the second order draft.
Eckert, Sandra	No	4	14	436	14	436	Introduce and define the levels of impacts. "level-3 impacts". It has not been introduced/defined yet.	Thank you for your comment. We have included the definition in the second order draft.
Government of Germany	Yes	4	14	436	14	436	No classification of impacts has been introduced in the chapter so far. Please specify what is meant by "level 3 impacts". What other levels exist?	Thank you for your comment. We have included the definition in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	14	436	14	436	Please, define level 3 impacts.	Thank you for your comment. We have included the definition in the second order draft.
Schaffner, Urs	No	4	14	436	14	436	Describe what level 3 impacts means	Thank you for your comment. We have included the definition in the next draft.
Shimura, Junko	No	4	14	436	15	451	Need explanation on "level 3". What is the basis of impact levels determined? Reference?	Thank you for your comment. We have included the definition in the second order draft.
Fumey, Christian (Government of Ghana)	Yes	4	14	438	14	438	Explain what level 3 impact mean.	Thank you for your comment. We have included the definition in the second order draft.
Eckert, Sandra	No	4	14		15		Table 4.10, Table 4.11. Is it possible to move them further down to where they actually are discussed in the text?	Thank you, we have revised the structure of the chapter and made sure to include the tables and figures where they are discussed
Kühn, Ingolf	No	4	15	135	15	143	Or it can be extended here by the notion that (negative) impacts can occur by the decrease of services or the increase of disservices while positive impacts by increased services (NCPs) or decreased disservices, see e.g. Vaz AS, Kueffer C, Kull CA, Richardson DM, Vicente JR, Kühn I, Schröter M, Hauck J, Bonn A, Honrado JP (2017) Integrating ecosystem services and disservices: insights from plant invasions. Ecosystem Services 23: 94-107. doi: 10.1016/j.ecoser.2016.11.017. or Milanović M, Knapp S, Pyšek P, Kühn I (2020) Linking traits of invasive plants with ecosystem services and disservices. Ecosystem Services 42: 101072. doi: 10.1016/j.ecoser.2020.101072. This can easily be adopted to NCPs...	Thanks for this suggested change. We have included it in the second order draft.
Butchart, Stuart	No	4	15	445			This section conspicuously omits the only global indicator currently available showing the impacts of IAS on nature as measured by effects on extinction risk. The Red List Index (impacts of IAS) shows trends in species survival probability (the inverse of extinction risk) driven by IAS, i.e. the balance between negative impacts on species survival owing to threats from IAS, and the positive impacts of successful actions to eradicate or control IAS. It is based on the movement of species between IUCN Red List categories and factors out such re-categorisations resulting from improved knowledge or revised taxonomy, and this version of the RLI factors out genuine shifts between categories driven by factors other than IAS. The data are based on data from mammals (5701), birds (11117), amphibians (6681), corals (842), and cyeads (304). The indicator was used in the IPBES Global Assessment, Global Biodiversity Outlook-5 and other policy reports, papers and processes. The graph and data are available for global & each region (incl IPBES regions) at https://www.iucnredlist.org/search/grid (select "Red List Indices" under "type", "Thematic" and "impacts of IAS". Or contact me at stuart.butchart@birdlife.org if you want more info.	Thank you for this suggestion. This analysis is based on our database (which was still incomplete in the first order draft) of documented evidence of impacts. We have discussed your suggestion with the author team and while we cannot integrate the Red List data into our database we have reported them in a separate paragraph/section taking into account other databases documenting impacts of IAS.
Kudjawa, Jewel (Government of Ghana)	Yes	4	15	446	15	447	Some examples of positive impacts should be provided.	Thanks for this suggested change. We have included it in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	15	447	15	447	I don't see six records of positive impacts in Table 4.9.	Thank you, we have updated the numbers in the second order draft.
Kortz, Alessandra	No	4	15	449	15	452	There should be a definition of level 3 impacts (refer to Table 4.10)	Thank you for your comment. We have included the definition in the second order draft.
Faulkner, Katelyn	No	4	15	451	15	451	Unclear what a "level 3 impact" is	Thank you for your comment. We have included the definition in the second order draft.
Dunn, Christopher	No	4	15	453	15	453	Acacia is misspelled	Thank you for your comment. We have corrected it in the second order draft.
Joshi Rijal, Srijana	No	4	15	453	15	453	Correct spelling of <i>Acacia saligna</i> as <i>Acacia</i> .	Thank you for your comment. We have corrected it in the second order draft.
Schaffner, Urs	No	4	15	454	15	454	Indicate the time period over which native protozooid species did not recover	Thank you for your comment. As part of restructure of the chapter, we have deleted that section in the next draft.
Faulkner, Katelyn	No	4	15	464	16	479	This is a very detailed example, consider putting this information in a box	Thank you for your comment. We have updated it in the second order draft.
Eckert, Sandra	No	4	15	465	15	465	Maybe consider reading and adding Eckert et al., 2020, "Niche change analysis as a tool to inform management of two invasive species in Eastern Africa." It informs about suitable conditions for two IAS trees/shrubs in Eastern African countries.	Thank you for your suggestion. As this chapter focus on impacts, we have not included in the second order draft.
Schaffner, Urs	No	4	15	468	15	470	This study does not provide the numbers for the whole of Afar region; use the numbers published in Shiferaw et al. (2019, Scientific Reports), i.e. approximately 1.17 million ha.	Thank you for your suggestion. We have added this data in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	15	470	15	470	spec??	Thank you for your comment. We have corrected in the second order draft.
Joshi Rijal, Srijana	No	4	15	470	15	470	Suggest to change <i>Prosopis spec.</i> to <i>Prosopis spp.</i> Throughout the document.	Thank you for your comment. We have corrected in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	15	476	15	476	spec??	Thank you for your comment. We have corrected in the second order draft.
Government of Ethiopia	Yes	4	16	481	16	481	The table (4.12) caption needs revising (for better clarity)	Thank you for your comment. We have updated it in the second order draft.
Rüegg, Simon	No	4	16	484	16	491	The OIE database for animal diseases including wildlife should provide more occurrences of negative impacts of invasive microbes on animal populations: https://www.oie.int/en/animal-health-in-the-world/world-animal-health/ . I suspect a similar database should be available for plant pests at the FAO. This would cover all regions of the globe.	Thank you for this suggestion. The link provided is unfortunately broken. Unfortunately, the OIE database did not provide the information about the status of the disease (alien/native) and data on its impacts in a format compatible with our database.
Shimura, Junko	No	4	16	490	16	490	Is "category 3" meaning the same as "level 3"? Consistent terminology is required	Thank you for your comment. We have updated it in the second order draft.
Caceres, Sarah	No	4	16	493	16	505	There could be more examples of impacts on nature of IAS in Indian ocean islands (notably in Reunion island). Please consult references (Cheke 1987, 2010; Macdonald et al. 1991; Mandon-Dalger et al. 2004; Cheke & Hume 2008; Faulquier et al. 2009; Buckland et al. 2014).	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here (but it is now included below in ...)
Caceres, Sarah	No	4	16	496	16	496	Please replace <i>Acridotheres tristis</i> by <i>Acridotheres tristis</i> ; Replace <i>Pycnonotus jocosus</i> by <i>Pycnonotus jocosus</i> .	Thank you for your comment. We have updated it in the second order draft.
Joshi Rijal, Srijana	No	4	16	497	15	500	Substantiate with references.	Thank you for your comment. We have clarified it in the second order draft.
Pisano, Benoit	No	4	16	497	16	497	Lyons and Scott 2000 not referenced. Check throughout many lacking or incorrect references in the literature cited.	Thank you for your comment. Citations and references have been harmonized in the second order draft.
Singheiser, Martin	No	4	16	497	16	497	Clarification is needed: the endangered endemic bird - please name species - or endangered endemic birds - more than one species. I assume that not only one endemic species on Mauritius is threatened by IAS.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft.
Dudgeon, David	No	4	16	507	16	513	Large- and small mouth bass are mentioned in the text here, but do not appear earlier in the text (e.g. in Chapter 2 around L. 2113) where one might expect that they would be mentioned. For completeness, I'd have expected to see rainbow trout mentioned in this paragraph, and perhaps some other examples of noxious freshwater invaders (e.g. <i>Dreissena spp.</i> , <i>Procambrus clarkii</i> , etc.)	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft.
Eckert, Sandra	No	4	16	510	16	510	"category 3 impacts" Introduce and define the levels of impacts. Make sure to use consistent terms (it could be the same as level-3 impacts previously	Thank you for your comment. We have included the definition in the second order draft.
Joshi Rijal, Srijana	No	4	16	510	17	523	Keep scientific name of the species in bracket: consistency should be maintained throughout the chapter.	Thank you, we have harmonized this in the second order draft, where appropriate

Shimura, Junko	No	4	16	526	16	526	Spell out NIS.	Thank you. Most acronyms have been removed from the second order draft.
Feest, Alan	No	4	17	515	17	515	italics	Thank you. This example has been removed from the second order draft.
Joshi Rijal, Srijana	No	4	17	522	17	522	Delete AJAS; Karssing et al. 2012. missing in ref list.	Thank you for your comment. Citations and references has been harmonized in the second
Eckert, Sandra	No	4	17	526	17	526	Define abbreviation used here "NIS"	Thank you. Most acronyms have been removed from the second order draft.
West, Vicky	No	4	17	530	17	530	Structural impacts of M. galloprovincialis and S. algosus but no later mention of them - would suggest that structural impacts to development would be a large negative impact to say transport e.g. harbours, fisheries. Might be nice to include a marine example.	Thank you. In preparation of this chapter we assembled a data set of publications that document scientific evidence - observational or experimental. Unless impacts (not occurrence) in harbours or interference in fisheries is scientifically documented, it does not appear in the
Joshi Rijal, Srijana	No	4	17	533	17	541	Long sentence, rephrase it.	Thank you for your comment. We have corrected it in the second order draft.
Pisanu, Benoit	No	4	17	552	19	623	Throughout the chapter - i was confused by some descriptions of the impacts of IAS to NCP categories. On page 3 - impacts on NCP are defined as follow "Impact to NCP, formerly 'ecosystem services', is defined as a measurable change to the positive contributions, losses or detriments, that people obtain from nature, comprising material, non-material and regulating NCP, of use and non-use value (Pascual et al., 2017; Ellis et al., 2019)." As an example, you indicate that the fall armyworm (lines 558-567) is one of the most destructive crop pests in African countries, citing reduction in crops and cereal yields with severe impact on maize and rice production. But maize is an introduced species that is cultivated - so wouldn't it be better to separate it from "impact on ecosystem services" - and rather being transferred into "impact on GQL" - as reduced food availability affects a good quality of life ? About IAS plant impacts (lines 575-599), i better understand that plants invading rangeland with native grassland offering food resource to livestock do better correspond to an impact on NCP. I'm fully aware that my remark is "occidentally oriented" - based on a particular understanding of "cultural ecosystem services"- and is based on my own vision of "nature" (which i tried to fix in my mind through several keys provided by Ducarme & Couvet 2020	Thank you very much for your feedback. We have revised the chapter and clarified the distinction between nature, NCP and GQL (see also Chapter 1) in the second order draft.
Takahashi, Yasuo	No	4	17	552	20	626	Under the "Impacts on NCP" subsections across regions, realms and taxa, authors may be able to substantiate the assessment of the impacts of IAS on NCP 17 (identities), which currently has scarce evidence, drawing on the findings in section 4.1.4 (P5 L179 - P6 L235).	Thank you, we have updated the numbers and now report on NCP 17 in the second order draft.
Kühn, Ingolf	No	4	18	242	18	242	DAISIE --> DAISIE (2009)? (https://www.gbif.org/dataset/39f36f10-559b-427f-8c86-2d28aff168ca)	Thanks for your comment, we have typed this correctly in the second order draft.
Catford, Jane	No	4	18	254	18	257	It would be helpful to include statement/discussion on the implications of these gaps for how people should interpret trends	Thank you for your comment. We have clarified how these gaps affect the interpretation of the assessment in the second order draft.
Daguitan, Florence	No	4	18	558	18	567	Among the Ifugao people, army worms are managed through the ritual called <i>holok</i> . (See https://sgp.undp.org/spacial-itemid-projects-landing-page/spacial-itemid-project-search-results/spacial-itemid-project-detailpage.html?view=projectdetail&id=4019)	Thank you for your comment. In the second order draft, we have added more examples related to ILK, including on the Ifugao people - but we haven't included this specific example as Chapter 4 doesn't focus on management
Eckert, Sandra	No	4	18	567	18	567	"...pest reaching the region." please specify which region.	Thank you for your comment. We have revised it in the second order draft.
Eckert, Sandra	No	4	18	572	18	572	consider converting british pounds into US Dollars to make it comparable to the other mentioned costs/values that are all provided in US Dollars.	Thank you very much. Original sentence does not exist any more, but consistency in currency has been considered in the second order draft.
Joshi Rijal, Srijana	No	4	18	572	18	572	Replace m with million " £ 1-2 m".	Thank you for your comment. We have revised it in the second order draft
Dunn, Christopher	No	4	18	575	19	599	An interesting example to also include is the role of the invasive mangrove in Hawai'i. Yes, mangroves can be invasive! In Hawai'i, the mangroves have drastically altered Native Hawaiian fishponds and other cultural uses and management of near-shore systems.	Thanks for the comment. This section of the chapter just deals with impacts of IAS in Africa, but we agree the impact should be included in our database.
Dunn, Christopher	No	4	18	575	18	577	This sentence is awkward and unclear. Needs to be rewritten.	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	18	575	19	599	Suggested reference to look for - Nigatu et al. 2010 Impact of Parthenium hysterophorus on grazing land communities in north - eastern Ethiopia;	Thank you for the suggestion. This reference is part of our evidence database already. We cannot cite all references from our database in the second order draft.
Joshi Rijal, Srijana	No	4	18	585	18	585	Check the reference (Tamado and Milberg, 2000). In reference list it is 2002.	Thank you for your comment. Citations and references have been corrected in the second
Joshi Rijal, Srijana	No	4	18	587	18	589	This sentence can be deleted as the reference is from Pakistan and it is here mentioned in Africa section. It seems this statement is unnecessary repetition and also mentioned under Asia section Line -2724-2726.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft.
Joshi Rijal, Srijana	No	4	18	591	18	592	Check the reference (Tamado et al 2002). It is missing in ref list.	Thank you for your comment. Citations and references have been revised in the second order
Catford, Jane	No	4	19	278	19	280	good acknowledgement of gaps. would be nice to try to account for study effort somehow (e.g. number of papers published on topic in total) to give an estimate of size of likely gaps by looking at relative study in each country/issue for example	Thank you for this suggestion. In the second order draft, we have included an analysis to give an estimate of size of likely gaps in each IPBES region
Eckert, Sandra	No	4	19	616	19	616	define abbreviation used here "NCL"	Thank you for your comment. We have revised it in the second order draft
Government of Germany	Yes	4	19	616	19	616	Question: What is meant by NCL? (Was NCP meant here?)	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	19	616	19	616	What does NCL stand for - Define the acronym NCL as this is mentioned for first time or I suspect it is NCP.	Thank you for your comment. We have revised it in the second order draft
Dudgeon, David	No	4	19	619	19	619	Which crayfish? I'd think P. clarkii is a bigger problem than the Cherax that is mentioned.	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	19	620	19	623	Reference needed.	Thank you for your comment. Citations and references have been harmonized in the second
Eckert, Sandra	No	4	19	622	19	623	"making the unsuitable for sale" something is wrong with this sentence	Thank you for your comment. We have revised it in the second order draft
Dudgeon, David	No	4	19	623	19	623	The last sentence does not make sense.	Thank you for your comment. We have revised it in the second order draft
Government of Germany	Yes	4	20	650	79	2250	It is suggested to introduce and explain the idea of "constituents of well-being" in 4.2.1 (types of impacts).	Thank you for your comment. We have included it in the second order draft
Joshi Rijal, Srijana	No	4	21	649	21	651	Please rephrase it correctly.	Thank you for your comment. We have revised it in the second order draft
Schaffner, Urs	No	4	21	680	23	737	Box 4.1: I think this box needs considerable revision. Statements like "Mesquite also provides benefits to people and from the records analysed there were more positive (14) than negative (12) impacts, not taking into account the scale of impacts assessed" are likely to confuse policymakers. Of course, deliberately introduced IAS have some positive impacts, which is why they were originally introduced. The question is whether their invasive character leads to a situation where the negative impacts outweigh these positive impacts. The other key question is whether the positive impacts can be taken over by other, non-invasive species, thereby preventing trade-offs among ecosystem services or between biodiversity and ecosystem services. The sentence on L.709 starts with a "However", implying that the study cited in the previous sentence did not consider potential positive impacts; this is not correct, because the applied method, a choice experiment method, is one of the methods that allows integration of positive and negative effects. The notion that Proposis is "also used extensively for feeding livestock" should be amended by the statement that "it can only be fed up to a certain percentage of the animal feed and thus loses its value when the	Thanks for your comment. The box has been revised and the sentences mentioned by the reviewer were rephrased in the second order draft.
Joshi Rijal, Srijana	No	4	21	683	21	683	Please check the reference if it R T Shackleton et al.2014 a or b . references is same for a and b; please correct in reference as well.	Thank you for your comment. Citations and references have been harmonized in the second
Joshi Rijal, Srijana	No	4	22	704	22	704	Please check and add the reference Walter and Armstrong, 2014 a or b.	Thank you for your comment. Citations and references have been harmonized in the second
Taki, Hisotomo	No	4	23	738	23	739	Ton right is missing.	Thank you for your comment. We have revised it in the next draft.
Catford, Jane	No	4	23	general			I want to commend the authors on the huge amount of work done in preparing this draft! Truly impressive	Thank you for your comment.
Heringer, Gustavo	No	4	24	750	24	750	A general observation about this section. Considering the unbalanced number of studies, the number of invasive species, and socio-economic conditions between North America and Latin America (Bellard C and Jeschke JM 2015 - DOI: 10.1111/cobi.12611; van Kleunen M et al. 2015 - DOI: 10.1038/nature14910; Nuñez MA et al. 2019 - DOI: 10.1111/1365-2664.13319; Pyšek P et al. 2019 - DOI:10.1111/geb.12891), I would recommend an explicit comparison between both in an additional subsection. The numbers from North America probably inflated the results for America. In addition, several studies highlighted the need for more studies in Latin or Southern America (Bellard C and Jeschke JM 2015 - DOI: 10.1111/cobi.12611; Nuñez MA et al. 2019 - DOI: 10.1111/1365-2664.13319; Pyšek P et al. 2019 - DOI:10.1111/geb.12891) and it did appear here due to this inflation. I'm pretty sure both regions need to distinct scientific and political directions and the merge of the results for North with Latin America makes it difficult to note that.	Thank you for this suggestion. We have chosen to include a comparison between North America and Latin America in the second order draft
Alejandra Grez Villarreal, Audrey	No	4	24	759	24	764	Is there any analysis that rules out that this could be a bias due to most invasion scientists work with terrestrial plants? (I see biases are discussed later in the	Thank you for your comment. We have revised it in the second order draft
Faulkner, Katelyn	No	4	25	767	25	767	Figure 4.4 is useful	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Feest, Alan	No	4	25	781	25	781	reducing biodiversity meaning what? Loss of biodiversity meaning what?	Thank you for your comment. We have revised it in the second order draft
Kortz, Alessandra	No	4	25	781	25	781	There should be a more precise definition of what does "reduce the biodiversity" mean. For instance, this could be related to decreases in species richness, abundance, and/or biodiversity homogenization. Consider editing to "biodiversity change".	Thank you for your comment. We have revised it in the second order draft
Castano Arboleda, Nicolás	No	4	25	783	25	784	Add reference (Baptiste et al. 2015. Análisis de riesgos y propuesta de categorización de especies introducidas para Colombia.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Heringer, Gustavo	No	4	26	785	26	785	I would recommend mentioning Brazil. Acacia mangium also have been causing a set of impacts in the Brazilian Atlantic Forest region, as published recently (e.g., Heringer et al. 2019a - DOI: 10.1007/s10530-019-01955-5; Heringer et al. 2019b - DOI: 10.1007/s10530-019-02024-7; Heringer et al. 2020 - DOI: 10.1007/s10530-019-01955-5)	Thank you for your suggestion. The positive feedback is greatly appreciated by the chapter authors. We have added these references for Brazil in the second order draft
Kortz, Alessandra	No	4	26	789	26	790	Consider including the citation Pivello et al.1999 on alien grasses as a threat to Brazilian savanna biodiversity (10.1023/A:1008933305857)	Thank you for your suggestion, we have added this reference for Brazil in our database
Feest, Alan	No	4	26	794	26	795	reducing biodiversity meaning what? Loss of biodiversity meaning what?	Thank you for your comment. We have revised it in the second order draft
Singheiser, Martin	No	4	26	796	26	796	Please check the example of the Burmese python: Python bivittatus is a distinct species and not longer belonging as a subspecies to Python molurus. The Burmese python P. vittatus originally belongs to SE-Asia where it lives in marshy areas and now is invasive in Florida. Python molurus also known as the Indian rock python or Asian rock python is originally from India and stays smaller than the Burmese python. Reference: Jacobs, H.J.; Auliya, M.; Böhm, W. (2009). "On the taxonomy of the Burmese Python, Python molurus bivittatus KUHLE, 1820, specifically on the Sulawesi population". Sauria. 31: 5–11.	Thank you for your comment. We have checked the Taxonomy of this species in the second order draft

Alejandra Grez Villarroel, Audrey	No	4	26	803	27	805	Table 4.16, 1) very impressive that only three AIS are described to cause significant impacts in mediterranean forests, woodlands and scrub. Is that correct? It does not seem to be the case in central Chile, an area where IAS are considered one of the main threats to biodiversity. 2) Was the negative effect of Harmonia axyridis on the abundance and richness of native ladybird species in cultivated areas of Chile (Grez et al. 2016) and others parts of the Americas considered in this table? (also Coccinella septempunctata). Harmonia axyridis is considered a model of IAS, and its negative impact has been widely described (Brown et al. 2018; Roy & Wajnberg, 2008). 3) Curious that no axyrid effect of IAS on GQL are described for Urban/Semi-urban areas (e.g., monk parakeet Myiopsitta monachus, invasive in several countries of the Americas and other parts of the world)	Thank you for your comment. 1) We have included information on invasive alien species of South American animals in the second order draft 2) We have revised it in the second order draft 3) numbers have been revised in the second order draft
Heringer, Gustavo	No	4	26	803	26	805	It is not possible to distinguish positive from negative impact in the table. Add both impacts to the table would be much more informative. I would suggest the same template used in table 4.17.	Thank you for your comment. We have revised it in the second order draft
Heringer, Gustavo	No	4	26	803	26	805	The meaning of N, NCP, and GQL should be reinforced in the caption of the table.	Thank you for your comment. In the second order draft, we reinforced the meaning of N, NCP and GQL in the caption of the table.
Catford, Jane	No	4	27	481	27	483	units?	Thank you for your comment. We have updated it in the second order draft.
Kortz, Alessandra	No	4	27	813	27	813	There should be a definition on reduction of performance of native species.	Thank you for your comment. We had included an explanation of impact magnitudes in the second order draft
Pisanu, Benoit	No	4	27	816	27	818	Very hard sentence. Should be rephrased.	Thank you for your comment. We have rephrased the sentence in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	27	821	27	822	Isn't this represented in Fig. 4.6 instead of 4.5? I do not see local/global extinctions in Fig. 4.6.	Thank you for your comment. Reference to the figure has been revised in the second order
Alejandra Grez Villarroel, Audrey	No	4	27	822	27	823	Check these numbers (% for each realm).	Thank you for your comment. We have corrected the numbers in the second order draft
Schaffner, Urs	No	4	28	825	28	825	Table 4.17: I do not understand this table; are there indeed 20 records of invasive plant species causing impact on native invertebrates and exactly the same number of records of invasive invertebrates causing impacts on native plant species? How can the low number of records of impacts by invasive alien invertebrates and the lack of records of impacts by invasive alien diseases on native plant species be explained, considering that the list of forest IAS for Canada alone includes some 80 insect pests and diseases and impacts have been documented for several if not many of these forest IAS. I noted that the review has not been completed, does that mean these and other numbers will still increase substantially?	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft
West, Vicky	No	4	28	825	28	825	Not sure Table 4.17 is required - it doesn't add much and doesn't fit particularly well with the surrounding text.	Thank you for your comment. We decided to change several tables in the second order draft
Faulkner, Katelyn	No	4	28	827	28	829	The colours of the bars in Figure 4.6 should be ordered in the same way for each grouping, this would make it easier to interpret the results.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have changed the figure in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	28	827	28	828	Fig. 4.6, please check why the colors of the bars are in different order, and see if it is correct what is described in lines 815-816.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have changed the figure in the second order draft
Taki, Hisatomo	No	4	28	827	28	828	It may be better to show them in the same order, plants vertebrates and invertebrates.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have changed the figure in the second order draft
West, Vicky	No	4	28	827	29	831	More explanation required in the figure legend - what is the difference between reduced and population decline - I understand what you are trying to show with these figures but further description will make these more useable.	Thank you for your comment. As part of restructure of the chapter, we have deleted that figure in the second order draft
Faulkner, Katelyn	No	4	29	830	29	831	Good use of Figure 4.7. Need to demonstrate results consistently throughout the chapter. Figures are used in some sections, tables in others	Thank you for your comment. We have updated the tables and figures in the second order draft to be more consistent.
Mc Kay, Fernando	No	4	29	830	29	856	Line 850, Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia was recently recircumscribe to include Eichhornia species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Commeliniales) sheds light on the necessity of its recircumscription and synopsis of Pontederia L. Phytotaxa 368: 25–83. doi:10.3897/phytokeys.108.27652	Thank you very much. According to the Plant List <i>Euchronia</i> is the accepted name
Joshi Rijal, Srijana	No	4	29	839	30	871	It is worth citing reference of Pimental et al. 2000 in this section. "Pimental D, Lach L, Rodolfo Z, Morrison D (2000) Environmental and Economic Costs of Nonindigenous Species in the United States. Bioscience 50:53."	Thank you for your suggestion. The positive feedback is greatly appreciated by the chapter authors. We have added this reference in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	29	841	29	841	León Cordero et al., 2016 not in the references.	Thank you for your comment. Citations and references have been harmonized in the second
Alejandra Grez Villarroel, Audrey	No	4	29	846	29	852	Based on the definition of IAS (Lines 89-90), what are the threats of these IAS that have positive impacts?	Thank you for your comment. We have revised the definition in the second order draft
Government of Germany	Yes	4	30	867	30	868	Question: It isn't clear what is meant by "upwards of 41%" (Does this mean that 59% are under threat?). Please reformulate.	Thank you for your comment. We have rephrased the sentence in the second order draft.
Faulkner, Katelyn	No	4	30	872	30	878	Which impact classification scheme is used in Figure 4.8? Was this scheme only used for the Americas? Ideally the same scheme should be used for all regions.	Thank you for your comment. We have clarified it in the second order draft
Joshi Rijal, Srijana	No	4	31	816	31	816	What does NIS stand for - abbreviation needed.	Thank you for your comment. Most of the acronyms are spelled out in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	31	880	33	980	There is a very well developed analysis for Marine IAS, with several detailed examples. But not a similar analysis for terrestrial or freshwater systems?	Thanks for your comment. We have included more detailed examples for the terrestrial or freshwater systems in the second order draft.
Alejandra Grez Villarroel, Audrey	No	4	31	886	31	886	Define NIS	Thank you for your comment. We have clarified it in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	31	895	31	898	This refers to marine IAS?	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft
Dudgeon, David	No	4	31	907	31	907	Something wrong with the citation.	Thank you for your comment. Citations and references have been harmonized in the second
Takahashi, Yasuo	No	4	33	982	36	1035	Under the "Impacts on NCP" subsections across regions, realms and taxa, authors may be able to substantiate the assessment of the impacts of IAS on NCP 17 (identities), which currently has scarce evidence, drawing on the findings in section 4.1.4 (P5 L179 - P6 L235).	Thank you, we have updated the numbers and now report on NCP 17 in the second order draft.
Government of Germany	Yes	4	33	988	33	989	Question: What is meant by "IAS that support peoples identities"?	Thank you for your comment. We have rephrased the section in the second order draft
Heringer, Gustavo	No	4	33	1006	33	1006	Considering the extension of the document could be interesting to avoid using the abbreviated scientific name. For instance, using Pinus patula instead P. patula.	Thank you for your comment. We have used the full scientific names in the second order draft, where possible.
Faulkner, Katelyn	No	4	34	1033	36	1035	Table 4.18 would be better as a figure.	Thank you for your suggestion. We have changed several tables in the second order draft
Alejandra Grez Villarroel, Audrey	No	4	34	1033	36	1035	Table 4.18: it would be nice to better describe the results of this table.	Thank you for your suggestion. We have changed several tables in the second order draft
Government of Germany	Yes	4	36	1047	36	1049	In addition to its IAS characteristics, you may wish to consider studies that show that Calotropis procera has the potential invading degraded areas (ALMEIDA et al., 2019: https://www.scielo.br/scielo.php?pid=S1983-21252019000200543&script=sci_arttext#B3). In some drylands, it is therefore also considered being	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Joshi Rijal, Srijana	No	4	36	1047	36	1047	Replace are with have.	Thank you for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Joshi Rijal, Srijana	No	4	37	1091	37	1093	Correct the figure "38 species to GQL" to 157 species.	Thank you for your comment. All the numbers have been updated in the second order draft based on the further development of the database.
Eckert, Sandra	No	4	37	1095	38	1097	Improve Table 4.20 Not all columns are clearly labelled. Thus it is unclear what the second and third column represent.	Thank you for your comment. We have updated the tables in the second order draft
Faulkner, Katelyn	No	4	37	1095	38	1097	Table 4.20 is confusing, and is formatted differently to other tables in the chapter	Thank you for your comment. We have updated the tables to be more consistent through the chapter in the second order draft
Schaffner, Urs	No	4	38	1107	38	1107	Table 4.21: see comment above; maybe the number of invertebrates causing negative impacts on Nature in terrestrial realms of the Asia-Pacific region will also be much higher at the end of the review.	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the updated database
Pisanu, Benoit	No	4	39	1122	39	1122	Table 4.24	Thank you for your comment. We have revised it in the second order draft
West, Vicky	No	4	39	1124	39	1124	Could the descriptor for Table 4.22 be clarified, not 100% clear what this is trying to show	Thank you for your comment. All the tables have been updated in the second order draft
Joshi, Chudamani	No	4	39	1126	39	1127	Table 4.22 included very limited number of species, the table doesn't provide a realistic picture.	Thank you for your comment. All the tables have been updated in the second order draft based on the further developed database.
West, Vicky	No	4	39	1128	39	1128	Could Table 4.23 be combined in some way with Table 4.20 above - there are quite a lot of tables in this section and detract from some of the messages - they also overlap in what they are showing so makes it hard to determine results	Thank you for your comment. All the tables have been updated in the second order draft to make it consistent through the chapter.
Dudgeon, David	No	4	40	1132	40	1132	The cane toad (R. marina) is a problem as an invasive in its adults stage which is terrestrial. I would not regard it as a freshwater species or belonging to the freshwater realm.	Thank you for your comment. As part of restructure of the chapter, we have deleted that table in the second order draft
Schaffner, Urs	No	4	40	1132	40	1132	See comment above regarding cane toad	Thank you for this suggestion. We have chosen to include an explanation about the unit of analysis used in second order draft (Chapter 1)
West, Vicky	No	4	40	1132	40	1132	Not sure of the value of this table - Rhinella marina has the most positive number of cases at 17 but it has 123 recorded negative cases so not sure what this is trying to achieve	Thank you for your comment. All the tables have been updated in the second order draft
Lozan, Aurel	No	4	42	898	42	898	With clear corroboration evidence in the island-endemic butterflies (e.g. Lozan et al., 2008).	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft
Lozan, Aurel	No	4	42	898	42	898	With clear corroboration evidence in the island-endemic butterflies (e.g. Lozan et al., 2008).	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft
Lozan, Aurel	No	4	42	899	42	899	A DNA evidence proved that an introduced braconid parasitoid insect (Cotesia glomerata) can threaten the Canary Island Large White butterfly (Pieris cheiranthi), an island-endemic of laurel forests unique to the Canary Islands of Macaronesia (see Lozan et al., 2008)	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft
Lozan, Aurel	No	4	42	899	42	899	A DNA evidence proved that an introduced braconid parasitoid insect (Cotesia glomerata) can threaten the Canary Island Large White butterfly (Pieris cheiranthi), an island-endemic of laurel forests unique to the Canary Islands of Macaronesia (see Lozan et al., 2008)	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft
Faulkner, Katelyn	No	4	43	1149	43	1149	Figure 4.9 presents the results for the IPBES units of analysis for Asia Pacific. Similar figures are not shown for other regions. Are these results available for other regions? Should be consistent	Thank you for your comment. We have restructured in the second order draft to be more consistent.

Eckert, Sandra	No	4	45	1192	45	1193	Improve figure 4.14. what is the unit on Y-axis? add taxon to the three plots.	Thank you for your comment. All the figures have been updated in the second order draft with clear legend and XY-axis.
Pisanu, Benoit	No	4	45	1194	45	1194	Fig. 4.14: Y-axis labels = Percentage of species - not Number of species	Thank you for your comment. All the figures have been updated in the second order draft with clear legend and XY-axis.
Pisanu, Benoit	No	4	46	1203	46	1208	Parasites are often secretive organisms, but not always. Those organisms have not been ignored in Ecology - but surely in Invasion Biology. But see Dunn A (2009) https://www.sciencedirect.com/science/article/abs/pii/S0065308X0806076 Special Feature INVASIONS AND INFECTIONS, in Functional Ecology - Volume 26, Issue 6 Pages: 1231-1460 December 2012 https://besjournals.onlinelibrary.wiley.com/doi/10.1111/j.1365-2435.2012.26/6	Thank you very much. Yes, indeed.
Joshi Rijal, Srijana	No	4	46	1225	46	1225	Correct authors name Carengie as Carnegie.	Thank you for your comment. Citations and references have been harmonized in the second order draft
Joshi Rijal, Srijana	No	4	49	1294	49	1294	rephrase About half these examples to About half of these examples	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	49	1302	49	1303	Replace (Eupatorium glandulosum) with Ageratina adenophora, as throughout the document Ageratina is used (Eupatorium glandulosum) is a synonym).	Thank you for your comment. We have decided to use Eupatorium glandulosum consistently in the chapter in the second order draft.
Joshi Rijal, Srijana	No	4	49	1305	49	1305	Suggest adding reference related to negative impact on habitat. For example mikania micrantha which is one of the 100 world worst weed and have caused threat to the one-horned rhinoceros (Rhinoceros unicornis) habitat" Murphy, S. T., Subedi, N., Jwawi, S. R., Lamichhane, B. R., Upadhyay, G. P., Kock, R., & Amin, R. (2013). Invasive mikania in Chitwan National Park, Nepal: the threat to the greater one-horned rhinoceros Rhinoceros unicornis and factors driving the invasion. <i>Oryx</i> , 47(3), 361-368."	Thank you, this example has been added (with a different reference) in the second order draft
Taki, Hisotomo	No	4	50	1321	50	1322	It is hard to read the text in the figure.	Thank you for your comment. All the figures have been updated in the second order draft
Takahashi, Yasuo	No	4	53	1390	55	1467	Under the "Impacts on NCP" subsections across regions, realms and taxa, authors may be able to substantiate the assessment of the impacts of IAS on NCP 17 (identities), which currently has scarce evidence, drawing on the findings in section 4.1.4 (P5 L179 - P6 L235).	Thank you for your comment, yes, numbers have been updated in the second order draft
Pisanu, Benoit	No	4	54	1414	54	1414	negatively	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	55	1429	55	1432	Reference missing at the end of the sentence after levels.	Thank you for your comment. Citations and references have been harmonized in the second order draft
Singheiser, Martin	No	4	55	1432	55	1435	Although there are many feral camels in Australia, the effect of CO2 emissions is independent of being an IAS or not. There are obviously other aspects of massive CO2 emissions regarding extensive farming. I would delete this example.	Thank you, this example has been deleted from the second order draft
Joshi Rijal, Srijana	No	4	55	1437	55	1467	Some reference related to positive impact of Eichhornia crassipes linking to NCP can be added in this section.	Thank you for your comment. We cannot add additional text to the chapter due to word length
Eckert, Sandra	No	4	55	1449	55	1551	how can one produce charcoal from Chromolaena odorata? Also the local name of "White forest killer" makes no sense to me. Please clarify/explain.	Thank you for your comment. We have revised the section in the second order draft
Dunn, Christopher	No	4	55	1456	55	1456	"than" should be "that"	Thank you for your comment. We have revised it in the second order draft
Dunn, Christopher	No	4	56	1477	56	1478	Hawai'i might be a special case and deserve some specific discussion. It is the most isolated land mass in the world; is the endemic species "capital" of the world; the invasive species "capital," and has the highest percentage of endangered species.	Thank you. We have included several examples from Hawai'i in the second order draft but cannot dedicate a section to it because of length restrictions
Government of Australia	Yes	4	57	1517	57	1537	Consider including toxic dinoflagellates e.g. Hallegraeff, G. M. (1992). "Harmful algal blooms in the Australian region." <i>Marine Pollution Bulletin</i> 25(5-8): 186-190.	Thank you for this suggestion. The status of many of these dinoflagellates as alien is uncertain and thus we didn't include them.
West, Vicky	No	4	57	1530	57	1530	Information concerning impacts is meagre, and mostly confined to national publications' - remove sentence, repeated from above	Thank you for your comment. We have revised it in the second order draft
Government of Australia	Yes	4	58	1539	58	1560	The likely impact of A. amurensis on spotted handfish (Brachionichthys hirsutus) is worth considering: Edgar, G. J., et al. (2017). "New opportunities for conservation of handfishes (Family Brachionichthyidae) and other inconspicuous and threatened marine species through citizen science." <i>Biological Conservation</i> 208(Supplement C): 174-182. Also the impact of New Zealand screw shell (Maoricolpus roseus) on the epifauna of south-east Australia e.g. Bax, N. J., et al. (2003). Distribution and biology of the introduced gastropod, Maoricolpus roseus (Caenogastropoda: Turritellidae) In Australia. Hobart, Centre for Research on Introduced Marine Pests (CRIMP): 40. And Reid, A. P., et al. (2018). "Impacts of the New Zealand screwshell Maoricolpus roseus on growth and condition of juvenile commercial scallops Pecten fumatus." <i>Marine Ecology Progress Series</i> 604: 173-185.	Thank you for your comment. Edgar et al. 2017 wrote "the ultimate cause of the population decline remains unknown, potential factors include predation of eggs by the introduced Northern Pacific seastar (Asterias amurensis), lack of available habitat structure for deposition of eggs, and poor environmental condition throughout the current known range of the species at the mouth of the Derwent Estuary near Hobart". Ch. 4 dataset is limited to quantitative observational/experimental evidence. Studies documenting the impacts of Maoricolpus roseus
Rius Viladomiu, Marc	No	4	58	1540	58	1560	The species Pyura praeputialis (Castilla, J.C., Guñez, R., Caro, A.U. & Ortiz, V. 2004a. Invasion of a rocky intertidal shore by the tunicate Pyura praeputialis in the Bay of Antofagasta, Chile. Proceedings of the National Academy of Sciences of the USA 101, 8517-8524) and Mytilus galloprovincialis (Branch GM, Steffani CN (2004) Can we predict the effects of alien species? A case-history of the invasion of South Africa by Mytilus galloprovincialis (Lamarck). <i>J Exp Mar Biol Ecol</i> 300:189-215) should be included here. The first forms large aggregates that conform the largest biomass ever reported in intertidal ecosystems and the second species has colonised thousands of kilometers of coastlines. Both displace	Thank you for your comment. These literatures have been added to the database for the statistical analysis.
Feest, Alan	No	4	59	1596	59	1596	Nicobar Islands	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	59	1596	59	1596	Please correct the spelling Niobar as Nicobar.	Thank you for your comment. We have revised it in the second order draft
White, Michael	No	4	59	1596	59	1596	Nicobar	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	60	1642	60	1662	This section can provide more examples from Asia in terms of the total annual loss caused by invasive alien species.	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft
Government of Germany	Yes	4	60	1665	73	2053	The choice of subchapters is not clear to me. For Europe, there are the following subchapters: "Gaps", "Summary", "Impacts on Nature", "Impacts on NCP" and "GQL", Impacts on Terrestrial invertebrates and "Marine impacts" (Nature, NCP). The subheadings for the other regions, e.g. for Africa, are different ones. I could not see why that is the case. The chapters describing each IPBES region would need to be streamlined. There are too many data tables, and the data description should be reduced to a readable amount.	Thank you for your comment. We have restructured the chapter in the next draft.
Schaffner, Urs	No	4	62	1710	62	1710	Table 4.41 and elsewhere: It is not surprising that most positive impacts on NCP are reported from plant IAS, as many of them were deliberately introduced, often because the can provide some NCP. This raises the question whether a comparison of 'positive' and 'negative' impacts on NCP is really the type of information policymakers and other stakeholders need for decision-making. In my opinion, more relevant questions are a) whether overall the negative effects of an IAS outweigh the positive ones (not in numbers, or b) whether other, non-invasive species can provide the same positive impacts on NCP as a particular	Thanks for this comment. We agree with this comment and have discussed it in the Chapter.
Singheiser, Martin	No	4	62	1715	62	1717	The American mink (Mustela vison) might be added as well.	Thanks for your suggestion. Mustela is now included in the list of invasive alien species (top 10 by #records) causing maximum impact on Nature in the terrestrial realm, by the affected
Joshi Rijal, Srijana	No	4	63	1765	63	2053	Recommend to check below reference and add example and reference in this section "Kettunen, M., Genovesi, P., Gollash, S., Pagad, S., Staffinger, U. ten Brink, P. & Shine, C. 2009. Technical support to EU strategy on invasive species (IAS) - Assessment of the impacts of IAS in Europe and the EU (final module report for the European Commission). Institute for European Environmental Policy (IEEP), Brussels, Belgium, 44 pp. + Annexes."	Thank you for this reference. We have included it in the second order draft
Takahashi, Yasuo	No	4	63	1765	64	1796	Under the "Impacts on NCP" subsections across regions, realms and taxa, authors may be able to substantiate the assessment of the impacts of IAS on NCP 17 (identities), which currently has scarce evidence, drawing on the findings in section 4.1.4 (P5 L179 - P6 L235).	Thank you for this comment. In the second order draft impacts on NCP identities have been explored more deeply
West, Vicky	No	4	64	1794	64	1796	Can you elaborate more on what some of these impacts are?	Thank you for this suggestion. We have extended on this issue in several places of the Chapter in the second order draft
Joshi Rijal, Srijana	No	4	64	1801	64	1803	Table 4.42: Suggest to remove "comma" add / after negative impact figures.	Thank you for your comment. All the tables have been updated in the second order draft
Girod, Christophe	No	4	66	1818	66	1820	In France, Ragweed cost is estimated at 40 millions euros per year, only in the Auvergne-Rhône-Alpes region (estimation provided by Regional Health Agency, in 2020, which is the most affected one (as an inhabitant of this region, I confirm the high affection and health cost of this species:))	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
West, Vicky	No	4	66	1818	66	1820	This is very interesting, can you say what the cost is? Being the only example it is interesting to see what impact it could have	Thank you, this example has been deleted in the second order draft, but you can find more information on costs in Box 4.12
Singheiser, Martin	No	4	66	1857	66	1859	One might add the crayfish-plague as well.	Thank you for your suggestion. We have included it in the second order draft
West, Vicky	No	4	66	1859	66	1859	Please do expand - interesting to note more commercial impacts such as clogging/ impacts to water canals.	Thank you for your suggestion. We have extended on this impact a bit more in the second order draft
Kühn, Ingolf	No	4	72	1677	72	1677	See e.g. Kumschick S, Bacher S, Dawson W, Heikkilä J, Sendek A, Pless T, Robinson T, Kühn I (2012) A conceptual framework for prioritization of invasive alien species for management according to their impact. <i>NEOBIOA</i> 15: 69-100. doi: 10.3897/neobiota.15.3323, or Milanović M, Knapp S, Pyšek P, Kühn I (2020) Linking traits of invasive plants with ecosystem services and disservices. <i>Ecosystem Services</i> 42: 101072. doi: 10.1016/j.ecoser.2020.101072.	Thank you, this reference has been forwarded to Chapter 5 (management) for their consideration
Joshi Rijal, Srijana	No	4	72	2043	72	2044	Please check the reference is either incomplete or wrongly cited Mineur et al. (Frederic Mineur et 2043 al., 2014)	Thank you for your comment. Citations and references have been updated in the second order draft
Hughes, Kevin	No	4	73	2056	73	2058	It seems odd to mention the land, and then expand upon freshwater bodies, but make no mention of the marine environment (see AH McCarthy, LS Peck, KA Hughes, DC Aldridge. 2019. Antarctica: The final frontier for marine biological invasions. <i>Global change biology</i> 25 (7), 2221-2241). The general review by Cavicchioli (2015) on microbes in lakes might also be supplemented by Cowan, D. A. Chown, S. L., Convey, P., Tuffin, M., Hughes, K. A., Pointing, S., Vincent, W. F. (2011). Non-indigenous microorganisms in the Antarctic - assessing the risks. <i>Trends in Microbiology</i> 19: 540-548. I am not sure it is fair to say there are 'many' land-based waterbodies on the continent. Compared to other continents, ice-free land in Antarctica is scarce and lakes on ice-free land	Thank you, this sentence has been removed from the second order draft.
Hughes, Kevin	No	4	73	2056	73	2057	The authors mention the areas south of latitude 60oS, but this may seem a rather arbitrary boundary to the readers. Would it be helpful to say that this marks the boundary of the Antarctic Treaty area?	Thank you for your suggestion, this is edited in the second order draft
Hughes, Kevin	No	4	73	2056	73	2056	The section heading talks about the sub-Antarctica islands, but this line refers to the Antarctic maritime islands. In terms of biogeographic zones, the maritime Antarctic is generally not considered to include sub-Antarctica islands, so the authors may like to consider clarifying the scope of this section. I've just realised that the first sentence is actually meant to be the section heading. This should be corrected.	Thank you, this section heading has been revised accordingly in the second order draft
Hughes, Kevin	No	4	73	2062	73	2065	Concerning flies, do the authors want to include the Boreas sp. found at Cierva Point? I am not aware of a non-native nematode in Antarctica (but I am sure they will have been introduced over the years), but wonder if the authors would like to mention the introduced enchytraeid worm Christensenidrilus blocki that has been persistent on Signy Island for several decades. See the supplementary material to: Hughes, Kevin A., Petriera, Luis R., Molina-Montenegro, Marco A., Convey, Peter. (2015) Biological invasions in terrestrial Antarctica: what is the current status and can we respond?. <i>Biodiversity and Conservation</i> , 24, 1031-1055. 10.1007/s10531-015-0896-6	Thank you very much. The entire Antarctica box was rewritten - the Antarctic continent and its nearby islands were separated from the sub Antarctic islands - some of them are remote from the south pole as Ireland from the north pole. Your important work IS cited in the second order draft and your comments are much appreciated.
Hughes, Kevin	No	4	73	2062	73	2062	The authors write 'Currently, invasive species are limited to those in terrestrial systems' and then go on to list several species. This contradicts earlier table showing only one invasive species in the terrestrial environment. Perhaps the authors should change 'invasive' to 'non-native'	Thank you, this has been revised accordingly in the second order draft.

Hughes, Kevin	No	4	73	2065	73	2065	Again, it would be helpful to be more precise regarding the use of the terms non-indigenous and IAS. I don't think any populations of IAS have been eradicated from Antarctica (certainly from the sub-Antarctica, but not within the Antarctic Treaty area).	Thank you very much. The entire Antarctica box has been rewritten in the second order draft.
Hughes, Kevin	No	4	73	2069	73	2070	I would agree that 'Surveillance for and information about non-indigenous species in the terrestrial waterbodies of the Antarctic south of 60°S remains sparse' but I think this point could be extended across both the marine and terrestrial realms within Antarctica. Routine monitoring for non-native species (such as done by D.J. Russell, K. Hohberg, V. Otte, A. Christian, M. Potapov, A. Brückner, S.J. McInnes. The impact of human activities on soil organisms of the maritime Antarctic and the introduction of non-native species in Antarctica Federal Environment Agency (Umweltbundesamt) (2013) (http://www.uba.de/uba-info-medien-e/4416.html) is rarely undertaken (and never for the Antarctic marine environment?) and there have been calls for this to be put in place - see: Hughes, Kevin A., Perterra, Luis R., (2016) Evaluation of non-native species policy development and implementation within the Antarctic Treaty area. Biological Conservation, 200. 149-159. 10.1016/j.biocon.2016.03.011, which states 'Monitoring: With some notable exceptions (Russell et al., 2013, Germany, 2013), most non-native species monitoring is opportunistic and science-led, as opposed to being commissioned with policy and management outcomes in mind.'	Your comments are much appreciated, but better directed to the chapters dealing with inventorying and alien species. The focus in Ch.4 is on the impacts of invasive species, and is based on studies documenting quantitative observations/experiments.
Hughes, Kevin	No	4	73	2072	73	2072	As a general point, it would be useful to review use of 'IAS' within this section.	Thank you, we have revised this section accordingly in the second order draft
Hughes, Kevin	No	4	73	2079	74	2081	I appreciate that it is implied in the text, but it might be useful to state simply whether or not <i>Poa annua</i> is considered invasive in Antarctica.	Thank you, we have revised this section accordingly in the second order draft
Kühn, Ingolf	No	4	74	1735	74	1737	<i>Batrachochytrium dendrobatidis</i> is not a parasite but a pathogen! Although this invasive fungus is considered to be responsible for the decline of >500 amphibian species incl. the extinction of 90 species, it is hardly considered in this chapter! Scheele BC, Pasmans F, Skerratt LF, Berger L, Martel A, Beukema W, Acevedo AA, Burrows PA, Carvalho T, Catenazzi A, De la Riva I, Fisher MC, Flechas SV, Foster CN, Frias-Álvarez P, Garner TWJ, Gratwicke B, Guayasamin JM, Hirschfeld M, Kolby JE, Kosch TA, La Marca E, Lindenmayer DB, Lips KR, Longo AV, Maneyro R, McDonald CA, Mendelson J, Palacios-Rodriguez P, Parra-Olea G, Richards-Zawacki CL, Rödel M-O, Rovito SM, Soto-Azat C, Toledo LF, Voyles J, Weldon C, Whitfield SM, Wilkinson M, Zamudio KR, Canessa S (2019) Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity. <i>Science</i> 363: 1459-1463. doi:	Thank you for your suggestion. We have revised it in the second order draft.
Hughes, Kevin	No	4	74	2081	74	2081	I agree that few studies have examined the impact of non-native species in Antarctica. The authors have discussed, in some detail, <i>Poa annua</i> , but it would be helpful if they also mentioned the invertebrate <i>Eretmoptera murphyi</i> on Signy Island, the larvae of which are present in high concentrations and have been shown to have dramatically altered nutrient cycling within the terrestrial (see work by Bartlett et al. and also; Hughes, K. A., Worland, M. R., Thorne, M., Convey, P. (2013). The non-native chironomid <i>Eretmoptera murphyi</i> in Antarctica: erosion of the barriers to invasion. <i>Biological Invasions</i> 15: 269-281.)	Thank you very much. Bartlett et al. 2020 documented the range and abundance increase of <i>E. murphyi</i> , and using modelling, highlight areas at risk of further colonisation across Signy Island, but fail to provide quantitative evidence of its impact. Bartlett, J.C., Convey, P., Perterra, L.R. and Hayward, S.A., 2020. An insect invasion of Antarctica: the past, present and future distribution of <i>Eretmoptera murphyi</i> (Diptera, Chironomidae) on Signy Island. <i>Insect</i>
Hughes, Kevin	No	4	74	2084	74	2084	In general for this section, please check that the references have been included in the reference list.	Thank you for your comment. Citations and references have been harmonized in the second
Hughes, Kevin	No	4	74	2091	74	2093	I struggled to find the quoted references in the reference list. The exception was Jones et al 2019 which appear to be about algal blooms, so I wonder if this is	Thank you for your comment. Citations and references have been harmonized in the second
Hughes, Kevin	No	4	74	2098	74	2100	I wonder if it would be useful to make the point that the 'brev' can also be an invasive species (e.g. rabbits on Macquarie Island).	Thank you for your suggestion. This section has been revised in the second order draft.
Pisanu, Benoit	No	4	74	2108	74	2108	see also Brodier, S., Pisanu, B., Villers, A., Pettex, E., Lloret, M., Chapuis, J. L., & Bretagnolle, V. (2011). Responses of seabirds to the rabbit eradication on the Ile Verte, sub - Antarctic Kerguelen Archipelago. <i>Animal Conservation</i> , 14(5), 459-465.	Thank you for your valuable remark - this is added to the text in the second order draft.
Hughes, Kevin	No	4	74	2111	74	2113	The point about the removal of reindeer impacting upon indigenous beetles is well made, but how can the reference be appropriate when it was published long before the reindeer were finally removed in 2014	Thank you very much. We do not refer to the removal of reindeer, but rather to their presence, and its impact on native and alien grasses - and indirect impact on native beetle - please check Chown, S.L. and Block, W., 1997. Comparative nutritional ecology of grass-feeding in a sub-Antarctic beetle: the impact of introduced species on <i>Hydromedion sparsutum</i> from South
Pisanu, Benoit	No	4	74	2111	74	2111	Chapuis	Thank you, this is corrected in the second order draft
Joshi Rijal, Srijana	No	4	74	2115	74	2121	All reference cited in this section is missing in reference list.	Thank you for your comment. Citations and references have been harmonized in the second
Government of Ethiopia	Yes	4	75	2142	75	2142	The table (4.52) does not reflect the situation in Africa. What is reported is inaccurate, and the reality (negative impacts of IAS) in the region is not properly captured. While IAS such as <i>Prosopis juliflora</i> , parthenium weed (<i>Parthenium hysterophorus</i>), water hyacinth (<i>Eichhorniacrassipes</i>) <i>lantana</i> weed (<i>Lantana camara</i>), <i>Cryptostegia grandiflora</i> , <i>Parkinsonia aculeata</i> , <i>Mimosa diplotricha</i> and <i>Nicotiana glauca</i> are well established and studied, the table reports existence	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants and updated the tables in the second order draft.
Government of Germany	Yes	4	76	2149	76	2149	Suggestion for literature: Relevant but also a bit outdated literature review on economic impacts of terrestrial invasive species not yet included in the assessment: Olson, Lars J. (2006). The Economics of Terrestrial Invasive Species: A Review of the Literature. In <i>Agric. resour. econ. rev.</i> 35 (1), pp. 178–194. DOI: 10.1017/S1068280500010145.	Thank you for your suggestion. We report on the most recent and global assessment of economic impacts of invasive alien species from the Invacost project.
Alejandra Grez Villarreal, Audrey	No	4	76	2167	76	2169	What about other groups, like insects?	Thank you for your comment. We have revised it in the second order draft.
Joshi Rijal, Srijana	No	4	76	2171	76	2174	Add table or fig no to support the statement.	Thank you for your comment. We have updated the second order draft with appropriate
Heringer, Gustavo	No	4	76	2173	76	2174	I am not sure if 'Impacts investigated, but not observed...' is clear enough. Does It means impacted that were studied, but the study did not corroborate it? I believe could be better to be more explicit.	Thank you for your comment. We have revised it in the second order draft.
Kühn, Ingolf	No	4	77	1818	77	1820	I think this might solve your problem: Richter R, Berger UE, Dullinger S, Essl F, Leitner M, Smith M, Vogl G (2013) Spread of invasive ragweed: climate change, management and how to reduce allergy costs. <i>Journal of Applied Ecology</i> 50: 1422-1430. doi: 10.1111/1365-2664.12156.	Thank you, agreed, but this has been removed from the chapter in the second order draft
Alejandra Grez Villarreal, Audrey	No	4	77	2188	77	2188	Where does this come from?	Thank you for your comment. We have updated it in the second order draft with appropriate
Joshi Rijal, Srijana	No	4	78	2201	78	2201	Add table number after (19%).	Thank you for your comment. We have updated it in the second order draft with appropriate
Alejandra Grez Villarreal, Audrey	No	4	78	2213	78	2214	I am curious about the zero negative impact observed for invertebrates in Mediterranean units.	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft.
Takahashi, Yasuo	No	4	78	2222	79	2242	Under the 'Impacts on NCP' subsections across regions, realms and taxa, authors may be able to substantiate the assessment of the impacts of IAS on NCP 17 (identities), which currently has scarce evidence, drawing on the findings in section 4.1.4 (P5 L179 - P6 L235).	Thank you, numbers have been updated in the second order draft
Heringer, Gustavo	No	4	79	2237	79	2237	Seems 15% of the studies reported a negative impact, but I suppose to be more. Maybe should be interesting to rephrase.	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft.
Joshi Rijal, Srijana	No	4	80	2257	80	2262	It will be interesting to see the data bias within the region with country information as well as reported in Africa section Line 408.	Thank you, this is indeed interesting, and further information is available in the data
Guareschi, Simone	No	4	80	2264	88	2501	In line 2327 I think it is important to mention the first study that identified and quantified the impact of signal crayfish on invertebrate functional diversity (Mathers et al. 2020. Invasive crayfish alter the long-term functional biodiversity of lotic macroinvertebrate communities. <i>Functional Ecology</i>). Line 2335. I suggest you provide further detail about X. victoricensis to help the reader like for example adding this info "(Annelida: Clitellata)" It may also be worth mentioning a new study here by Thomas et al. 2020 (Parasitology) where they stress "we reveal that A. astaci infection affects signal crayfish to a much greater extent than previously considered". - Thomas et al. 2020. <i>Parasitology</i> . Crayfish plague affects juvenile survival and adult behaviour of invasive signal crayfish.	Thank you, we added more details on X. victoricensis to the second order draft but because of length restrictions we decided not to include the suggested references
Eckert, Sandra	No	4	80	2270	80	2270	Please change "AIS" to "IAS". This appears several times.	Thank you for your comment. We have revised it in the second order draft.
Joshi Rijal, Srijana	No	4	80	2270	80	2270	Consistency AIS or IAS may be good to change IAS throughout the document.	Thank you for your comment. We have revised it in the second order draft.
Joshi Rijal, Srijana	No	4	83	2364	83	2364	Delete "Most" - were Most from.	Thank you for your comment. We have revised it in the second order draft.
Government of Ethiopia	Yes	4	83	2369	83	2371	Caption of the table (4.67) needs modifying. The way data presented doesn't facilitate easier understanding.	Thank you for your comment. All the tables have been updated in the second order draft.
Joshi Rijal, Srijana	No	4	83	2369	83	2372	Table 4.67 Suggest to remove "comma" add / after negative impact figures.	Thank you for your comment. All the tables have been updated in the second order draft.
Ahimbisibwe, Imran	No	4	83	2380	84	2392	Discussion of positive impacts of IAS is erroneous and tends to drag the report into irrelevance. Besides the suffix invasive implies negativity which is why species categorized as IAS are undesirable from CBD point of view irrespective of their social and economic benefits. Article 8h of CBD calls for identification of pathways of AS and their subsequent control and eradication. The report should concentrate on the negative impacts of AIS on biological diversity and how they can be addressed in line with the requirements enshrined in CBD instead of advocating for justification of their social and economic benefits.	Thank you, we are following the scoping document approved by the IPBES Plenary
Smith, Emily	No	4	84	2404	84	2404	As well as having a negative impact on fauna e.g. fish, the introduction of Signal crayfish in Europe has also had a significant negative impact on recreational fishing. Results in decreases in fish populations, undermines the banks increasing costs for fishery owners as well as resulting in loss of income as when crayfish reach substantial numbers, they take the fishing bait and thus anglers only catch crayfish rather than fish. In extreme cases puts the fishery at risk of closing due to lost customers. This presents a negative impact to sit along the flourishing pet trade example.	Thank you. There are many appropriate examples, here are cited common intentional introductions considered beneficial.
Mc Kay, Fernando	No	4	85	2416	85	2456	Lines 2429; 2433. Instead of <i>Eichhornia crassipes</i> it should be <i>Pontederia crassipes</i> . <i>Pontederia</i> was recently recircumscribe to include <i>Eichhornia</i> species (Marco O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of <i>Pontederiaceae</i> (Commelinales) sheds light on the necessity of its recircumscription and synopsis of <i>Pontederia</i> L. <i>Phyto Keys</i> 108: 25–83. doi: 10.3897/phytokeys.108.27652	Thank you very much. According to the Plant List <i>Eichornia</i> is the accepted name
Catford, Jane	No	4	87	2161			how does this compare with study effort and number spp in each category? - try to account for bias	Thank you - this has been revised in the second order draft - see introduction, methodology and challenges section.
Joshi Rijal, Srijana	No	4	87	2492	87	2492	Please add scientific name of silver carp.	Thank you for your comment, this is done in the second order draft.
Government of Germany	Yes	4	88	2502	88	2502	Suggestion for literature: A similar literature review on economic impacts of aquatic invasive species: Lovell, Sabrina J.; Stone, Susan F.; Fernandez, Linda (2006). The Economic Impacts of Aquatic Invasive Species: A Review of the Literature. In <i>Agric. resour. econ. rev.</i> 35 (1), pp. 195–208. DOI: 10.1017/S1068280500010157.	Thank you for your suggestion. We report on the most recent and global assessment of economic impacts of invasive alien species from the Invacost project.
Rius Viladomiu, Marc	No	4	88	2528	89	2544	In addition, there is also more recent empirical evidence: Zipp, Katherine Y.; Lewis, David J.; Provencher, Bill; Zanden, M. Jake Vander (2019). The Spatial A few sentences should be included mentioning that ascidians (Ascidacea, Tunicata, Chordata) are a unique model system to study marine biological invasions, mainly due to their limited natural dispersal and large impacts both in aquaculture facilities and intertidal/subtidal ecosystems: Zhan, A., Briki, E., Bock, D. G., Ghabooli, S. & Maelsaens, H. J. (2015) Ascidians as models for studying invasion success. <i>Mar. Biol.</i> 162: 2449–2470. A good example is mentioned in this section (Pyura doppelganger), another I included in my comment above (Pyura praeputialis) and subtidal examples are <i>Microcosmus squamiger</i> (Rius M, Pineda MC, Turon X (2009) Population dynamics and life cycle of the introduced ascidian <i>Microcosmus squamiger</i> in the Mediterranean Sea. <i>Biological Invasions</i> 11: 2181–2194) and <i>Ciona robusta</i> (Rius, Heasman, McQuaid (2011) Long-term coexistence of non-indigenous species in aquaculture facilities <i>Marine Pollution Bulletin</i> 62: 2395–2403), which can reach densities of 2,300 individuals/ m2 and 2,700 individuals/ m2 respectively.	Thank you very much. Ascidians are indeed well documented in the marine data set - including the species mentioned above. However, this chapter is limited to brief mention of the species with most recorded impacts (of various kinds) (out of 167 species listed in the dataset).
Government of Ethiopia	Yes	4	89	2557	90	2557	Table 4.71 is a replica of Table 4.52??	Thank you for your comment. All the tables have been updated in the second order draft.
Government of Ethiopia	Yes	4	90	2559	90	2559	Table 4.72 is identical to Table 4.53??	Thank you for your comment. All the tables have been updated in the second order draft.

Joshi Rijal, Srijana	No	4	90	2574	90	2581	The two sentence are bit repetition. Please check and remove one of them "There are approximately 500 plant IAS causing impacts to Nature, NCP and GQL." and Line- 2581 Globally, there are 479 plant IAS (+ 29 taxa identified to genera) causing impacts to Nature, NCP and GQL.	Thank you for your comment. We have revised it in the second order draft.
Heringer, Gustavo	No	4	90	2576	90	2576	I would suggest using "Approximately XX% of the changes of Nature" or "Approximately 1/XX of the changes of Nature" instead "Many changes to Nature".	Thank you for your comment. We have revised it in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	91	2591	91	2592	South and central America as well.	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft.
Alejandra Grez Villarreal, Audrey	No	4	91	2597	91	2598	Again, based on the definition of IAS (Lines 89-90), what are the negative impacts of these 17% IAS that have positive impacts?	Thanks for this comment. They refer to increases in some ecological variable.
Alejandra Grez Villarreal, Audrey	No	4	91	2603	91	2603	Vila et al. (remove Monserrat, it is her first name). Correct throughout the ms.	Thank you for your comment. Citations and references have been harmonized in the second
Catford, Jane	No	4	92	2286	92	2289	Does this consider indirect or just direct impacts - eg. Catford, J. A. (2017) Hydrological Impacts of Biological Invasions. Impact of Biological Invasions on Ecosystem Services. (ed. by M. Vilà and P. E. Hulme), pp. 63-80. Springer International Publishing, Cham.	Thank you. This has been clarified in the second order draft
Alejandra Grez Villarreal, Audrey	No	4	92	2617	92	2618	See Sala et al. 2000 (10.1126/science.287.5459.1770). They mention that Mediterranean ecosystems are highly affected by invasions.	Thank you for your comment. We cannot add additional text to the chapter due to word length
Eckert, Sandra	No	4	92	2631	92	2631	Example is missing. Please add.	Thank you for your comment. We have revised it in the second order draft.
Dudgeon, David	No	4	93	2643	93	2647	This text would be a lot more useful if it were modified to explain how the invasive plants had these various detrimental effects on fishes, invertebrates, etc.; i.e. mechanisms.	Thanks for this comment. We have enlarged this paragraph to add mechanisms of impact in the second order draft.
Rüegg, Simon	No	4	95	2709	95	2710	Maybe it would be prudent to consistently write about the impacts "being recorded" rather than "occurring". As we are aware that there is a bias in recording more terrestrial events than marine or aquatic and that some regions are more covered than others, I think the text should reflect that uncertainty by clearly stating that it refers to reports and thus only indirectly to occurrences. This also implies that more could occur than is being recorded.	Thanks for this suggestion. We have made this change throughout the text in the second order draft.
Joshi Rijal, Srijana	No	4	95	2737	95	2738	Correct the statement in India, the estimated cost per household, for the treatment of human and livestock health affected by this weed, amounts to \$ 73 and \$2031 per year, respectively (Bajwa et al., 2019). This information is from Pakistan not from India.	Thank you for your comment. We have revised it in the second order draft.
Will, David	No	4	98	2825	105	2983	A recent publication provided a framework for assessing the impacts of invasive species on islands to the UN Sustainable development goals and found that invasive vertebrate eradication align with 13 SDGs and 42 associated targets encompassing marine and terrestrial biodiversity conservation, promotion of local and global partnerships, economic development, climate change mitigation, human health and sanitation and sustainable production and consumption. In particular this paper provides a series of references about the direct and indirect impacts invasive vertebrates have to food production, human health, and climate change mitigation that could be incorporated throughout this section. de Wit, L.A., Ziliacus, K.M., Quadri, P., Will, D., Grima, N., Spatz, D., Holmes, N., Tershy, B., Howald, G.R. and Croll, D.A., 2020. Invasive vertebrate eradications on islands as a tool for implementing global Sustainable Development Goals. Environmental Conservation, 47(3), pp.139-148.	Thank you, a sub-section on islands has been added in the second order draft
White, Michael	No	4	103	2906	105	2983	Box 4.4 is very good. Public awareness campaigns in kiwi habitats mainly target dogs; cats not mentioned	Thank you very much for your feedback.
Alejandra Grez Villarreal, Audrey	No	4	105	2985	105	2985	Please, consider the case of <i>Bombus dahlbomii</i> in Chile and Argentina that has been negatively affected by <i>Bombus terrestris</i> and <i>Bombus ruderatus</i> (Aizen et al. 2018, https://doi.org/10.1111/1365-2664.13121 ; Arbetman et al. 2013 https://doi.org/10.1007/s10530-012-0311-0 ; Morales et al. 2013 https://doi.org/10.1890/120321 ; Madjidian et al. 2008, 10.1007/s00442-008-1039-5, and others), by competition and disease transmission.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it in the second order draft.
Guareschi, Simone	No	4	105	2985	106	3006	I suggest here adding Carbonell et al. 2017 and Mathers et al. 2020 (Functional Ecology) as relevant invertebrate examples of biological invasions focussed on aquatic insects and crustacean respectively. - Carbonell et al. 2017. Biological invasion modifies the co-occurrence patterns of insects along a stress gradient. Functional Ecology 31 (10), 1957-1968 - Mather et al. 2020. Invasive crayfish alter the long-term functional biodiversity of lotic macroinvertebrate communities. Functional Ecology. https://doi.org/10.1111/1365-2435.13644	Thank you for this suggestion. We considered them for the impact evidence database.
Government of Germany	Yes	4	106	2990	106	2991	Kindly check, this sentence seems to be incomplete.	Thank you for your comment. We have revised it in the second order draft.
Rüegg, Simon	No	4	109	3027	110	3035	As mentioned during the PESC meeting, the particular focus should be put on the event of spillover. Global spreading of diseases follows transportation and communication pathways, i.e. in the realm of public health. What is concerning about the emerging diseases is that they are occurring with increasing frequency. This means that the probability of a spillover event at the wildlife-domestic/human interface has risen. This is where a structural systems analysis is needed to understand, why this probability rises. A good example is provided by Wallace 2015: https://www.sciencedirect.com/science/article/abs/pii/S0277953614006145?via%3Dihub SARS-CoV2 is a human disease with low zoonotic potential, hence the control of COVID is primarily in the human health sector. Qfever (Coxiella) or brucellosis (Brucella) are examples of zoonoses which are readily transmitted from (domestic) animals to humans, but require a frequent contact, i.e. agricultural settings. They are thus subject to the veterinary and public health activities. The pandemics we talk about today are singular, very rare events which result from unusually high contact rates between wild species and domestic animals or humans. These are results of behavioural changes induced by conditions such as poverty, land use change, or climate stress. This is the area where the	Thank you for this suggestion. The health section has been revised with your comment in mind in the second order draft. However, due to length restrictions, we were unable to take all details into account.
Shimura, Junko	No	4	109	3027	109	3031	Use standard terminology: CoVID-19 -> COVID-19; emerging diseases -> emerging disease agents; SARS -> SARS-CoV.	Thank you for your comment. We have revised it in the second order draft.
White, Michael	No	4	109	3030	109	3030	MERS Middle Eastern Respiratory Syndrome. Not MARS	Thank you for your comment. We have revised it in the second order draft.
White, Michael	No	4	110	3033	110	3035	Never mentioned by politicians	Thank you for your comment.
Pisanu, Benoit	No	4	110	3034	110	3035	Nunez et al. 2020a & 2020b are the same in literature cited ...	Thank you for your comment. Citations and references have been harmonized in the second
Dunn, Christopher	No	4	110	3041	110	3041	Should be "Dutch Elm Disease" (all capitals), otherwise it suggests that it is a disease of Dutch elms (which is not the case). Please see: Dunn (ed). 2000 "Elms: Breeding, Conservation, and Disease Management." Kluwer publishers.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from the second order draft.
White, Michael	No	4	110	3055	110	3058	Oceanic plastics and discarded industrial fishing gear are major transportation vectors	Thank you. This is treated in Chapter 3.
White, Michael	No	4	110	3065	110	3068	All worsened by ocean warming	Thank you, this is now addressed in Box 4.5 in the second order draft (Invasive alien species impacts worsen when interacting with other drivers of biodiversity loss.)
Pisanu, Benoit	No	4	111	3081	111	3081	Kim et al., 2014 not referenced	Thank you for your comment. Citations and references have been harmonized in the second
White, Michael	No	4	111	3090	111	3092	Is there a reference for this?	Thank you for your comment. Citations and references have been harmonized in the second
White, Michael	No	4	111	3097	111	3100	Because they don't do ongoing EIAs (e.g. during operational phase rather than only before a project)	Thank you very much. We document impacts, not policy and management (or
White, Michael	No	4	111	3102	111	3106	I noticed this at fish-farms in Argostoli bay, Kefalonia, Greece. All 3 farmed spp were also wild locally	Thank you for your comment. We cannot add additional text to the chapter due to word length
Faulkner, Katelyn	No	4	111	3108	111	3108	The section that starts on this line should probably be at the beginning of the chapter. First present global trends and then look at different regions etc.	Thank you for your comment. We have restructured the chapter in the second order draft
Joshi Rijal, Srijana	No	4	112	3114	112	3115	Please check this figures once from Table 4.94 and 4.95 There are 1238 species of IAS with documented impacts on Nature globally, thereof 1217 with negative and 136 with positive impact.	Thank you for your comments. All tables and figures have been updated based on the further developed database in the second order draft
Heringer, Gustavo	No	4	112	3116	112	3116	I understood the impact on nature complain more than native species (as described in between lines 89 and 97). Therefore, if I'm right, "Nature" should be used instead of "native taxa".	Thank you for your comment. We have revised it in the second order draft
Heringer, Gustavo	No	4	112	3146	112	3146	Replace "paragraph" with "section"	Thank you for your comment. We have revised it in the second order draft
Brooks, Thomas	No	4	112	3147	112	3147	Very important to add a paragraph or section here on the impacts of IAS in driving global species extinction risk. Smith (2020; http://www.issg.org/publications.htm) provide an analysis of documented impacts on IAS across taxonomic groups comprehensively assessed on the IUCN Red List (https://www.iucnredlist.org/), which would provide the key input material to such a paragraph. Also, Butchart (2008 Bird Conserv Int; https://www.cambridge.org/core/journals/bird-conservation-international/article/red-list-indices-to-measure-the-sustainability-of-species-use-and-impacts-of-invasive-alien-species/BFA17D64284A8508582CC77CA6156B6D) developed the methods for disaggregating the Red List Index to track changes in extinction risk driven by increasing or decreasing impacts of IAS - another key citation here. Rodrigues et al. (2014 PLoS ONE Fig 3E; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0113934) mapped this change in IAS impacts on extinction risk across countries -	Thank you. This is now included in a box in the second order draft
Government of Ethiopia	Yes	4	112	3155	112	3155	Three tables with identical caption: Table 4.94; Table 4.71 (page 89); Table 4.52 (page 75).	Thank you for your comment. All the tables have been updated in the second order draft
Singheiser, Martin	No	4	116	3186	124	3187	Table 4.100: A table of IAS that shows alien populations that led to the local or global extinction of native populations is a valuable tool to become an overview of the most relevant species. However, if many table columns are indicated with "NA", the scientific value is reduced, since evidence is lacking and a listing due to the precautionary principle is possible as well. For a proper IPBES overview, detailed information should be given wherever possible. Otherwise, one might consider deleting these species.	Thank you, we have revised this table in the second order draft
Ahimbisbew, Imran	No	4	117	3185	124	3187	Entry number 34 <i>Eichornia Crassipes</i> is shown not to have impacted negatively local and global species but this is not the case. the provided link https://u.pcloud.link/publink/show?code=XZkhWqkZKMGPd11b6AyC4DdnkFhNy05Jf9kV shows the extent to which <i>Eichornia Crassipes</i> forms a dense mat on surface of the water, blocking sunlight for organisms below including aquatic plants and fish, depleting the low concentrations of oxygen in the lake hence causing death of aquatic life both native endemic species such as haplochromine and the introduced exotic Nile perch plus plants that	Thank you for your comment. All the tables have been updated in the second order draft
Joshi, Chudamani	No	4	117	3185	124	3185	Table 4.100 need a revision	Thank you for your comment. All the tables have been updated in the second order draft
Brooks, Thomas	No	4	117	3186	4	3186	Table 4.100 is informative and useful to include. It would be useful to complement it with a table of those IAS documented to be driving increased extinction risk, derived from the Red List (https://www.iucnredlist.org/).	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the second order draft
Singheiser, Martin	No	4	122	77	122	77	Please check taxonomic status pf <i>Python molurus bivittatus</i>	Thank you for your comment, the species is no longer in the second order draft
Dunn, Christopher	No	4	124	3197	125	3203	It is unclear how positive, negative, and neutral are defined. Very subjective.	Thank you. The definitions of positive, negative and neutral are now included in the first section of the chapter in the second order draft
Joshi Rijal, Srijana	No	4	125	3203	125	3203	Acronym FOD as this is mentioned for first time.	Thank you. Most acronyms have been removed from the second order draft.
Joshi, Chudamani	No	4	125	3230	126	3230	To maintain consistencev, scientific names would be preferable	Thank you for your comment. We have revised it in the second order draft

Schaffner, Urs	No	4	125	3230	125	3230	Table 4.101: This table raises a number of questions; there are 44 numbers of impact reports for fall armyworm; I assume that they refer to one or a indicators, i.e. reduction in crop (maize) yield and maybe increased pollution due to pesticide use. Thus, in this case the high number of impact reports can be interpreted as evidence for a significant negative impact of this IAS on 1-2 indicators of NCP. On the other hand, Himalayan balsam is listed second with a similar number of negative impact reports, but it is far less clear what the relevance is of these reported negative impacts (and the many positive impact reports) by Himalayan balsam on NCP. On the other, species like <i>Acacia longifolia</i> and <i>Prosopis juliflora</i> are only included among the top IAS causing positive impacts to NCP. Moreover, apparently there are far more positive impact records for Japanese knotweeds than negative impact reports for knotweeds, but what does this mean for policymakers? Finally, the presence of Giant goldenrod, Himalayan balsam and black locust in this list suggests that the number of impact reports for plant IAS rather reflects a biogeographic bias than a relevance in terms of the IAS' overall impact. The information provided in this table therefore suggests that	Thank you. We have revised the table to address this concern in the next version.
Schaffner, Urs	No	4	127	3242	127	3242	See my comment on Table 4.41;	Thank you - we do not aim at comparing the positive and negative impacts (and find that negative impacts indeed outweigh the positive ones)
Takahashi, Yasuo	No	4	127	3243	127	3247	Citations to backup this statement can include the followings: Shackleton et al. 2019. The role of invasive alien species in shaping local livelihoods and human well-being: A review. <i>J. Environ. Manage.</i> 229, 145–157. https://doi.org/10.1016/j.jenvman.2018.05.007 ; Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy.</i>	Thank you, this is added in the second order draft.
Kühn, Ingolf	No	4	128	3186	135	3187	Table 4.100. I find the column "affected native species" really weak. Why are frequently IAS mentioned, if the affected species is NA? But also, when an affected species is mentioned, it usually is just "plant" or "vertebrate" or "invertebrate". This is not helpful. Which species exactly are brought to extinction? At which scale? And what is the reference for this?	Thank you for your comment, indeed the database was under construction. We added numerous invasive alien species examples of both animals and plants in the updated database for the second order draft
Takahashi, Yasuo	No	4	128	3299	129	3303	It'll be good if data in Table 4.102 are presented in a more visual manner. The following paper could provide a good example: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy.</i> https://doi.org/10.1016/j.envsci.2020.06.014 .	Thank you for your comment. All the tables have been updated in the second order draft
Joshi Rijal, Srijana	No	4	131	3354	131	3355	Change "This suggests than" to "This suggest that."	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	132	3399	132	3401	Rephrase the sentence.	Thank you for your comment. We have revised it in the second order draft
Feest, Alan	No	4	132	3400	132	3400	Hodgkins	Thank you for your comment. We have revised it in the second order draft
Joshi Rijal, Srijana	No	4	132	3413	132	3417	It would be useful to give a few examples here on negative impact of regulating services.	Thank you for your comment. We have revised it in the second order draft
Government of Germany	Yes	4	132	3421	132	3425	The sentence is very long and confusing. Kindly reformulate to make it clearer and more concise.	Thank you for your comment. We have revised it in the second order draft
Kühn, Ingolf	No	4	136	3233	137	8234	Table 4.101: Is there a way to briefly summarize the most important negative or positive impact per species?	Thank you, we now show the type of impacts for the top 20 invasive alien species in the
Eckert, Sandra	No	4	136	3546	136	3546	"expect"? Maybe "except"?	Thank you for your comment. We have revised it in the second order draft
Government of Germany	Yes	4	136	3553	136	3555	This sentence is too long and not sufficiently clear. Kindly reformulate.	Thank you for your comment. We have revised it in the second order draft
Rüegg, Simon	No	4	137	3582	137	3588	If infectious diseases of humans and animals are to be considered as microbial IAS, I suspect that these impacts are even more severe.	Thank you very much. Indeed, but see Chapter 1 for an introduction on infectious diseases and
Feest, Alan	No	4	137	3583	137	3583	Chestnut!!!!	Thank you for your comment. We have revised it in the second order draft
Singheiser, Martin	No	4	137	3603	137	3603	Please add header to Table 4.104 highlighting the IAS having either positive or negative impact on GQL.	Thank you for your comment. All the tables have been updated in the second order draft
Government of Germany	Yes	4	140	3632	141	3651	There is growing importance of the "One Health concept" - please consider to recognize it here, even if the focus is on isolated human health impacts.	Thank you for your comment. We have revised it in the second order draft
Feest, Alan	No	4	140	3639	140	3639	Is the plant really called parentship not parsnip?	Thank you for your comment. We have revised it in the second order draft
Government of Germany	Yes	4	141	3655	141	3655	The subchapter on economic impacts is very informative. The discussion of databases like InvaCost is highly appreciated and will help to inform the public and policy-makers about the costs of IAS. The chapter, however, could profit from a more in-depth analysis on various economic aspects like general welfare impacts and in particular labour market disruptions. Literature which hasn't been cited yet include: 1. McDermott, Shana M.; Finnoff, David C.; Shogren, Jason F. (2013). The welfare impacts of an invasive species: Endogenous vs. exogenous price models. In <i>Ecological Economics</i> 85, pp. 43–49. DOI: 10.1016/j.ecolecon.2012.08.020. 2. Jones, Benjamin A. (2020): Labor Market Impacts of Deforestation Caused by Invasive Species Spread. In <i>Environ Resource Econ</i> 77 (1), pp. 159–190. DOI: 10.1007/s10640-020-00469-2.	Thank you. This is discussed in Chapter 5
Takehara, Mari (Government of Japan)	Yes	4	141	3655	145	3860	The amount of damage is one of the main bases for policy decisions. It would be very helpful if the damage amount and countermeasure cost for each species could be referred to in a list.	Thank you. We have expanded on this in the second order draft
Joshi Rijal, Srijana	No	4	141	3656	141	3671	This section may provide more reference from different region on economy Suggest to check reference from Xu et al. 2006 on economic cost associated with alien invasive species. "Xu, H., Ding, H., Li, M., Qiang, S., Guo, J., Han, Z., ... & Wan, F. (2006). The distribution and economic losses of alien species invasion to China. <i>Biological Invasions</i> , 8(7), 1495-1500."	Thank you for this suggestion. Due to length restrictions, we are unable to report on all regions separately.
Eckert, Sandra	No	4	141	3673	141	3673	Change to "on one side.."	Thank you for your comment. We have revised it in the second order draft.
Government of Germany	Yes	4	143	3751	143	3769	Please check: This section considers management and policy options for IAS which may be better placed in in ch 5 and 6 according to the chapter outline.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from chapter 4 in the next draft.
Shimura, Junko	No	4	143	3752	143	3757	Add CBD COP decision 14/11 (annex 1 on unintentional introductions of live organisms)	Thank you for your comment. As part of restructure of the chapter, we have deleted that section from chapter 4 in the second order draft.
Joshi Rijal, Srijana	No	4	143	3771	143	3776	Entire section needs more references to justify the statements and figures.	Thank you for your comment. Citations and references have been harmonized in the second
Joshi Rijal, Srijana	No	4	143	3771	144	3811	The figure presented in this section on cost incurred by IAS needs rephrasing. suggest to make this changes in one section "This annual cost steadily increased over decades at a rate of more than 10-fold per decade and reached \$93 billion year between 2000 and 2009, (Goodenough, 2010); but declined to \$29.1 billion annually between 2010 and 2017(Diagne et al. in revision)"	Thank you for your comment. We have revised it in the second order draft.
Joshi Rijal, Srijana	No	4	144	3789	144	3786	Information provided on economic cost associated with invasive species is incomplete. Add the quantitative statistic.	Thank you for your comment, indeed the database was under construction. We have revised the second order draft based on the updated database.
Joshi Rijal, Srijana	No	4	146	3878	146	3879	In addition to standardization of approach I suggest to add broad standardized framework and approaches should be prepared to compare and measure the	Thank you. Please see the updated methodology section in the second order draft
Schaffner, Urs	No	4	147	3901	147	3905	I agree that comparing (not understanding) impacts of a large number of IAS requires standardization of measurements or development of indices. This may be particularly helpful with regard to decision processes during the initial stages of invasion, e.g. introduction and establishment. However, indices or categorization of impacts is not useful when assessing the impacts (both positive and negative) of one or a few IAS on Nature, NCP, GQL or social-ecological systems. In these cases the raw data of the context-dependent impacts need to be considered and then put in the context of stakeholders' needs, the effects of these impacts on the stability/resilience of social-ecological systems etc. The latter is particularly relevant in decision processes at later stages of biological invasions, e.g. whether a particular IAS should be targeted for management, or which of a small number of widely established IAS should be prioritized for	Thank you for your comment. This is also addressed in Chapter 5
Joshi Rijal, Srijana	No	4	147	3913	147	3913	Correct "Ien" to alien.	Thank you for your comment. We have revised it in the second order draft.
Brooks, Thomas	No	4	147	3922	148	3943	Useful discussion of EICAT. It would be worth noting how important application of the standard will be in reducing the data biases and data gaps in documentation of IAS impacts on Nature which have been highlighted throughout the chapter.	Thanks for this suggested change. We have included it in the second order draft.
Joshi Rijal, Srijana	No	4	147	3922	147	3922	Suggest to refer Rumlerová, Z., Vilá, M., Pergl, J., Nentwig, W. and Pyšek, P. (2016) Scoring environmental and socioeconomic impacts of alien plants invasive in Europe. <i>Biological Invasions</i> .	Thank you for your comment. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here (but it is now included in the evidence database).
Smith, Emily	No	4	147	3925	147	3925	Please add "IUCN_2020" in to the citations after Hawkins et al., 2015. = IUCN (2020). IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa First edition. Gland, Switzerland and Cambridge, UK: IUCN. X + Xpp.	Thank you, this is added in the second order draft.
Kühn, Ingolf	No	4	148	3603	150	3604	Table 4.104: Is there a way to briefly summarize the most important negative or positive impact per species?	Thank you, the new structure in the second order draft responds to your request.
Smith, Emily	No	4	148	3933	148	3933	"IUCN_2020" not listed in references section - I presume it is = IUCN (2020). IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa First edition. Gland, Switzerland and Cambridge, UK: IUCN. X + Xpp.	Thank you. References and citations have been harmonized in the second order draft.
Smith, Emily	No	4	148	3933	148	3934	Sentence on EICAT is not finished. Suggest "EICAT has a similar structure as the IUCN Red List Categories and Criteria (Mace et al., 2008, IUCN 2012) and thus profits from the experience gathered through its development, application and governance over the past few decades". IUCN citation = IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section in the second order draft.
Eckert, Sandra	No	4	148	3934	148	3934	Part of the sentence at the end is missing.	Thank you for your comment. As part of restructure of the chapter, we have deleted that section in the second order draft.
Pan, Xubin	No	4	148	3934	148	3934	"From the....."	Thank you for your comment. As part of restructure of the chapter, we have deleted that section in the second order draft.
Brooks, Thomas	No	4	148	3939	148	3939	Add reference to IUCN (2020b) Guidelines for using the IUCN Environmental Impact Classification for Alien Taxa (https://www.iucn.org/sites/dev/files/content/documents/eicat_guidelines_v1.1.pdf)	Thank you for this suggestion. We feel that this is too detailed to be mentioned here.
Smith, Emily	No	4	148	3939	148	3940	EICAT Standard is now launched. Please also add "IUCN, 2020b" to the citation after Volery et al. 2020 for the updated guidelines. Full reference = IUCN. 2020b. Guidelines for using the IUCN Environmental Impact Classification for Alien Taxa (EICAT) Categories and Criteria. Version 1.1. IUCN, Gland Switzerland, Cambridge, UK.	Thank you for this suggestion. We feel that this is too detailed to be mentioned here.
Takahashi, Yasuo	No	4	148	3945	148	3948	The following paper could be an example of economic evaluation of IAS impacts on NCP 12 (food) https://www.sciencedirect.com/science/article/pii/S2211912416301092?iaid=33Dihub	Thank you for this suggestion. The section has now been considerably revised in the second order draft, with your suggested paper in mind.
Rüegg, Simon	No	4	148	3951	148	3966	A central question to One Health is how impact should be quantified (or compared). In humans this is usually presented as a time-tradeoff, i.e. life time to compensate a certain cost (e.g. DALY, QALY). In domesticated animals market prices are used, but it becomes evident that many non-monetary values are not represented in this approach. In conclusion, we are faced with similar problems as the TEEB tries to resolve when it comes to comparing impacts. However, monetary approaches are inherently biased by market differences. On the other hand bioeconomic approaches gauge less relevance in the political discourse. Time-tradeoffs seem to be a promising metric as they are non-tradable, incompressible, potentially scalable and globally equal, as well as easily interpretable.	Thank you for this interesting comment. Part of this is also discussed in Ch6

Brooks, Thomas	No	4	148	3954	148	3962	Useful discussion of SEICAT. It would be worth noting how important application of the standard will be in reducing the data biases and data gaps in documentation of IAS impacts on NCP and GOL which have been highlighted throughout the chapter.	Thanks for this suggested change. We have included it in the second order draft.
Feest, Alan	No	4	148	3959	148	3959	The old problem of five point scales; lack of information results in a 3 and the assumption that each point on the scale is of equal spaced from each other one (1-5 is equally spaced).	Thank you, but this was not the scale used in the first order draft. The level of impacts is now explained in Box 4.2 in the second order draft.
Kortz, Alessandra	No	4	148	3961	148	3962	Consider including a short sentence summarizing the outputs of applying SEICAT to amphibian IAS, marine fish and birds.	Thanks for this suggested change. We have included it in the second order draft.
Peterson, Garry	No	4	148	3968	148	3992	It's critical to only review what has been done with models and scenarios, but also identify important gaps and research needs. The assessment of the state of the art must ensure that it doesn't only report on what is done but also what needs to be done.	Thank you very much, we agree.
Joshi Rijal, Srijana	No	4	149	3995	149	4000	EICAT and SEICAT tools are used for measuring impacts as perceived by society which could be bias. Even though the shortcomings of tools is reported, we may also have to consider other unbiased estimation such as detailed cost-benefit analyses to assess the impact of IAS for ecosystem and society.	Thank you for this suggestion. EICAT and SEICAT do not rely on perceived impacts, but on objectively quantifiable metrics. By contrast, cost-benefit analyses might be more biased as not all impacts can be easily be quantified in terms of costs.
Feest, Alan	No	4	149	4003	149	4003	A Major problem is that the current definition of biodiversity by CBD is not adequate and needs refining as proposed by Feest (2010) in such a way as will allow the type of impact to be measured. There is also the problem of setting baselines which are often missing so impact is not possible to be accurately	Thank you for this suggestion. We have chosen not to change the definition within the assessment, as the suggested reference does not contradict with the CBD definition of
Singheiser, Martin	No	4	149	4004	149	4014	The authors raise two fundamental questions/challenges in this section. First, how to close the gap of data and information in different regions and on different levels. This issue will be challenging also due to a lack of financial support for conducting research. Moreover, the question, at which level a species may be invasive - geographical boundaries vs. political borders - applies for all regions worldwide. Therefore, this topic shall be addressed first, since different "definitions" of IAS may yield different risk analyses and results, which are not comparable in the end. According to this point, a differentiation of natural migration of species - which also has taken place in the past and will in future -and human displacement of species - independent of being intentional or	Thank you for your comment. The definition of invasive alien species is outlined and discussed in Chapter 1. Options to address the gaps identified in this Chapter are presented in Chapter 6.
Government of Germany	Yes	4	149	4005	149	4006	Question: Did CLAs with the support of the co-chairs of this assessment, the TSU and MEP/Bureau try to identify contributors to this chapter from missing or underrepresented groups and regions during the assessment phase? If not, it is suggested to ensure with support of the TSU that groups and regions, who are not represented in the development of this assessment (or are underrepresented) are explicitly invited to participate in the external review of the SOD.	Thank you for your comment. The co-chairs, TSU and IPBES MEP/Bureau indeed supported the identification of contributing authors to fill the regional and taxa gaps (now covered, where possible, in the second order draft).
Joshi Rijal, Srijana	No	4	150	4026	150	4028	Please provide eg with reference to support this statement "Also, some IAS were causing both positive and negative impacts on NCP in different regions around the world, whilst for others these mixed impacts are experienced in the same region. In this sense, the socio-ecological approach to invasions is still a challenge in studies on impacts of invasive species".	Thank you for your suggestion. We have provided reference to support this statement in the second order draft
Government of Germany	Yes	4	150	4032	150	4033	Clarification required: What is meant by "this"?	Thank you for your comment. We have changed the sentence to clearly present the idea in the second order draft
Government of Germany	Yes	4	150	4035	150	4037	Kindly expand on how medical science perceives pathogens, i.e. whether they are understood as "invasive" species" related to a specific geographical area.	Thank you for your comment. We cannot add additional text to the chapter due to word length
Eckert, Sandra	No	4	150	4045	150	4047	I am not sure if this statement is true. Chapter 3 on drivers points out land use change as important driver of IAS, wouldn't that also lead to an increase in impacts? Consider reading and maybe referring to relevant sections in chapter 3.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have changed the sentence in the second order draft
Government of Germany	Yes	4	150	4053	151	4066	Although the term "sustainable development" is prominently placed in the title of ch 4, it is hardly /not really discussed or mentioned in the chapter. It is therefore suggested to specifically consider sustainable development aspects whilst addressing the questions listed under section 4.5 that are to frame the formulation of the conclusions of this chapter.	Thank you, we have revised the title in the second order draft.
Dunn, Christopher	No	4	151	4065	151	4065	The question is bigger than how IPLCs adopt or reject IAS. There needs to be serious and substantive discussion, which is lacking in this draft report, of how IAS impact lives, livelihoods, cultural practices, etc. The question posed here is fine, but very one-sided and incomplete.	Thank you, this is now revised and included in the second order draft.
Kühn, Ingolf	No	4	152	3668	152	3671	An early overview on economic costs of biological invasions in Europe (much before Diagne et al, submitted), estimated that the total costs of IAS in Europe to be at least 12.5 billion EUR per year: Kettunen M, Genovesi P, Gollasch S, Pagad S, Starfinger U, Brink Pt, Shine C (2008) Technical support to EU strategy on invasive species (IS) - Assessment of the impact of IS in Europe and the EU (Final Module Report for the European Commission). Institute for European Environmental Policy (IEEP) (Brussels, Belgium).	Thank you for your comment. We have revised it in the second order draft.
Kühn, Ingolf	No	4	160	3969	160	3960	There is an excellent paper on addressing each of these steps in modelling: Leung B, Roura-Pascal N, Bacher S, Heikkilä J, Brotons L, Burgman MA, Dehnen-Schmutz K, Essl F, Hulme PE, Richardson DM, Sol D, Vila M (2012) TEASing apart alien species risk assessments: a framework for best practices. Ecology Letters 15: 1475-1493. doi: 10.1111/ele.12003.	Thank you for this suggestion. We added the reference in the second order draft.
Rüegg, Simon	No	4	161	4031	161	4032	I suggest to refer to transdisciplinarity, i.e. interdisciplinary and participatory collaboration. In the field of sustainable development this has been quite well established, one health attempts to insist on TD because of the complexity of the systems at stake. Also citizen values are relevant high leverage points when it comes to governance and behavioural changes. A short reasoning for TD in one health is contained here:	Thank you, we agree - though these issues are now addressed in Chapter 6.
Brooks, Thomas	No	4	164	4689	164	4689	Add IUCN (2020): https://portals.iucn.org/library/node/49101	Thank you for your comment. References have been harmonized in the second order draft.
Kühn, Ingolf	No	4	171	4465	171	4472	Merge both Essl et al. 2019 references (the second is more complete)	Thank you. References and citations have been harmonized in the second order draft.
Joshi Rijal, Srijana	No	4	171	5053	172	5059	Consider rechecking the references.	Thank you for your comment. References have been harmonized in the second order draft.
Lozan, Aurel	No	4	179	4862	179	4862	Lozan, A., Monaghan, M., Spitzer, K., Jaros, J., Žurovcová, M., Brož, V. DNA-based confirmation that the parasitic wasp <i>Cotesia glomerata</i> (Braconidae, Hymenoptera) is a new threat to endemic butterflies of the Canary Islands. Conservation Genetics 9(6):1431-1437.	Thank you for your comment. References have been harmonized in the second order draft.
Lozan, Aurel	No	4	179	4862	179	4862	Lozan, A., Monaghan, M., Spitzer, K., Jaros, J., Žurovcová, M., Brož, V. DNA-based confirmation that the parasitic wasp <i>Cotesia glomerata</i> (Braconidae, Hymenoptera) is a new threat to endemic butterflies of the Canary Islands. Conservation Genetics 9(6):1431-1437.	Thank you for your comment. References have been harmonized in the second order draft.
Schaffner, Urs	No	4	183	5597	183	5597	CABI Centre for Agriculture and Biosciences International	Thanks for this suggested change. We have corrected it in the second order draft.
Kühn, Ingolf	No	4	188	5311	188	5316	Merge both Shaakleto et al. 2014 references!	Thank you for your comment. References have been harmonized in the second order draft.
Catford, Jane	No	4	196	5672	196	5672	dates of search?	Thank you for your comment. We have updated the information in the data management
Verbrugge, Laura	No	4	all	all	all	all	A general remark about how Chapter 4 is structured - I appreciate the effort of distinguishing between impacts on Nature, NCP and GOL and the inclusion of both negative and positive impacts. This is a breach from current and past terminology for assessing and describing impacts of IAS. In that sense, there seems to be some sort of interpretation or categorization that the authors have done in order to be able to list and describe these impacts on N, NCP and GOL. Only at the end are the methodologies discussed which have underpinned most research on impacts so far. From a reader perspective it would make more sense to first discuss the methodologies and approaches that have been used in impact assessments, as well as their limitations, to provide a context and explain what type of literature is reviewed. The next step could be to introduce the new framing of impacts. In my view this is a better starting point (one that better reflects the past research on impacts) for the review results. It would also be a way to avoid speaking of what is 'formerly known as ecological impact' or 'formerly known as ecosystem services'. Despite the terminology used in the IPBES report these terms will carry on existing and keep on being used.	Thank you for your comment. We have updated the structure in the next draft.
Santoul, Frédéric	No	4	65				line 65, again more details on fish stocking practices could be added as it is widely used by managers in many countries.	Thank you for your comment. We cannot add additional text to the chapter due to word length
Government of Portugal	Yes	4	123			125	The introduction of IAS outside their natural range is always negative for biodiversity as they will alter the composition (and even the structure and function) of native communities, occupy physical space and use resources that will no longer be available to native species, among other impacts.	Thank you, this has been revised and further discussed in Chapter 1 in the second order draft
Government of Portugal	Yes	4	139			140	The introduction of IAS outside their natural range is always negative for biodiversity as they will alter the composition (and even the structure and function) of native communities, occupy physical space and use resources that will no longer be available to native species, among other impacts.	Thank you, this has been revised and further discussed in Chapter 1 in the second order draft
Rüegg, Simon	No	4	3186			3187	Table 4.100 row 36 feral cats are problematic in many areas beyond Asia-Pacific and affect wild rodent, reptile and bird populations. As they are synanthropic, it may be that extinctions are not uniquely attributed to them. In my view their role should be highlighted in peri-domestic habitats. Feral dogs should be considered as potential IAS as well.	Thank you, this is added in the second order draft.
Government of Portugal	Yes	4	4021			4024	The introduction of IAS outside their natural range is always negative for biodiversity as they will alter the composition (and even the structure and function) of native communities, occupy physical space and use resources that will no longer be available to native species, among other impacts.	Thank you, this has been revised and further discussed in Chapter 1 in the second order draft
Faulkner, Katelyn	No	4					There are a lot of tables in this chapter, and the results presented in them would often be easier to interpret if presented as figures	Thank you for your comment.
Faulkner, Katelyn	No	4					Well done on including both positive and negative impacts in this chapter, as well as both socio-economic and environmental impacts.	Thank you for your comment.
Regpala, Maria Elena	No	4					On Management of IAS. "Because the trees (gmelina, considered as IAS) absorb much water, the other plants will every summer. Gmelina uses and absorbs much water that is why there is less available for the plants. Our elders say that we should not cut trees. According to them when we cut trees, this is the reason why water decreases. That is why we are careful in cutting trees. We only cut old trees. When we cut trees, we plant new trees beside the ones that we cut... If there are tree seedling that sprout, we do not touch this. Instead we clean its surroundings for it to grow well. Everytime we cut a tree, we plant 3 to 5 new trees. This is the reason why our myoung is a thick and lush forest. Whoever cut small trees is fined. For every tree cut, it must be replaced by 20 trees. A penalized person must plant trees that we see here (native species), aside from gmelina and alnus. He must also care for the tree seedlings so that it will grow healthy. This is the only time that his punishment ends." Source: Interview with Velasco Madangne, member of Bokiawan Farmers Organization, Brgy. Bokiawan, Hungduan, Iugao, Cordillera Region, Philippines (Excerpt from the Video BARALAGA, April 2011)	Thank you, we have added more content from the ILK dialogue workshop organized in support of the assessment to cover these aspects.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	Communication and transparency are also key during management interventions, so all sides can see how approaches are functioning on the ground, and unforeseen negative impacts can be addressed. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Uipun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	Communication and transparency are also key during management interventions, so all sides can see how approaches are functioning on the ground, and unforeseen negative impacts can be addressed. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Uipun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	Communication and transparency are key issues when planning for management interventions for invasive alien species, so that information can be shared between governments, scientists, NGOs and IPLC. Potential negative and positive impacts need to be clearly explained and discussed between parties. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Uipun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 in the second order draft

Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Communication and transparency are key issues when planning for management interventions for invasive alien species, so that information can be shared between governments, scientists, NGOs and IPLC. Potential negative and positive impacts need to be clearly explained and discussed between parties. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Communities often have the capacity to adapt to invasive alien species or play a strong role in their management, as they are often live and work in close contact with their local environment. For example, local fishers can support management of invasive marine species, through their knowledge of the environment and their daily interactions with marine species. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien	Thank you for this suggestion. We have chosen to include it in the section 5.2.1
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Communities often have the capacity to adapt to invasive alien species or play a strong role in their management, as they are often live and work in close contact with their local environment. For example, local fishers can support management of invasive marine species, through their knowledge of the environment and their daily interactions with marine species. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien	Thank you for this suggestion. We have chosen to include it in the section 5.2.1
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Community members, including hunters, fishers, herders and gatherers, are often the first to see new species in their environment, and they will continue to monitor their spread and impacts. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thanks for this suggested change. We have included it in the second order draft see section 5.5.3.3. and 5.2.1.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Community members, including hunters, fishers, herders and gatherers, are often the first to see new species in their environment, and they will continue to monitor their spread and impacts. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 in the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Government regulations often limit the ability of IPLC to adapt to and manage IAS, as they can impede flexible approaches and experimentation in the face of new problems. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for your comment. Chapter 6 explores IPLC adaptation to and management of IAS
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Government regulations often limit the ability of IPLC to adapt to and manage IAS, as they can impede flexible approaches and experimentation in the face of new problems. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for your comment. Chapter 6 explores IPLC adaptation towards management of IAS
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	It is important to articulate and highlight spiritual methods for managing invasive alien species, including prayers, ceremonies and other ways of maintaining balance in the relationships between humans and nature. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1. Also, some specific examples such as sacred bathing and worshipping are given in 5.5.6.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	It is important to articulate and highlight spiritual methods for managing invasive alien species, including prayers, ceremonies and other ways of maintaining balance in the relationships between humans and nature. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1. Also, some specific examples such as sacred bathing and worshipping are given in 5.5.6.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Management strategies can also have unforeseen impacts. These can also often be undocumented, as realities on the ground can be complicated and different from official accounts. Underlying environmental, social, cultural and governance interactions need to be examined. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 and 5.5.6.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Management strategies can also have unforeseen impacts. These can also often be undocumented, as realities on the ground can be complicated and different from official accounts. Underlying environmental, social, cultural and governance interactions need to be examined. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 and 5.5.6 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Many articles, reports and papers are not written by IPLC, and instead are often written by researchers, NGOs and governments from outside of the community. They may therefore not capture realities on the ground. This can especially be the case when they describe towards co-management efforts, which can be portrayed as highly successful, even when communities find that power imbalances and other serious issues are present. Authors should be aware of this potential source of bias in the literature. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Many articles, reports and papers are not written by IPLC, and instead are often written by researchers, NGOs and governments from outside of the community. They may therefore not capture realities on the ground. This can especially be the case when they describe towards co-management efforts, which can be portrayed as highly successful, even when communities find that power imbalances and other serious issues are present. Authors should be aware of this potential source of bias in the literature. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Participatory mechanisms for managing IAS with IPLC need to explore broad collaboration, taking into account the self-determination of indigenous peoples, Free, Prior and Informed Consent, land rights, and meaningful participation of women and youth at all levels, before any kinds of intervention to control IAS in IPLC lands, waters or territories. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	Participatory mechanisms for managing IAS with IPLC need to explore broad collaboration, taking into account the self-determination of indigenous peoples, Free, Prior and Informed Consent, land rights, and meaningful participation of women and youth at all levels, before any kinds of intervention to control IAS in IPLC lands, waters or territories. More information in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	When a species is new to an environment, communities may not initially have the knowledge to manage or adapt to it. Observation and experimentation is needed to learn what to do. Collaborations and knowledge sharing between communities can be important to help develop knowledge and strategies between localities and regions. Collaborations with scientists and other researchers can also be helpful, as long as this is done on equal terms with respect for ILK. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	5	0	0	0	0	0	0	When a species is new to an environment, communities may not initially have the knowledge to manage or adapt to it. Observation and experimentation is needed to learn what to do. Collaborations and knowledge sharing between communities can be important to help develop knowledge and strategies between localities and regions. Collaborations with scientists and other researchers can also be helpful, as long as this is done on equal terms with respect for ILK. More information and examples in IPBES (2020) Andreve, J.L., Batzin Chojo, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you for this suggestion. We have chosen to include it in the section 5.2.1 of the second order draft
Caplat, Paul	No	5	0	0	0	0	0	0	Control vs. containment are ignored in one section, used indifferently in another, and explained in a third. Terminology and emphasis should be consistent throughout the chapter (and probably across chapters)	Thank you for this suggestion. We have harmonized the terminology while revising the sections in the second order draft
Caplat, Paul	No	5	0	0	0	0	0	0	I find the split of "framework for targeting", "tools", and "management in practice" sections difficult to navigate. There are pages of technological advances, and quite little on theoretical frameworks.	Thank you for this suggestion. In the second order draft, we have tried to rectify this bearing in mind that this Chapter is solutions focused limiting our capacity to cover "theoretical frameworks". We have consolidated the links between Section 2 (decision making frameworks)
Caplat, Paul	No	5	0	0	0	0	0	0	You did a fantastic job overall!	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Feest, Alan	No	5	0	0	0	0	0	0	This Chapter is well written unlike Ch 4	Thank you for your feedback.
García Martínez, Margarita	No	5	0	0	0	0	0	0	Different parts of the document are very repetitive, what changes is the context but the same information is included in different subtopics. This is even true for the examples, e.g. the example of rabbit eradication using biological control methods in Australia is included in two different parts.	Thank you for your comment. Repetition was addressed and the text was clarified in the second order draft

García Martínez, Margarita	No	5	0	0	0	0	0	There must be a balance in the contents of the sub-themes, there are very long sub-themes (with lots of information and examples) and there are sub-themes that include only a small paragraph or a couple of lines that do not give much information or there are not enough references. / It can be understood that for some cases there is more information worldwide than for others, that is why the most relevant information of each sub-theme must be selected in such a way that the distribution of the contents is similar.	Thanks for this suggested change. We have included it in the second order draft
Government of Germany	Yes	5	0	0	0	0	0	It is suggested to consider recent European examples on Invasive Species Management (Lessons Learned) in this chapter as well.	Thanks for the comment. We must include examples across the globe and in different biomes so we can't specifically address regional case histories, but we will endeavour to include the important examples from the European region as well in the second order draft.
Government of Germany	Yes	5	0	0	0	0	0	It is suggested to expand the title of this chapter to "Management: Lessons learned - challenges and opportunities". Rationale: This would make this ch sound more forward-looking by indicating that desirable outcomes will be promoted.	Thank you. All IPBES assessment are based on published information so the extent to which "forward-looking" can be gleaned from the literature we are capturing this using our "solutions focussed" approach. C&O is also more clearly defined in the SPM
Government of Germany	Yes	5	0	0	0	0	0	It is suggested to reduce the size of this chapter by removing redundant sections.	Thanks. We have reduced the length of the chapter without avoiding important information, but we disagree with the statement that this chapter so far includes "redundant sections".
Government of Germany	Yes	5	0	0	0	0	0	The sub-titles should be interlinked to the text to allow easier reading.	Thank you. Your comment is well taken. We have reworded the titles to increase the readability in the second order draft
Government of Germany	Yes	5	0	0	0	0	0	While ch 5 deals with tools, practices and programmes used during the pre-entry and entry phase of the "invasion curve" in order to achieve preparedness and prevention, it falls short of engaging with many of the direct and indirect drivers which have been described in ch 3. Thus, the management of IAS is narrowed down to a very technological and syntomataical approach. A more holistic approach would take into account the important issue of biodiversity mainstreaming in order to include appropriate policies and practices in all relevant fields and sectors. Generally, it is suggested to take up the threads of the previous chapters to increase the overall coherence of the assessment.	Thank you very much. As Ch 5 has very limited space to cover all IAS management options, therefore we focussed on tried and tested approaches to directly tackling IAS across the invasion continuum with a "solutions focussed" chapter. Managing direct and indirect drivers of IAS is outside of our scope and indeed the scoping document. We do not understand the concept of "biodiversity mainstreaming" to respond to this part of the comment. In the second order draft, we seek to provide better threads to the previous chapters noting that they provide very few threads themselves into management options and solutions.
Heubach, Katja	No	5	0	0	0	0	0	Kindly consider looking at and providing recommendations for better alignment of policies, between IAS policies and other. E.g. comparing the EU legal re-orientation which requests management of IAS while preventing removing some (e.g. shooting Egyptian geese). The chapter could provide a discussion on how to streamline IAS into regulations in various sectors.	Thanks for the comment. This is most relevant for Ch 6 and outside the scope of Ch 5 .
Heubach, Katja	No	5	0	0	0	0	0	Kindly consider providing practical guidance on how to use the results of the assessment 'on the ground'. The suggested measures are still too high-level to be directly useful for practitioners. For example, there is a publication shared by the European Commission that is very useful (see here: https://circabc.europa.eu/sd/a/71b7fd4a-bcb3-47b8-8969-61dbd5cc0acb/TSSR-2016-003%20Alopochn%20aegyptiaca.pdf). It evaluates different measures concerning the management of the Egyptian goose. Of course, this level of detail is not to be realized through the assessment. However, it might give an idea of the information needed for practitioners. What is beautiful about this publication is that it works on the level of "informed decision-making", i.e. on the basis of this information, they can decide themselves which measure is the most appropriate to their context (instead of only promoting "the one and only" measure).	Thanks for your suggestion. The word limit may not permit us to include practical guidelines on how to use the results on the ground. The purpose of the assessment is different.
Mill, Aileen	No	5	0	0	0	0	0	The chapter is too long, parts are repetitive or unnecessary. More needs to be done to link the sections back to the overview figure 5.1 - specifically to consider the management goal being considered.	Thanks for the comment. We have tried to avoid repetitions and provide better links back to Fig 5.1 in the second order draft
Papadopoulou, Paraskevi	No	5	0	0	0	0	0	Check the figure and table legend formatting -Overall well structured and written chapter. Easy to follow it through.	Thanks for this suggested change. We have included it in the second order draft.
Papadopoulou, Paraskevi	No	5	0	0	0	0	0	Check the figure and table legend formatting.	Thanks for this suggested change. We have included it in the second order draft.
Rüegg, Simon	No	5	0	0	0	0	0	There are a lot of issues on how we frame a problem but this will impact on the solution you choose and its effectiveness. It should be discussed in Chapter 5, with feedback loops in perspective.	Thanks for the comment. It may not be possible to include more information for length restrictions but we developed a decision tree for when to tackle pathways species and sites in
Sarat, Emmanuelle	No	5	0	0	0	0	0	Some very good points here are the facts that managing IAS should focus on maintaining the productivity, biodiversity and ecosystem services, instead of focusing on population control or eradication. The point about the precautionary principle is very good too, since it encourages to take quick decisions even when knowledge is not complete. And finally, replacing management issues in a longer timeframe is very helpful because very few strategies and management plans currently finance short term actions, without monitoring or follow up.	Thank you for your comment.
Shimura, Junko	No	5	0	0	0	0	0	Evidence and successfulness on pathway management (introduction of IAS crossing biogeographic border) is still weak in the current text. More information on pathway analyses and concrete measures taken by national or international community should be highlighted (e.g. trade regulations, transport regulations (e.g. SPS agreement, IPPC, BWM Convention and their implementations covering IAS), raising public awareness and participatory control efforts, incl. industry)	Thanks for the comment. Linkage to SPS, IPPC and other Conventions is now in Ch 6. Pathway management analysis and Participatory approaches are covered in Ch5. In the second order draft, we expanded out these sections in line with this comment
Shimura, Junko	No	5	0	0	0	0	0	The term "pests" should be replaced IAS in the entire chapter for the purpose of this assessment, unless otherwise explained the reason for using the terminology of IPPC/OIE.	Thanks for the comment. We shall replace it wherever appropriate in the second order draft
Takehara, Mari (Government of Japan)	Yes	5	0	0	0	0	0	We think that a review of best practices is useful. In particular, effective examples of cooperation between the Convention on Biological Diversity (CBD) and other international frameworks (e.g., IPPC) and the effectiveness of multilateral cooperation (e.g., Japan, China and Korea) should be presented.	Thanks for the suggestion. Issues relating to the interactions of Conventions is outside the agreed scope of Ch5. It is covered in Ch6
Marchante, Elizabete	No	5	0	0	0	0	0	I'm not sure what can be done to improve readability, but the different sections in Chapter 5, even with Figure 5.2 and the text below, are a little difficult to integrate and relate to each other ... I imagine a manager reading this would expect a much more "direct" message, but instead it will get lost in all these different approaches/ levels ... maybe it could help if Figure 5.2 was mentioned at the beginning of each section and a better "transition" and clear reference to the connection / relationship with the section previous one was made.	Thank you, we have revised the text, taking into account this comment
Government of Germany	Yes	5	1	1	204	7717	7717	Only references in English are used and cited - intention or omission?	Thank you for your comment. Our experts have tried to add more language diversity in their references. Please note that in other chapters, there are many more references in other languages and literature searches were in a wide selection of languages. (e.g. Impact datasets).
Government of Germany	Yes	5	1	1	1	36	36	The executive summary is still very generic and only partially reflects the key findings in this chapter. We look forward to a more mature version provided in	Thanks for the comment. A revised Executive Summary has been included in the second order
Marchante, Elizabete	No	5	1	1	1	36	36	Kindly consider including a key message on the need for stronger focus on prevention and on the integration of pathway, species and site management strategies. Often the pathway strategy is developed by the national state but is not taken up by the practitioners. And the practitioners do some actions at the species or site level but without addressing the pathways of introduction the results are not satisfying. This can also lead to identifying a key message about the work between stakeholders: e.g. road managers implement IAS measures on a 10 meter stretch on the road sides, but the IAS spread beyond that e.g. private garden. It would be great if the executive summary could provide some guidance on how to overcome this.	Thanks for the comment. This has been addressed without the need to go into the level of detail of roadsides. We have ensured there is broader coverage of pathway management pre and post border in the second order draft
Mason, Peter	No	5	1	1	157	5403	5403	The next draft will require a very careful read for grammar and spelling. There are numerous mistakes (expected in a first draft) that require attention.	Thanks. We have revised the text accordingly in the second order draft
Rüegg, Simon	No	5	1	2	1	3	3	In my view, it is also important to note that prevention produces no evidence that it was successful. I.e. it is very difficult to claim (only with counterfactual scenarios) and thus political motivation is quite weak. The executive summary should highlight this explicitly to make decision- and policy-makers aware of this challenge. As an example, an outbreak such as COVID was predicted since the early 2000, yet no investments were made, because the threat was not imminent. This is a psychological barrier a preventive measure needs to overcome and which has high costs.	Thanks for the comment. Although prevention does not leave any evidence, we are pushing the emphasis away from prevention per se towards "preparedness" for this and other reasons (prevention rarely works for ever)
Bliss, Cebuan	No	5	1	4	1	4	4	Why is eradication in this summary assumed as the only way of dealing with IAS? Suggest the term 'mitigation' instead	Thanks for the comment. We have adjusted the ES in the second order draft and that makes this no longer an issue
Flevaris, Spyridon	No	5	1	5	1	6	6	Suggestion to alter order of elements in this sentence, to reflect the importance of biodiversity and ecosystem services: "Focus of management should be on preventing, minimising and mitigating the adverse impact on biodiversity and related ecosystem services, as well as on maintaining sustainable productivity". Also noting that the concept of "sustainable productivity" is not clear.	Thank you very much. The text is changed in the second order draft.
Singheiser, Martin	No	5	1	5	1	6	6	Point 3: Focus of management should be on maintaining sustainable productivity, biodiversity and 5 ecosystem service benefits, not just IAS reductions - this issue is very important since for managing IAS species from the animal kingdom, in some cases als aspect of animal welfare acts do apply.	Thanks for the comment. This adjustment has been made to reflect the body of the chapter in the second order draft
Maillard Jean-Francois	No	5	1	7	1	8	8	include the necessity to base management on research results	Thanks for this comment. This is the same as ensuring best practice is applied, developed through adaptive management which is a theme of the Chapter
Peck, Harry	No	5	1	7	1	9	9	For species where management feasibility is known to be low this seems illogical. For example, if it is known that action will result in impacts which are not significantly different from impacts under inaction then it may make sense to target species which pose a lower risk and have a higher degree of management feasibility. Perhaps action should be taken "only" when management feasibility is not fully understood for high risk species rather than "even if the science is not fully understood". The statement "even if the science is not fully understood" implies that if the science is understood, and it shows that action would be illogical because it is ineffective, then action should take place anyway. Similar discussion is provided in Booy et al., 2017.	Thank you. The ES has now been completely re-written in the second order draft
Singheiser, Martin	No	5	1	7	1	9	9	The precautionary approach may be useful in some, but not in all cases. Especially in geographic regions - e.g. the European Union - the risk of one species to become invasive may be higher in the mediterranean region than in northern parts of Europe. Under precautionary principles, a ban affects the entire EU leading also to less acceptance in the population of understanding and supporting the management of IAS. Precautionary principles there may be more useful with respect to the potential geographic region based on climate conditions. Maybe such informations are useful to mention as well?	Thank you. The ES has now been completely re-written in the second order draft
Government of Ethiopia	Yes	5	1	16	1	16	16	Better to amend as "Protected areas, sacred sites, areas of high cultural value and islands of ..."	Thank you. The ES has now been completely re-written in the second order draft
Singheiser, Martin	No	5	1	18	1	18	18	I do not understand this sentence	Thank you. The ES has now been completely re-written in the second order draft
Brooks, Thomas	No	5	1	25	1	25	25	Change "not just conservation for conservation sake" to read "not just conservation for the intrinsic value of biodiversity", or perhaps simpler, just delete this	Thank you. The ES has now been completely re-written in the second order draft
Flevaris, Spyridon	No	5	1	26	1	27	27	Suggestion to include "scientific and technical challenges" on the list of major challenges in managing IAS.	Thank you. The ES has now been completely re-written in the second order draft
Flevaris, Spyridon	No	5	1	34	1	36	36	Suggestion to alter order of elements in this sentence, to reflect the importance of biodiversity and ecosystem services: "Scenarios and modelling can be useful to support the design and implementation of IAS management maintaining biodiversity and ecosystem service benefits as well as sustainable productivity". Noting again that the concept of "sustainable productivity" is not clear and should be better explained what is meant by it.	Thank you. The ES has now been completely re-written in the second order draft

Flevaris, Spyridon	No	5	2	39	2	43	The distinction between EU and non-EU (the rest of the world?) is unclear. The notion of "management" under Regulation 1143/2014 is actually closer to (a) but comprises partly also (b). Suggest to remove the EU - non-EU distinction and just mention the different approaches. Maybe also useful that you clarify what approach you follow in the document.	Thank you for your suggestion. Management is defined in the glossary in the second order draft
Linnamägi, Merike	No	5	2	39	2	43	Has been clearly stated that this definition has been used in 2 separate ways in different regions, which is useful background info. However how management is defined in this IPBES assessment is unclear, are we expected to always consider whether EU or non-EU region is meant?	Thank you for your suggestion. Management is defined in the glossary in the second order draft
Linnamägi, Merike	No	5	2	53	2	54	Eradication- the current definition is very passive. In general eradication is considered active / needing human intervention. If species goes extinct due to natural (climatic etc) conditions it is not considered eradicated, but having gone extinct or having failed to establish. IPCC defines as "Application of phytosanitary measures to eliminate a pest from an area", which is rather plant health centric but the part of "application of measures" would improve the	Thank you for your suggestion. Eradication is defined in the glossary in the second order draft
Shimura, Junko	No	5	2	71	2	71	consider a new text: zoonotic disease causative agents, such as SARS-CoV-2 should also be viewed as an IAS (reason: to distinguish disease (state of condition) and alien species (an organism/agent caused diseases))	Thank you for the comment, this has been removed from the second order draft
Cudmore, Becky	No	5	3	0	4	0	5.2.2 and 5.4 -section titles both say tools, think better if have a descriptor/adjective before tools for the titles to avoid confusion.	Thank you, this has been addressed in the second order draft
Mason, Peter	No	5	3	70	3	70	"microorganism" or "micro-organism", compare with page 29, line 977 and page 53, line 1825.	Thanks for this suggested change. We have included microorganism in the second order draft
Scalera, Riccardo	No	5	3	70	3	71	The sentence about the Covid-19 sounds kind of overstatement here, as the problem of the management of IAS is far more complex, while the focus on zoonosis seems not the most appropriate to simplify the introductory explanation of the issue	Thank you for the comment. The overviews of the connection between this assessment and zoonotic disease causing agents will be provided in Chapter 1. In Chapter 5 we chose not to give detailed discussions on it since it can overshadow the main aim of the chapter.
Singheiser, Martin	No	5	3	70	3	72	If one treats Corona-Virus as an IAS, then all infectious diseases like avian flu, swine flu, AIDS and HIV, SARS, MERS, Ebola, Malaria and others should be listed/treated/viewed as IAS as well. However, I would not recommend in doing so.	Thank you for the comment. The overviews of the connection between this assessment and zoonotic disease causing agents will be provided in Chapter 1. In Chapter 5 we chose not to give detailed discussions on it since it can overshadow the main aim of the chapter.
Verbrugge, Laura	No	5	3	70	3	72	I would suggest to move this sentence to the end of the paragraph as it provides an additional viewpoint and is not at the core of the chapter.	Thank you for the comment. The overviews of the connection between this assessment and zoonotic disease causing agents will be provided in Chapter 1. In Chapter 5 we chose not to give detailed discussions on it, since as you mentioned it can overshadow the main aim of the
Government of Germany	Yes	5	3	71	3	72	It is suggested to differentiate precisely between the disease (COVID-19) and the virus (SARS-CoV-2).	Thank you for the comment. We have distinguished diseases and agents caused diseases in the second order draft.
Government of Germany	Yes	5	3	79	3	80	One Health is tackled by the WHO/OIE/FAO Tripartite. Please mention Tripartite and include FAO in this context.	Thanks for the comment. We have included this in the second order draft.
Government of Germany	Yes	5	3	81	3	81	Please consider inserting SDG (15) and its target 15.8 which refers to IAS, and please expand on the fact that target 15.8 states: "By 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species." By IPBES decision, this assessment should respond directly to Aichi Biodiversity Target 9 (Annex III to decision IPBES-4/1), which states: "By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment." We therefore recommend the analyses of the recently launched CBD GBO-5 report (2020, https://www.cbd.int/gbo/) that provides an in depth analyses of what progress has been achieved so far under Target 9. In order to maintain continuity in this process we warmly encourage the authors to analyse IAS-related aspects in ongoing CBD processes that should lead to further goals/targets under the planned 'post-2020 global biodiversity Reference could be made to the concept of Bioeconomy which will be guiding future development trends.	Thanks for this suggestion. We have revised the introduction, and included target 15.8 in the second order draft.
Government of Germany	Yes	5	3	82	3	85	Reference could be made to the concept of Bioeconomy which will be guiding future development trends.	Thanks for this suggestion. Bioeconomic models are included in 5.2.2.4 in the second the
Scalera, Riccardo	No	5	3	82	3	82	IUCN is not an UN agency	Thanks for this suggestion. We have revised this in the second order draft
Damaseno, Gabriella	No	5	3	87	3	92	I would split this sentence into two to ease clarification. One listing the databases and another the management actions.	Thanks for this suggestion. The introduction has been revised in the second order draft
Scalera, Riccardo	No	5	3	87	3	87	What exactly are "high impacting IAS"? IAS are by definition species with an impact, so it is sufficient to say "database of IAS"	Thanks for the comment. We have revised the text in the second order draft
Damaseno, Gabriella	No	5	3	94	3	99	I would also include the long-term management of IAS that can not be eradicated anymore.	Thanks for this suggestion. We have chosen to include it in the second order draft
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. When considering the 'goals' there is no mention of reducing the impact of an IAS, this is similar to containment but needs to be made explicit. Examples might include reducing density of a herbivorous IAS to maintain the impact of grazing pressure to within a tolerable threshold.	Thanks for this comment. We employed the term "adaptive management" which has a broad meaning including the concept of reducing the impact of IAS.
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. Control is a vague term - I'd argue that "complete removal", "suppression" (density reduction , abundance reduction) and spatial 'containment' are all management strategies that fall under long-term management and should be better represented in this figure and later in the text e.g. 5.5.1.6	Thanks for the comment. We have used "adaptive management" instead of "control" in the figure. Also, control has now been defined in the glossary, both in the introduction and section 5.5.1.6 in the second order draft
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. IPM needs defined.	Thanks for the comment. We have decided not to include IPM in the figure in the introduction in the second order draft.
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. It could be argued that surveillance, detection and monitoring are required prior to management.	Thanks for the comment. We have considered surveillance and monitoring as part of management. Those are detailed in Section 5.5.
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. Please review this alongside Roberson et al (2020) Biol Invasions. Where a framework for management is set out alongside suggestions for defining management terminology. https://link.springer.com/article/10.1007/s10530-020-02298-2	Thanks for the comment. We reviewed and included the paper in the second order draft
Mill, Aileen	No	5	4	107	5	119	Figure 5.1. The figure currently implies that there is no complete removal option for management should a species become established/ widespread. Often referred to also as eradication - this 'complete removal' of a species is a used management objective.	Thanks for the comment. This figure is showing the general management options along invasion continuum. Complete removal after establishment is not impossible, but in general, eradication needs to be done before establishment or soon after. Again, the figure presented here should be general, so we have chosen not to include the aspect in the second order draft
Rüegg, Simon	No	5	4	116	4	116	Fig 5.1 In Chapter 4 the phases are named differently: uptake, transport, establishment, spread etc. The terminology and differentiation should be consistent throughout all chapters.	Thank you, the invasion stages have been harmonized across the assessment.
Shimura, Junko	No	5	5	106	6	151	Goal should be a clear conservation goal to protect biodiversity and ecosystem services from IAS (taking into account the geographic, biological and socio economic context) - what species, habitats or ecosystem services will be protected by control measures and what biodiversity is safeguarded. The current text on goals should be read as stages of control measures.	Thanks for the comment. We have chosen not to use goal in this context in the second order draft
Government of Germany	Yes	5	5	114	5	115	Figure 5.1. It is not clear what is meant by "Focus Pathway" (purple line). Is it referring to "pathway management"(L134), or "high-risk introduction pathways" (L760-761) or "managing introduction pathways" (L772)? It would be useful, if this Figure is self-explaining without have to go too in depth into the text to find all explanations required to understand it.	Thanks for the comment. We have revised the text and the figure to make our intention clear in the second order draft
Government of Germany	Yes	5	5	115	5	115	Please consider changing "Integrated Pest Management (IPM)" in figure 5.1 to "integrated species management" or "ecosystem management" as broader concepts, which go beyond agriculture.	Thanks for the comment. We have decided not to include IPM in the second order draft.
Pourkazemi, Mohammad	No	5	5	115	5	116	In Figure 5.1, in Action, I think in case of shared ecosystem such as the Caspian Sea or Black Sea which is shared water bodies between 5 countries before Biosecurity we need "Regional agreement to develop a joint Action plan" then biosecurity can work much better.	Thanks for the comment. We have now separated terrestrial and marine figures, and biosecurity is not included in the marine one to avoid oversimplification. Biosecurity in marine ecosystems are detailed in Section 3 and 5 of the second order draft.
Schaffner, Urs	No	5	5	115	5	115	Fig. 5.1: For management purposes, I suggest to include Early Detection and Rapid Response (EDRR) at subnational or national level as an option to reduce spread at the national or regional level. E.g. individual states in the US have implemented EDRR to prevent the spread of invasive weeds established in neighbouring states. Also, Terblanche et al. (An approach to the development of a national strategy for controlling invasive alien plant species: The case of Parthenium hysterophorus in South Africa; Bothalia 2016) define areas with the same management approach and distinguish between zones assigned to prevention, eradication and containment measures. If the authors prefer not to include EDRR in the Figure because eradication is already included, then I suggest that they clarify that in a spatially explicit management strategy EDRR can also be a management goal at the subnational level and maybe add	Thank you for the comment. We have included early detection in the management objective part of the figure.
Peck, Harry	No	5	5	116	5	118	Figure 5.1b implies eradication is never attempted after a species begins to spread or is widespread. This is not always true. For example see Robertson et al., 2015 regarding the attempted eradication of the Ruddy duck across Europe where this species has become widespread. Perhaps it should be made clearer that eradication is typically less achievable for more widespread species, though it remains a valid goal for some species regardless.	Thanks for the comment. For most cases, eradication needs to be done before establishment or soon after. The figure presented here should be general, so we have made the length of eradication bar short. In the second order draft, we have revised the text to make it clear that feasibility of eradication GENERALLY decreases as invasion proceeds.
Rüegg, Simon	No	5	5	116	4	116	Fig 5.1.b in the context of emerging infectious diseases, if spillover is considered as "uptake", prevention should have a focus on cultural practices, land use, and other determinants of emergence/uptake. Biosecurity/quarantine are not effective for prevention. Indeed, the heading "Management response" is quite explanatory, but from a more systemic perspective, maybe one could move ahead of response with some of the management approaches. In the context of emerging diseases this was suggested as structural one health: https://www.sciencedirect.com/science/article/abs/pii/S0277953614006145 , i.e. tracking disease	Thank you for the comment. After a discussion with CLAs, in Chapter 5 we have decided not to give detailed discussions on infectious diseases since it can overshadow the main aim of the chapter.
Mill, Aileen	No	5	5	120	5	129	Consider making reference to Roberson et al (2020) https://link.springer.com/article/10.1007/s10530-020-02298-2	Thanks for the comment. We reviewed and added the paper in the second order draft
Mill, Aileen	No	5	5	120	5	120	Is preparedness the same as contingency planning? Should this term be introduced here too?	Thanks for the comment. Preparedness is defined in Glossary. In the second order draft, we have decided to include it in the figure as it is an important concept in the context of IAS
Rüegg, Simon	No	5	5	120	5	122	In contrast to preparedness, prevention can be framed as reducing the probability of uptake as commented for Fig 5.1, chapter 3 and 4. This contains completely different options and actions than preparedness and would deserve a separate exploration.	Thank you for your comment. We are afraid we don't clearly understand the comment but it seems to be about zoonotic diseases which we have agreed now are out of scope for this Chapter
Scalera, Riccardo	No	5	5	120	5	120	Shouldn't the option "do nothing" be an additional management goal to consider here?	Thank you for this suggestion. We have chosen not to include it here, but it is raised in section 2 of chapter 5
Mill, Aileen	No	5	5	121	5	121	What is optimal success. Just success?	Thanks for the suggestion. We have revised the text in the second order draft
Flevaris, Spyridon	No	5	5	123	5	124	Taking into account the approach taken in this section that "prevention" is one of the goals of "management", this sentence seems conceptually wrong: Prevention is not implemented through management. Suggested redrafting: "Prevention through management and maintaining a state of preparedness are implemented in the pre-entry phase to allow for interception of a new alien species upon arrival."	Thanks for this suggested change. We have included it in the second order draft
Schaffner, Urs	No	5	5	124	5	126	See my comments regarding Fig 5.1; as indicated there, this statement may be true at higher spatial scale (e.g. at national scale), but in spatially explicit management strategies EDRR in areas next to the invasion front can continue to flatten the curve in a phase where the species is spreading at the national scale. As mentioned in Terblanche et al., depending of the resolution of the geographic management units EDRR is not the same as containment.	Thank you for the comment. We have amended the sentence, bearing in mind that we are providing a conceptual approach of an invasion, there are context dependencies for all scenarios and management needs to be adapted to each.

Smith, Emily	No	5	6	124	6	134	Needs an additional sentence in here to state that the most cost-effective approach to species management is to stop it coming in in the first place. At present it just refers to early eradication/ long term control so feel it could be strengthened by highlighting this point at the outset and how this fits in within the	Thanks for the comment. It is well taken.
Mill, Aileen	No	5	6	133	6	151	Both paragraphs here final with a very similar sentence. More synthesis across these could make the section less repetitive.	Thanks for the suggestion. We have revised the sentence. In the second order draft
Damaseno, Gabriella	No	5	6	139	6	139	Maybe include a sentence clarifying that all these trade-offs are dependent on the socioeconomic context in the invaded system.	Thanks for the suggestion. This point has already been covered elsewhere.
Mill, Aileen	No	5	6	144	6	144	Here reference is made to surveillance and monitoring as a supporting activity rather than a Management Action. Need to be clear if this is the case and link to Figure 5.1	Thanks for the comment. Surveillance and monitoring are also part of management since these help early detection and eradication activities.
Damaseno, Gabriella	No	5	7	164	7	164	I think the figure would be clearer if turned upside down: with the inputs from chapters 2-4 on the top and the outputs to chapter 6 at the bottom.	Thanks for the comment. We have changed the figure accordingly in the second order draft
Mill, Aileen	No	5	7	164	7	166	Figure 5.2. I think this figure would be easier to read from top to bottom rather than bottom to top as currently presented. Move the boxes at the bottom with chp2-4 to the top, have the two way feedback arrows to the blue box for chpt 5 then have this progress to chapter 6 at the bottom.	Thanks for the comment. We have changed the figure accordingly in the second order draft
Mill, Aileen	No	5	8	186	8	196	I found this section dominated by surveillance and monitoring methods. I'd like to see more on current methods reviewed/ evaluated here (more suggestions	Thanks for this suggestion. We will adopt it in the second order draft if it adds to the overall
Mill, Aileen	No	5	8	216	9	249	I agree with much of what is here but review of the language and tone is needed. Some terminology should be harmonised with elsewhere in the document e.g. 'ethical dilemmas' (line 224) refers to the need to take better account of the ethics, humaneness and welfare standards when undertaking control.	Thanks for this observation.
Mill, Aileen	No	5	8	218	8	218	I'd argue one of the most serious challenges is where to apply limited resource.	Thanks for the comment. We have chosen to include it in the second order draft
Smith, Emily	No	5	8	218	8	218	Lack of resources on sufficient time scales is also a key issue for managers. They are unable to work at the scale necessary and the time frame required in order to manage IAS successfully	Thanks for the comment. We have chosen to include it in the second order draft
Smith, Emily	No	5	8	221	9	223	Maybe need to clarify this sentence. Wasn't sure what the point was here regarding reluctance to attempt prevention. Is this with regard to methods at the border, on a site e.g. biosecurity. I have not come across this in my experience so potentially needs an example to demonstrate this.	Thanks for the comment. We will make this point more explicit in the second order draft
Anderson, Freda	No	5	8	225	8	225	References for concern about biological control: How risky is biological control? Simberloff D & Stiling P. 1996. Ecology 77:1965-1974; The Double-Edged Sword of Biological Control in Conservation and Restoration Louisa SM & Stiling P 2004.Conservation Biology 18:50-53	Thank you for the reference. Due to the word count limitation we have chosen not to refer to it.
Bliss, Cebuan	No	5	9	223	9	225	Suggest be explicit that control means kill "add extra ref"	Thanks for this comment. We have made this point more explicit in the second order draft
Mill, Aileen	No	5	9	223	9	223	encounter opposition" - management is not always viewed as socially acceptable - this is something we need to get better at understanding rather than saying other groups oppose what we want to do, which is how this reads.	Thanks for this suggestion. We have revised this sentence suitably in the second order draft
Mill, Aileen	No	5	9	244	9	245	There is a need to integrate the concept of managing at appropriate (e.g. ecologically meaningful and relevant not just political) scales	Thanks for this suggestion. We have included it in the in the second order draft.
Smith, Emily	No	5	9	244	9	244	And at the most appropriate scale e.g. catchment scale.	Thanks for this suggestion. We have included it in the second order draft
Mason, Peter	No	5	10	251	10	252	Awkward wording, suggest "... actions to address IAS, for example technical, legal ... knowledge-based, and others."	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Mill, Aileen	No	5	10	251	10	261	This section needs to link to the management framework outlined in Fig 5.1, specifically with reference to what the management decision being made is, then link to who is involved and what the tradeoffs are. Ideally this is providing the justification/ rationale for the need for frameworks. This introductory paragraph falls short of stating why frameworks are needed.	Thanks for this suggested change. We have included it in the second order draft. The rationale for frameworks comes in 5.2.1
Mason, Peter	No	5	10	253	10	253	Awkward wording, suggest "Whatever the action, it arises ..."	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Marchante, Elizabeth	No	5	10	263	23	765	Kindly consider putting emphasis on the impact of funding limitations (e.g. short-term funding) to the success of evidence-based decision making and management strategies.	Thanks for this suggested change. We have included it in the second order draft. The rationale for frameworks comes in 5.2.1
Mason, Peter	No	5	10	264	10	264	Correct to "decision-making"; this needs to be corrected throughout.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Mill, Aileen	No	5	10	264	10	264	Decision making about what? About what is being managed, where and how?	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Peck, Harry	No	5	10	264	10	269	As far as I am aware there has been no quantitative analysis of the actual decision making process behind prioritising invasive species. The conclusion that ad-hoc decisions are made is likely true, but has seemingly been made on anecdotal evidence. For example, to what extent have tools which systematically compile evidence, such as risk assessments influenced decision making vs "ad-hoc" influences. An analysis such as this may provide greater clarity on the "room for improvement" but represents a gap in the knowledge.	Thank you for your comment. Although we share this view on the knowledge gap and room for improvement, we cannot address this aspect due to length restrictions.
Peck, Harry	No	5	10	264	10	266	It may be beneficial to provide greater clarity on what causes ad-hoc decisions to be made so that decision-makers can try and avoid these influences in the future and make effective management decisions. For example influential stakeholders may encourage Government to control an IAS, or there may be some political will to carry out management and this may lead to inefficient management. See Sheail, 2010 regarding the influential factors on the decision to	Thanks for this suggested change of wording. It is an improvement and we have adopted it, using sheail 2003 (not 2010) as an example.
Smith, Emily	No	5	10	267	10	267	For example contingency plans in the UK for Asian Hornet that enables rapid response to invasions	Thank you for your comment. We cannot add additional text or example to the section due to word length restrictions.
Mason, Peter	No	5	10	282	10	283	Replace << and >> with " and "	Thanks for this suggested change. We have included it in the second order draft
Feest, Alan	No	5	10	284	0	0	How is the value of biodiversity to be measured to detect the impact of IAS?	Thanks for this comment. The answers is addressed in Chapter 4 and the methodology in section 5.2.2.3 of the second order draft
Mill, Aileen	No	5	11	290	11	290	Should this figure be linked to the invasions stage (as in 5.1) where site management is considered more important for long term management strategies where as Pathways ans species are earlier in the invasion continuum? Can the decision maker be considered - is it the same people who are likely to be making decisions re all three aspects - I suspect not..... scale is important here too to consider - perhaps link to table 5.1 (when it is complete)	Thank you for this suggestion, we have included it in the second order draft.
Government of Ethiopia	Yes	5	11	311	11	312	Species abundance needs to be included as criteria of prioritizing in addition to 'species distribution' and 'species impact'.	Thank you for your comment. We deal with this topic in 5.4.3.1
Mill, Aileen	No	5	11	311	11	311	Prioritising species for what? For management?	Thanks for this suggested change. We have included it in the second order draft.
Damaseno, Gabriella	No	5	12	320	12	320	Items in the table could be displayed at the same order as they are presented in the subsequent text.	Thanks for this suggested change. We have included it in the second order draft
Karayannis, Theofanis	No	5	12	320	12	322	This comment is actually for Table 5.1 which does not have any line number associated with it: Pathway analysis (last row) can also be relevant for the identification of best management options but this combination is not marked. For example, all IAS-related work at IMO (International Maritime Organization) is at the level of a pathway (international shipping) and it's all about the best management of the relevant vectors (ballast water and biofouling).	Thanks for this comment. Although IAS-related work on marine IAS is done at the pathways level, the prioritization of pathways does not per se lead to the identification of the best management option. We have chosen not to include it here.
Marchante, Elizabeth	No	5	12	320	12	322	Table 5.1 could include some key REFs for the different tools and methods in a way to be easier to search for more info (even if several REFs are cited in the text below). Additionally, in the text below the order of the methods could be the same as it appear in the table (or vice-versa)	Thanks for this suggested change. We have included it in the second order draft
Mill, Aileen	No	5	12	320	12	320	Prioritisation for what? I'd argue Risk management is imprtant here too. Risk modelling is important for Hazard identification.	Thanks for this suggested change. We have included it in the second order draft
Rüegg, Simon	No	5	12	320	12	322	It may be useful to also link the methods to a certain phase of the invasion continuum in which they would be particularly suited.	Thanks for this suggested change. We have included it in the second order draft
Verbrugge, Laura	No	5	12	320	12	322	There is additional literature on the use of integrated modelling approaches that view IAS in the context of coupled human-environment systems: Haak et al 2017 and Büyüktaktakın 2015. Haak, D.M., Fath, B.D., Forbes, V.E., Martin, D.R., Pope, K.L., 2017. Coupling ecological and social network models to assess "transmission" and "contagion" of an aquatic invasive species. Journal of Environmental Management 190, 243-251. and Büyüktaktakın, I.E., Kabis, E.Y., Cobuloglu, H.I., Houseman, G.R., Lampe, J.T., 2015. An age-structured bio-economic model of invasive species management: insights and strategies for optimal control. Biological Invasions 17 (9), 2545-2563.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Ethiopia	Yes	5	12	321	12	321	In Table 5.1, Multi-criteria analyses is mentioned as criteria of prioritizing but it is not marked.	Thanks for this suggested change. We have included it in the second order draft.
Mason, Peter	No	5	12	321	12	322	Place "x" in 'Identification of best management options' column on "Horizon scanning" and Multi-criteria analyses" rows.	Thank you for your comment. Although information on management options may be included in horizon scanning schemes, it is not strictly speaking their objective.
Government of Germany	Yes	5	12	323	13	342	In 2013, Rabitsch et al. considered alien species that were likely to impact on native biodiversity but were not yet established in the wild in Germany (Rabitsch et al., 2013). The predictions of this were subsequently supported by the arrival of the Amur sleeper (Nehring & Steinhof, 2015), the Asian hornet (Witt, 2015) and the water primrose in Germany (Nigmann & Nehring, 2020). -- Nehring, S. & Steinhof, J. (2015). First records of the invasive Amur sleeper, Percottus glenii Dybowskii, 1877 in German freshwaters: a need for realization of effective management measures to stop the invasion. BioInvasions Records, 4, 223-232; Witt, R. (2015). First records of Asian Hornets Vespa velutina Lepeletier, 1838 in Deutschland und Details zum Nestbau (Hymenoptera, Vespinae). Ampulex, 7, 42-53; Nigmann, U. & Nehring, S. (2020). Erster nationaler Bericht Deutschlands gemäß Artikel 24 der Verordnung (EU) Nr. 1143/2014 über invasive Arten für den Berichtszeitraum 2015-2018. BfN-Skripten, 567, 1-143 https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript567.pdf	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Marchante, Elizabeth	No	5	12	323	22	715	The section on tools and methods for decision making is somewhat heterogeneous, with some methods much more explored than others. One option would be to include only a summary of the most relevant info and REFs in Table 5.1? That would help reducing the extent of this chapter. Furthermore, sometimes the distinction between them is not very clear ... it does not help that some schemes include various tools (eg. EPPO, NAPRA PRA, IUCN cost management, etc.), implying some overlap between the sections. Perhaps Table 5.1 (or the text, but perhaps more difficult) could somehow include information about the overlap or complementarity between the different tools and methods ... and (more difficult) some "measure" of which are more used / applied worldwide and how much they are used (approximate percentage or some kind of proportion) compared to the global management of IAS ... my perception (may be wrong in global terms, but it is close to the reality in Portugal) is that many of the IAS management projects are done without any of these tools being applied and that many of them are applied in a small percentage of "real cases of IAS management" - it would be useful for the reader to have some of this information because it will certainly be impossible to use all of them (12 tools / methods), but such an important report could help reader and managers to choose "the best" / most	Thanks for your comment. The second order draft of this section takes this into account as far as possible.
Copp, Gordon	No	5	12	328	12	328	Please remove "G. H." and "H. E.", which are redundant.	Thanks for this suggested change. We have corrected it in the second order draft.
Government of Germany	Yes	5	12	330	12	331	It is suggested to add "Rabitsch et al., 2013" as reference for a horizon study for Germany "at the level of a country (Lucy et al., 2020; Peyton et al., 2019)" -- Rabitsch, W., Gollasch, S., Isermann, M., Starfinger, U. & Nehring, S. (2013). Erstellung einer Warnliste in Deutschland noch nicht vorkommender invasiver Tiere und Pflanzen. BfN-Skripten, 331, 1-154 https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/skript331.pdf	Thanks for this suggested change. We have included it in the second order draft

Copp, Gordon	No	5	12	331	12	331	A global risk screening, which encompassed horizon scanning was undertaken for freshwater fishes by Vilizzi et al. 2019); Vilizzi, L., Copp, G.H., Adamovich, B., Almeida, D., Chan, J., Davison, P.I., Dembski, S., Ekmekci, F.G., Fernez, A., Forneck, S., Hill, J.E., Kim, J-E., Koutsikos, N., Leuven, R.S.E.W., Luna, S., Magalhães, F., Marr, S., Mendoza, R., Mourão, C.F., Neal, J.W., Onikura, N., Perdikaris, C., Piriá, M., Poulet, N., Puntilla, R., Range, L.L., Simonović, P., Ribeiro, F., Tarkan, A.S., Troca, D.F.A., Vardakas, L., Verreyken, H., Vintsek, L., Weyl, O.L.F., Yeo, D.C.J. & Zeng, Y. 2019. A global review and meta-analysis of applications of the Fish Invasiveness Screening Kit. <i>Reviews in Fish Biology and Fisheries</i> 29, 529–568. (doi: 10.1007/s11160-019-09562-2)	Thanks for this suggested change. We have included it in the second order draft
Cudmore, Becky	No	5	13	116	13	118	The graphic overlay of management actions associated with the invasion curve is very useful; wonder if it wouldn't benefit more from the addition of 'management costs'? Not necessarily in specific dollar values but even an identification of increase/decrease (or high/low) (*recognize this may be in another figure because it cannot be generalized.	Thank you for the comment. After a long discussion, we have chosen not to include the cost in the figure because it cannot be generalized.
García Martínez, Margarita	No	5	13	116	13	116	Figure 5.1 Last part says that "Actions" like Biological, Genetic approaches, Restoration and Integrated management (IPM), starts from the "spread" phase of invasion. However, at least for Biological and Genetic approaches could be from "Establishment phase".	Thanks for the comment. We have revised the figure as suggested in the second order draft
Mill, Aileen	No	5	13	341	13	343	Can you better quantify this rather than highlight only two examples. I think something like x out of x species arrived within x time period following horizon scan exercise. Did any species arrive that were not predicted to by horizon scan? If not this is a success too. Helen will have the details on this.	Thanks for this suggestion. However, this shortcut was requested from the internal review process asking for less details regarding this UK example.
Mason, Peter	No	5	13	344	13	351	It would be useful to mention CABI's Horizon Scanning tool : https://www.cabi.org/?q=Horizon+scanning+tool	Thanks for this suggested change. We have included it in the second order draft.
Mill, Aileen	No	5	13	344	13	244	Planning not scanning?	Thanks for this suggested change. We have included it in the second order draft.
Government of Bulgaria	Yes	5	13	344	13	351	There should be other examples or comparison between the situations in this area in more than one country.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Scalera, Riccardo	No	5	13	353	13	353	In this chapter "Pathways analysis or pathway-level risk assessment" it would be worth to explicitly mention and discuss that the European Union Regulation on IAS (EU regulation No. 1143/2014) requires MS to prioritise IAS pathways and develop pathways management plans (many MS have already done this or are currently working on this)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the
Peck, Harry	No	5	13	354	13	354	Has risk been defined? In this case does risk only refer to the likelihood of entry from a pathway, or does it refer to the magnitude (number) of individuals entering through this pathway, or even the scale of impacts which will ultimately be caused through the introduction of IAS through a pathway.	Thank you for your comment. Risk is now defined in the IAS assessment glossary in the second order draft
Faulkner, Katelyn	No	5	13	358	13	359	Hulme et al. (2008) outlined six pathways, not 32	Thanks for this suggested change. We made the changes accordingly in the second order draft.
Scalera, Riccardo	No	5	13	359	13	359	Here one should also mention the guidance document for the interpretation of such pathways made by the EC? E.g. see here https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/invasive-alien-species/eu-regulation-technical-support/pathways	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the
Flevaris, Spvridon	No	5	13	361	13	375	Pathways here seem to be limited (or nearly) to import of commodities. Unclear why this is so.	Thank you for this comment. We made changes to the text accordingly in the second order
Smith, Emily	No	5	13	376	14	406	In order to determine the risk of transfer by a pathway it is also crucial to understand the human aspect of the pathway as well. For example where humans are travelling to, their behaviour when they get there and when they return from a location. This is particularly relevant to unintentional pathways e.g. angling and boating. Only by understanding these human elements can you identify which species are most likely to be transferred between different regions, and what management measures are going to be the most effective at managing that route. e.g. Smith et al. 2020 - recreational angling as a pathway. Anderson et al. 2014. To fully understand a pathway and how to minimise the risk of spread it is crucial to understand human behaviour. This is often overlooked in pathway	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Germany	Yes	5	13	378	13	379	In the context of EU Regulation No. 1143/2014 several analyses were conducted, e.g. for Germany by Rabitsch et al. (2018). -- Rabitsch, W., Heger, T., Jeschke, J., Saul, W.-S. & Nehring, S. (2018). Analysis and prioritisation of pathways of unintentional introduction and spread of invasive alien species in Germany in accordance with Regulation (EU) No 1143/2014. <i>BiN-Skripten</i> , 490, 1-103	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the
Hughes, Kevin	No	5	14	383	14	386	With regard to 'infrastructure development activities' the following reference is relevant: Lee JE, Chown SL (2009) Quantifying the propagule load associated with the construction of an Antarctic research station. <i>Antarct Sci</i> 21:471–475	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Copp, Gordon	No	5	14	415	12	416	Beginning at 'whereas' in line 415, the sentence should be updated with more recent developments as follows: "whereas others were developed for specific environments (Oleinin et al., 2007) or for specific taxonomic groups, such as freshwater fishes (Copp et al., 2009) and freshwater invertebrates (Tricarico et al., 2010). Whereas, more recently some tools are more taxonomically generic, such as the AS-ISK, which is applicable to all aquatic species (Copp et al., 2016) and offers assessors with 32 language options with which to carry out their risk screenings and therefore reduce linguistic uncertainty in the communication of risk outcomes to stakeholders (Copp et al., 2020)." Copp, G.H., Vilizzi, L., Tidbury, H., Stebbing, P.D., Tarkan, A.S., Miossec, L. & Goulletquer, Ph. 2016b. Development of a generic decision-support tool for identifying potentially invasive aquatic taxa: AS-ISK. <i>Management of Biological Invasions</i> 7, 343–350. (doi: 10.3391/mbi.2016.7.4.04) Copp, G.H., Vilizzi, L., Wei, H., Li, S., Piriá, M., Al-Faisal, A.J., Almeida Real, D., Atiue, U., Al-Wazzan, Z., Rigters Bakui, R., Bašić, T., Bui, T.D., Castro, N., Canning-Clode, J., Chaichana, R., Çoker, T., Dashinov, D., Ekmekci, F.G., Erős, T., Fernez, A., Ferreira, M.T., Giannetto, D., Gilles, A.S.Jr., Glowacki, L., Goulletquer, P., Interosova, E., Iqbal, S., Jakubčinová, K., Kanongdate, K., Kim, J-E., Kopecký, O., Kostov, V., Koutsikos, N., Kozic, S., Kristan, P., Kurita, Y., Lee, H-G., Leuven, R.S.E.W., Li, S., Lipinskaya, T., Lukas, J., Marchini, A., González Martínez, A.I., Masson, L., Memedemin, D., Moghaddas, S.D., Monteiro, J., Mumladze, L., Naddaf, R., Nivodarska, I., Olsson, K.H., Onikura, N., Paganelli, D., Pavia, R.T.Jr., Perdikaris, C., Pichholz, R., Pozz, M., Preda, C., Ristovska, M., Rosiková, K., Santos, J.M., Semenchenko, V., Semanov, V., Simonović, P., Smeti, E., Stevoje, B., Švoliková, K., Ta, K.A., Tarkan, A.S., Top, N., Tricarico, E., Uzunova, E., Vardakas, L., Verreyken, H., Ziqba, G. & Mendoza, R. 2020. Speaking their language – development of a multi-lingual decision-support tool for communicating invasive species risks to decision makers and stakeholders. <i>Environmental Modelling and Software</i> (doi: 10.1016/j.envsoft.2020.104900)	Thank you for the references. We have included some in the second order draft.
Catford, Jane	No	5	15	164			Tricarico, E., Vilizzi, L., Gherardi, F. & Copp, G.H. 2010. Calibration of FI-ISK, an invasiveness screening tool for non-native freshwater invertebrates. <i>Risk</i> very useful figure!	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Government of Ethiopia	Yes	5	15	425	15	430	Various types impacts (social, biodiversity environmental and health) and risk assessments need to be clearly defined and distinguished from one another.	Thank you for your comment. The definitions of impacts are developed in Chapter 4
Government of Germany	Yes	5	15	432	15	439	IPCC defines risk as "[T]he potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability or likelihood of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. In this report, the term risk is often used to refer to the potential, when the outcome is uncertain, for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services) and infrastructure. (WGII, III)" (Source: https://www.ipcc.ch/site/assets/uploads/2019/01/SYRAR5-Glossary_en.pdf). Could it be useful to consider these reflections in the discussions on "risk", especially because the given reference is from 1976, and thus, more up-to-date discussions on the concept of "risk" may need to be considered as well. Possibly the reference to the IPCC discussions on "risk" may be better placed in section	Thank you for your comment. Risk is now defined in the IAS assessment glossary accordingly in the second order draft
Scalera, Riccardo	No	5	15	432	15	432	Risk assessment. In this section it is important to stress that the European Commission has financed several risk assessments (based on existing templates, but revised and updated to comply with the legislation requirements), which led to the listing of a number of species as IAS of Union concern (EU regulation No. 1143/2014) hence filling in the gap between the science-policy interface	Thank you for your comment. In the present section, we focus more on methodologies rather than examples of risk assessments. Additionally, as this is another example to support a point already made and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the geographic scope well-balanced.
Castaño Arboleda, Nicolás	No	5	15	433	16	466	In general, chapter 5 requires a description of the contradictions within countries that are faced with decisions of economically useful invasive species. An ideal condition is presented that is not in many countries.	Thank you for your comment. This topic is addressed in 5.6.1.2 in the second order draft
Rüegg, Simon	No	5	15	433	15	437	I am not sure this definition of risk is consistent with the definitions in other domains where risks are managed, e.g. disaster response. For policy impact, it may be useful to align it with other notions of risk.	Thank you for your comment. Risk is now defined in the IAS assessment glossary accordingly in the second order draft
Copp, Gordon	No	5	15	461	15	462	this line should be revised to be more up-to-date, and therefore read as follows: "Essl et al., 2011; Gollasch, 2006), including for specific use in assessing alien species used in aquaculture (Copp et al., 2016). Copp, G.H., Russell, I.C., Peeler, E.J., Gherardi, F., Tricarico, E., MacLeod, A., Cowx, I.G., Nunn, A.D., Ochipinti Ambrogi, A., Savini, D., Mumford, J.D. & Britton, J.R. 2016a. European Non-native Species in Aquaculture Risk Analysis Scheme – a summary of assessment protocols and decision making tools for use of alien species in aquaculture. <i>Fisheries Management & Ecology</i> 23, 1–11. (doi: 10.1111/fme.12074)	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	5	15	461	15	461	Instead of "Gollasch, 2006" please write "Gollasch & Nehring, 2006"	Thank you for your comment, references and citations have been harmonized in the second
Mill, Aileen	No	5	16	468	16	468	Related to 5.2.2.5 is spread modelling, such as least cost pathways and network analyses. E.g. https://www.researchgate.net/publication/226221656_Testing_assumptions_of_cost_surface_analysis-a_tool_for_invasive_species_management_and_Stevenson-holt (2014) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4224439/	Thanks for this suggested change. We have included it in the second order draft.
Mason, Peter	No	5	16	476	16	479	Please add an arthropod example "... Kriticos et al. 2009) and arthropods (Haye et al 2018)." [Haye T, Olfert O, Weiss R, Mason P, Gibson G, Garipey TD, Gillespie D (2018) Bioclimatic analyses of <i>Trichomalus perfectus</i> and <i>Mesopolobus morys</i> (Hymenoptera: Pteromalidae) distributions, two potential biological control agents of the cabbage seedpod weevil in North America. <i>Biological Control</i> 124: 30–39.]	Thanks for this suggested change. We have included it in the second order draft.
Government of Australia	Yes	5	16	481	16	491	In the marine environment distribution is largely limited by temperature. Satellite sea surface temperature data, processed to foundation depth, provides a ready data source for assessment of potential regional distribution of marine IAS (Richmond, L., et al. (2010). Determining the potential range of invasive marine pests for cost sharing. <i>Canberra, Bureau of Rural Sciences</i> : 55.)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Scalera, Riccardo	No	5	17	508	17	508	Risk management. In this section it is important to stress that the European Commission has financed several risk management notes (to inform the decision to be taken for listing IAS of Union concern, following the relevant risk assessment (for the implementation of their EU regulation No. 1143/2014) hence contributing to further fill in the gap between the science-policy interface. Risk management	Thanks for this suggested change. We have included it in the second order draft.

Mill, Aileen	No	5	17	509	17	509	recognised IAS risks' not clear what is being referred to here. Would be useful to highlight that evaluating risk management across all taxa/sectors AND invasion stages is not possible (yet?)	Thanks for this suggested change in the text. We have included it in the second order draft.
Mill, Aileen	No	5	17	509	17	509	RM is used to prioritise - table 5.1 needs to reflect this.	Concerning the additional suggestion, we cannot add additional text to the chapter due to word
Mill, Aileen	No	5	17	519	17	527	Should define that the NNRM scheme firstly requires the management objective to be defined - to date only been used to evaluate Eradication. Please update to reflect Booy et al 2020 https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15280 - where greater consideration of spatial scale and size of populations is incorporated. The schemes has also been applied in Queensland, Australia https://www.sciencedirect.com/science/article/pii/S0301479719306620?casa_token=a0Jl3pDmRPOAAAAA-zP-l54nYpMazTzxsQ1HeHwqCNL-96gE9o9tU0G8oDQ4vSDCXgNrlVCRmSlrXb2f_Sg_and_used_in_the_UK_overseas_territories_of_Anguilla_and_Turks_and_Caicos	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	5	17	530	17	538	Please check if this is also true for animal health (e.g. African Swine Fever) and human health. Please consider including early warning systems as well, because they are often also based on risk modelling.	Thank you for the comment. Verification were made and references added accordingly in the second order draft.
Singheiser, Martin	No	5	17	539	17	542	Risk communication is essential especially for the public which has to understand why a certain species (plant, animal) is not longer allowed to breed or cultivate. But therefore, risk assessments shall be suited to regions where the species is a risk due to climate and other factors. If a species is listed as IAS, control mechanisms by local authorities must apply, otherwise, the concept of IAS will not be accepted by the population.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Germany	Yes	5	18	570	18	570	Economic valuation offers various tools to analyse the benefits of the discussed management strategies and this chapter gives a useful introduction into the integration of economic considerations into tools and methodologies. There are several relevant valuation studies which have not been considered in the assessment so far and could be useful to inform about potential benefits but also barriers for IAS management strategies. See the list below (following comments): 1. Costs-effective levels of prevention measures in agriculture: Drechsler, Martin; Touza, Julia; White, Piran C. L.; Jones, Glyn (2016): Agricultural landscape structure and invasive species: the cost-effective level of crop field clustering. In Food Sec. 8 (1), pp. 111–121. DOI: 10.1007/s12571-015-0539-5. 2. Costs and benefits of ballast-water and hull-fouling treatment and the role of invasive species for maritime trade: Fernandes, Jose A.; Santos, Lionel; Vance, Thomas; Fileman, Tim; Smith, David; Bishop, John D.D. et al. (2016): Costs and benefits to European shipping of ballast-water and hull-fouling treatment: Impacts of native and non-indigenous species. In Marine Policy 64, pp. 148–155. DOI: 10.1016/j.marpol.2015.11.015. 3. Public preferences for controlling IAS: Rolfe, John; Windle, Jill (2014): Public preferences for controlling an invasive species in public and private spaces. In Land Use Policy 41, pp. 1–10. DOI: 10.1016/j.landusepol.2014.04.013. 4. Bithas, Kostas; Latinopoulos, Dionysis; Kolimenakis, Antonis; Richardson, Clive (2018): Social Benefits From Controlling Invasive Asian Tiger and Native Mosquitoes: A Stated Preference Study in Athens, Greece. In Ecological Economics 145, pp. 46–56. DOI: 10.1016/j.ecolecon.2017.08.017. 5. Mwebaze, Paul; Bennett, Jeff; Beebe, Nigel W.; Devine, Gregor J.; Barro, Paul de (2018): Economic Valuation of the Threat Posed by the Establishment of the Asian Tiger Mosquito in Australia. In Environ Resource Econ 71 (2), pp. 357–379. DOI: 10.1007/s10640-017-0158-z. 6. Field experiment on economic value of mitigation of invasive plants and role of labour: Rai, Rajesh Kumar; Scarborough, Helen (2013): Economic value of	Thank you for additional references. We have included them to better cover the diversity of economic valuation tools in the second order draft.
Mill, Aileen	No	5	18	570	18	570	Can this section be linked to figure 5.1 - where do economic or cost benefit considerations come in?	Thank you for the suggestion. As economic approaches can be adopted throughout the figure, we have decided not to include it so as not to make the figure more cumbersome, but have
Rüegg, Simon	No	5	18	571			I would contest that economic approaches are exclusively monetary. In a chapter on economic evaluation of One Health the various options have been demonstrated: Chapter 6 in https://www.wageningenacademic.com/doi/book/10.3920/978-90-8686-875-9 . One problem is that the conventional economic models aim for optimisation, which is not achievable in complex open socio-ecological systems. The valuation is another issue that the authors mention. Here non-monetary approaches are a possible alternative.	Thank you for this comment and associated reference. We have adapted the section accordingly in the second order draft.
Maillard Jean-Francois	No	5	19	601	19	601	cost analysis is an important attention point for financial decision makers and the best evaluation scenarios is needed. The risk to do nothing for a newly detected species must be explicit in economy terms too.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Marchante, Elizabete	No	5	19	622	19	623	When explicitly mentioning "extensive literature", at least some key REFS should be cited (here and elsewhere throughout the text).	Thank you for your comment. There is no mention of extensive literature anymore in the second order draft.
Mill, Aileen	No	5	19	623	19	638	With this definition The NNRM scheme described in Booy et al 2018 is a MCA and should be included in the review from line 630.	Thank you for your comment. We have however decided to highlight other papers to diversify the examples in the second order draft.
Cudmore, Becky	No	5	20	315	20	317	Flagging missing information which makes it difficult to review this paragraph.	Thank you, this is revised in the second order draft.
García Martínez, Margarita	No	5	20	315	20	318	XXX are well developed and appropriate for an application to management decisions. For other tools and methods such as XXX, are not yet well developed enough for immediate application to decisions, but there is strong potential. This paragraph is subjective as it will depend on several factors. The same tool or method can be well developed and appropriate for some area (country or region) and not for others, or for some species and not for others. It is unnecessary this paragraph or should not be so generalized.	Thanks for this suggested change. We have included it in the second order draft.
Cudmore, Becky	No	5	20	321	20	322	Right side of Figure 5.1 - entirely missing the application of differing levels of government (think an overall column description dividing the two groups of columns would also be useful (i.e. Tools and Methods for first column; Utility for next 3 columns; and Application to Government Levels for last 4 columns).	Thanks for this suggested change. We have included it in the second order draft.
García Martínez, Margarita	No	5	20	321	20	321	Table 5.1 In a Risk assessment it is included the pathways analysis then, I consider it should be included the risk assessment to the hazard identification.	Thanks for this suggested change. We have included it in the second order draft.
Scalera, Riccardo	No	5	20	652	21	664	Case studies: learning's from past successes and failures - This full section would be very interesting, but as it is now it seems very poorly developed and not informative at all	Thank you for this suggestion. In the second order draft, an example has been added with the initiative of the French IAS resource center collecting case studies.
Shaw, Richard	No	5	20	652	21	664	It would be good to have an example as there are examples for the next 2 cases.	Thank you for this suggestion. An example has been added with the initiative of the French IAS resource center collecting case studies.
Peck, Harry	No	5	20	658	20	659	This highlights the need to develop tools, similar to risk analysis or risk management tools, which can be used to report and evaluate the outcome of management in a manner which is useful for decision makers. Rather than "making do" with how the effectiveness of management has been reported, future research should seek to provide a framework which allows IAS managers to evaluate management in a way that is useful for decision makers. Without such a framework, IAS managers may be unaware of how to provide information which is useful to decision makers even if they intend to.	Thank you for this suggestion. In the second order draft, an example has been added with the initiative of the French IAS resource center collecting case studies.
Scalera, Riccardo	No	5	20	658	21	659	The statement "They are, however, rarely developed, compiled or presented in order to provide the information decision makers need" is very vague, it should be strengthened with at least some specific example, otherwise it does not provide any useful information to understand what it is meant	Thank you for this suggestion. In the second order draft, an example has been added with the initiative of the French IAS resource center collecting case studies.
Cudmore, Becky	No	5	21	371	21	375	connect 7 to 8 better	Thank you for the comment. We have decided to stick to variables as presented by Eszl et al. 2015 in the second order draft.
Scalera, Riccardo	No	5	21	690	21	690	10 - can have impact in generally unsuitable habitat or without establishment, or secondary spread from unsuitable to suitable	Thank you for this suggestion. It has been added to the text in the second order draft.
Shaw, Richard	No	5	21	698	21	700	Best practice management. The LIFE programme which finances nature conservation projects within the EU has a plethora of best practice examples of management actions towards alien species. I think it would be fundamental to mention it here. An example of report with a collection of best practice can be found here: https://www.naturachevalie.it/wp-content/uploads/2017/06/A-catalogue-of-LIFE-projects-contributing-to-the-management-of-alien-species-in-the-European-Union-1.pdf Other relevant reports are quoted in the introduction	Thank you for this suggestion. It has been added to the text in the second order draft.
Shaw, Richard	No	5	21	698	21	700	Refer to evidence from 5.2.2.10.	Thanks for notifying. We have adapted the sentence in the next version.
Linnamägi, Merike	No	5	22	710	22	715	Also, a good example would be EPPO (European and Mediterranean Plant Protection Organization) so-called PM9 standards on plants. Although there are just 9 standards so far one of them is on aquatic plants covering recommendations on many aquatic plants and growth forms. Also, EPPO covers 52 states so standards include examples and knowledge from a variety of countries and climates and therefore are well-rounded documents. PM9 standard - National regulatory control systems standard on phytosanitary measures. Plant standards are for eradication and containment of invasive alien	Thank you very much. We cannot add additional examples to the section due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here because the EPPO territory is already well covered in the text.
Government of Germany	Yes	5	22	717	22	717	The prioritisation of action under resource- and information constraints is a crucial aspect of IAS management and this subchapter is highly appreciated. Further literature which could be added to inform the assessment include (following comments): 1. Warziniack, Travis; Finnoff, David; Bosenbroek, Jonathan; Shogren, Jason F.; Lodge, David (2011): Stepping Stones for Biological Invasion: A Bioeconomic Model of Transferable Risk. In Environ Resource Econ 50 (4), pp. 605–627. DOI: 10.1007/s10640-011-9485-7. 2. Liu, Shuang; Hurley, Michael; Lowell, Kim E.; Siddique, Abu-Baker M.; Diggel, Art; Cook, David C. (2011): An integrated decision-support approach in prioritizing risks of non-indigenous species in the face of high uncertainty. In Ecological Economics 70 (11), pp. 1924–1930. DOI: 10.1016/j.ecolecon.2011.05.021. 3. Barber, Edward B.; Gwatipeda, Johnson; Knowler, Duncan; Reichard, Sarah H. (2011): The North American horticultural industry and the risk of plant invasion. In Agricultural Economics 42, pp. 113–130. DOI: 10.1111/j.1574-0862.2011.00556.x. 4. Finnoff, David; McIntosh, Chris; Shogren, Jason F.; Sims, Charles; Warziniack, Travis (2010): Invasive Species and Endogenous Risk. In Annu. Rev. Resour. Econ. 2 (1), pp. 77–100. DOI: 10.1146/annurev.resour.050708.144212.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Mason, Peter	No	5	22	717	22	728	"prioritise" or "prioritize"; consistency throughout the document.	Thank you for this suggestion. We have made the changes consistently in the second order
Mill, Aileen	No	5	22	717	22	741	5.2.3 prioritising for what? For any management or for management at a specific stage of invasion? This needs reviewed along with earlier sections on the risk management prioritisation frameworks and MCA, currently they read like the same points being made from a slightly different angle.	Thank you for this suggestion. We have adapted the text in the second order draft.
Government of Germany	Yes	5	22	722			Prioritisation is also needed for risk assessment as capacities even for risk assessment are limited. You may wish to take note of these publications: DOI: 10.1111/j.1365-2338.2010.02423.x or DOI: 10.1111/epi.12336	Thanks for this suggested change. We have included it in the second order draft.
Damascono, Gabriella	No	5	22	723	22	723	I think it should say prioritisation instead of framework at the first word.	Thank you for making this point. It does not seem to require changes to the text.
Rüegg, Simon	No	5	22	728			It may be worth mentioning that citizen participation in the prioritization process can enhance efficacy.	Thanks for this suggested change. We have included it in the second order draft.
Maillard Jean-Francois	No	5	22	730	22	730	prioritisation is subjective and is driven by financial capacities, awareness and understanding of a IAS issues	Thank you for making this point. It does not seem to require changes to the text.
Government of Germany	Yes	5	22	733	22	735	It is suggested to highlight the key messages in the executive summary against the Aichi Targets e.g. 9 as well.	Thank you for making this point. It does not seem to require changes to the text.
Smith, Emily	No	5	22	740	22	740	Discrete static land units. This term may be problematic for freshwater and marine systems which are often highly interconnected and changeable systems.	Thank you for this suggestion. We have adapted the text accordingly in the second order draft.
Cudmore, Becky	No	5	23	452	23	458	As mention North America but only included US, not Canada: suggest inclusion of Canadian guidelines for aquatic ecological risk assessments: Mandrak, N.E., Cudmore, B and Chapman, P.M. 2012. National Detailed-Level Risk Assessment Guidelines: Assessing the Biological Risk of Aquatic Invasive Species in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/092. vi + 17 p.	Thank you for your comment. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.

Singheiser, Martin	No	5	23	747	23	748	4. allows to prioritise sites exposed to a set of high risk species introduced through priority pathways. At this point, it shall be explained or highlighted, that a high risk pathway (1) for a certain high risk species (2) does not automatically coincide with the most exposed site, for example, if there are no ecological niches available the species can occupy and the pressure by others (e.g. larger species, predators) is higher. Therefore, high risk incidents may result in a high ranking exposed site, but it's not necessarily so. Also one eventually shall differentiate between islands and non-islands, since islands are generally more vulnerable to IAS.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Schaffner, Urs	No	5	23	749	23	753	I suggest that this paragraph is further elaborated, as spatially explicit management strategies for high-priority IAS are likely to become a key tool in IAS management programs at national level, e.g. for allocating management funds to the various subnational areas, depending on level of invasion, habitat suitability and management goal; there are several examples for weed and crop pest management strategies, including a description of tools suitable for developing such spatially explicit management strategies.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Catford, Jane	No	5	24	469	24	480	Risk modelling/mapping also considers transport pathways, i.e. in addition to climate matching, also whether likely to get there based on current and future trade routes etc. New Zealand Biosecurity does this, as one example This approach acknowledges direct transport from native range to introduced range, but also from other introduced ranges (i.e. indirect transport and introduction, for which there is a lot of evidence, e.g. Rius, M., Clusella-Trullas, S., McQuaid, C. D., Navarro, R. A., Griffiths, C. L., Matthee, C. A., von der Heyden, S. & Turon, X. (2014) Range expansions across ecoregions: interactions of climate change, physiology and genetic diversity. Global Ecology and Biogeography, 23, 76-88. Rius, M., Turon, X., Ordaz, V. c. & Pascual, M. Tracking Invasion Histories in the Sea: Facing Complex Scenarios Using Multilocus Data. PLoS ONE, 7, e35815. Smith, A. L., Hodkinson, T. R., Villella, J., Catford, J. A., Csergo, A. M., Blomberg, S. P., Crone, E. E., Ehrlen, J., Garca, M. B., Laine, A.-L., Roach, D. A., Salguero-Gomez, R., Wardle, G. M., Childs, D. Z., Elder, B. D., Finn, A., Munne-Bosch, S., Baudraz, M. E. A., Bodis, J., Brearley, F. Q., Bucharova, A., Caruso, C. M., Duncan, R. P., Dwyer, J. M., Gooden, B., Groenteman, R., Hamre, L. N., Helm, A., Kelly, R., Laanisto, L., Lonati, M., Moore, J. L., Morales, M., Olsen, S. L., Parrel, M., Petry, W. K., Ramula, S., Rasmussen, P. U., Enri, S. R., Roeder, A., Roscher, C., Saastamoinen, M., Tack, A. J. M., Topper, J. P.	Thanks for this suggested change. We have included it in the second order draft.
Kuhn, Ingolf	No	5	24	492	24	506	These approaches are not unchallenged. Especially, also due to the violation of some basic model assumptions, there seem to be problems with the transferability of models on IAS (which might also prevent using them for future scenarios), Capinha C, Essl F, Seebens H, Pereira HM, Kuhn I (2018) Models of alien species richness show moderate predictive accuracy and poor transferability. NEOBOTA 38: 77-96. doi: 10.3897/neobiota.38.23518. Liu C, Wolter C, Xian W, Jeschke JM (2020) Species distribution models have limited spatial transferability for invasive species. Ecol Lett. doi: 10.1111/ele.13577. Moreover, it seems important not only which species or algorithm used, but also which environmental data source (e.g. which specific database on climate) was used, independent of the chosen predictor variables: Datta A, Schweiger O, Kuhn I (2020) Origin of climatic data can determine the transferability of species distribution models. NEOBOTA 59: 61-76. doi: 10.3897/neobiota.59.36299.	Thanks for this suggested adaptations and associated references. They are now included in the second order draft.
Alejandra Grez Villaruel, Audrey	No	5	24	750	37	1078	Was salmon considered as an AIS in Southamerica?	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Government of Ethiopia	Yes	5	24	768	24	768	Other than four main approaches considered for prioritization (Pathway, species-based, site-based and management options), prioritization based on infestation level based categories is important to consider, since the tools used for the management varies depending on the infestation level. Ethiopian experience by level of infestation categories (free, low, medium and high infestation) can be mentioned. For further reference see National IAS prevention, eradication, containment and control even including restoration.	Thank you for this suggestion. We have chosen not to include it in the text, as infestation level is a criteria classically considering in prioritization of species-based, site-based and management options
Scalera, Riccardo	No	5	24	769	24	769	See comment above about the pathway prioritisation process required by law in the European Union	Thank you for your comment. As this is another example to support a point already made and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the geographic scope well-balanced.
Faulkner, Katelyn	No	5	24	771	24	771	The term 'pathway' has already been used in the chapter, but a definition is provided here. Provide this definition where the term is first used.	Thank you for the suggestion, we adapted the text accordingly in the second order draft.
Scalera, Riccardo	No	5	25	810	25	810	See also https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.12997	Thank you for this suggestion. As this is another example to support a point already made elsewhere, and as it relates to the EU territory already widely covered in this section, we have chosen not to include it to keep the geographic scope well-balanced.
Cudmore, Becky	No	5	26	545	26	545	To add to #1 - define scope and object with both science and management perspectives (too often these work in silos which undermine the process from the start) see: Newcomb, T.J., P.W. Simonin, F.A. Martinez, W. L. Chadderton, J.M. Bossenbroek, B. Cudmore, M.H. Hoff, R.P. Keller, B.D. Ridenhour, J.D. Rothlisberger, E.S. Rutherford, S. Van Egeren, and D.M. Lodge. 2020. A Best Practices Approach for Scientific Collaboration between Researchers and Managers. Fisheries (in production) Article ID: FSH10536; Article DOI: 10.1002/fsh.10536; Internal Article ID: 16906253).	Thank you for your comment. We cannot change the point recommended by the authors, but such methodologies are definitively elaborated in references line 568.
Maillard Jean-Francois	No	5	26	826	26	826	Prioritisation through Horizon scanning needs a periodic reassessment particularly with regard to climate change	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Shimura, Junko	No	5	27	837	27	871	Add ports of entry and surrounding areas as highly prioritized sites for biosecurity measures and that intercept the pathways of new introductions of IAS and vectors, incl. carrier conveyances.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Maillard Jean-Francois	No	5	27	870	27	870	site prioritisation can be apprehended also through dispersal sites or IAS reservoirs (cities for example) not only on protected areas	Thank you for your comment. We have chosen to focus here on the example of site prioritization in the context of protected areas. We cannot add additional text to the chapter due to word length restrictions.
Caplat, Paul	No	5	27	872	27	895	This paragraph focuses on eradication, but ignores control and containment, which is the most common solution left for managing common IAS. They are mentioned later, in 5.2.3 (Management in practice), but they have their own theoretical framework associated (e.g. control modelling reviewed by Caplat et al. 2012 Annals of the NY Academy of Science)	Thank you for your comment. We have chosen to focus here on the example of eradication, although we recognize other options do exist. We cannot add additional text to the chapter due to word length restrictions.
Mill, Aileen	No	5	27	872	27	872	There is a point made in Booy et al 2020 that where a species that has not yet established scores poorly for feasibility of eradication it should be prioritised for prevention. This is particularly true for marine examples.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Caceres, Sarah	No	5	27	873	27	884	There could be an example of the planning tool use in Reunion island. Please consult reference (Amy et al. 2019).	Thank you for this suggestion. We have chosen to include it in the section of the second order draft.
Mill, Aileen	No	5	27	896	27	896	This section can also feed into the section on knowledge gaps.	Thanks for this suggested change. We have included it in the second order draft.
Catford, Jane	No	5	28	624	general		Also important to consider indirect avenues of risk - e.g. alien pasture plants being bred in-country; cultivars are not subject to biosecurity because already there, even though species listed as invasive and plant breeding will give them traits that facilitate further invasiveness Driscoll, D. A., Catford, J. A., Barney, J. N., Hulme, P. E., Inderjit, Martin, T. G., Pauchard, A., Pysek, P., Richardson, D. M., Riley, S. & Visser, V. (2014) New pasture plants intensify invasive species risk. Proceedings of the National Academy of Sciences 111, 16622–16627.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Cudmore, Becky	No	5	28	659	28	661	Very confusing sentence - is there a word missing?	Thanks for notifying. We have adapted the sentence in the second order draft.
Government of Germany	Yes	5	28	902	28	902	Due to its well-known shortcomings it is proposed not to use wikipedia as a scientific reference.	Thank you for the suggestion, we adapted the text accordingly in the second order draft.
Damasseno, Gabriella	No	5	28	915	28	917	The integration among the three types of management is also dependent on socioeconomic context.	Thanks for this suggested change. We have included it in the second order draft.
Faulkner, Katelyn	No	5	28	918	28	918	Consider using the term 'site' instead of 'area'	Thanks for this suggested change. We have adapted it in the second order draft.
Faulkner, Katelyn	No	5	29	931	32	1050	Much of this section focuses on pathways that have been identified through risk assessments as being important, and not on strategies to manage them. Ballast water as a pathway is mentioned but not the ballast water convention, which outlines the global strategy. Other management strategies like the IPPC and its related standards are also not mentioned. There is also no discussion of strategies to manage within country movement. Perhaps the heading of the section needs to change?	Thanks for this suggested change of wording. The IPPC, OIE are now referenced in the second order draft, but we cannot add further text due to length restrictions. Therefore we have decided to retain the heading as it is. Also, the assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the change.
Scalera, Riccardo	No	5	29	941	29	941	in this section "Implementing pathway management strategies" it would be fundamental to discuss the development of several guidance document for the management of specific atways by the Bern convention of the Council of Europe (which scope includes MS also in Africa and Asia) as they are formally adopted documents targeting pets, zoos, fishery, hortamental plants, travel and tourism etc. Also, a detailed document on how to draft pathways action plan was also made, which could be of general interest. Full set of relevant documents available here : https://www.coe.int/en/web/bern-convention/on-invasive-alien-species	Thank you for your comment. Regarding the first suggestion, we cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these. We have however cited the Bern convention in the second order draft. Regarding your second suggestion, we can not provide prescriptive measures in the assessment.
Takehara, Mari (Government of Japan)	Yes	5	29	941	32	1050	Japan considers marine containers to be one of the main routes for unintentional invasion of alien species. If such a fact can be confirmed, it is desirable to describe it.	Thank you for your comment. We cannot add additional text or discussion to the chapter due to word length restrictions. However, marine containers are now listed as one of the pathways to facilitate long-distance dispersal.
Smith, Emily	No	5	29	942	5	1049	In this section there is no reference to unintentional movement of invasive species by recreational activity. These pathways present significant risk of transferring IAS between sites, both internationally and post-border as highlighted by Olaf et al. GB pathway analysis. I feel this section would benefit with a few sentences that highlighted these pathways, potentially within the paragraph starting on line 1002	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Smith, Emily	No	5	29	959	29	960	Biosecurity presents an effective way to manage pathways both at the pre-border and also post-border. Comes in different forms e.g. inspections of soils, or washing down recreational equipment. It might be appropriate to include a sentence on this, as biosecurity transcends spatial pathway management scales.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. These topics are already considered in Sections 5.2.3.2 and 5.4
Karayannis, Theofanis	No	5	29	970	29	971	Ballast water and hull fouling (biofouling) are mentioned as 'pathways' whereas they are vectors (as shown in Chapter 1). The same seems to be the case for other vectors mentioned in the same paragraph. This is an issue throughout several parts of this chapter whereby vectors are called 'pathways', including also in Figure 5.5. There should be consistency on this terminology throughout the Assessment.	Thank you very much. In agreement with the rest of the assessment, we followed the CBD's categorization, in which ballast water is considered as a pathway: https://www.cbd.int/doc/c/9d85/3bc5/d640f059d03acd717602cd76/sbst-22-inf-09-en.pdf
Shimura, Junko	No	5	29	974	29	974	Spell out IAPs	Thanks for this suggested change. We have included it in the second order draft.
Smith, Emily	No	5	30	981			Use of invasive alien species instead of acronym IAS	Thank you very much. All acronyms have been written out in full in the second order draft.
Anderson, Freda	No	5	30	982	30	984	Something is missing, text as it does not make sense.	Thanks for this suggested change. We have corrected it in the second order draft.

Copp, Gordon	No	5	30	1007	30	1010	The following sentence should be introduced into this line just after "et al., 2015)."	Thank you for your comment. The example has been cited in the second order draft.
							"Perhaps one of the best examples of an invasive species dispersing as a contaminant is the topmouth gudgeon (<i>Pseudorasbora parva</i>), which spread through Europe within a few decades as a contaminant of commercially-exported fish consignments (Gozlan et al. 2010)."	
							Gozlan, R.E., Andreou, D., Asaeda, T., Beyer, K., Bouhadad, R., Burnard, D., Caiola, N., Cakic, P., Djikanovic, V., Esmacili, H.R., Falka, I., Golicher, D., Harka, A., Jeney, G., Kováč, V., Musil, J., Nocita, A., Povž, M., Poulet, N., Virbickas, T., Wolter, C., Tarkan, A.S., Tricarico, E., Trichkova, T., Verreycken, H., Witkowski, A., Zhang, C-g., Zweimueller, I. & Britton, J.R. 2010. Pan-continental invasion of <i>Pseudorasbora parva</i> : towards a better understanding of freshwater fish invasions. <i>Fish & Fisheries</i> 11, 315–340. (doi: 10.1111/j.1467-2979.2010.00361.x)	
Mason, Peter	No	5	31	1027	31	1027	Use of "bugs" is inappropriate. Is the intent "arthropods" or something else?	Thank you, this has been corrected in the second order draft
Shimura, Junko	No	5	31	1044	31	1044	Change term "pathway" to means of spread. Reason: introduction via e-commerce fall in existing pathways - release, escape, transport-contaminants, transport-stowaway. Not a new category of new pathway.	Thanks for this suggested change. We have included it in the second order draft.
Shimura, Junko	No	5	31	1049	31	1049	Add hazard identification in the table. Living organisms of which biological invasion risk has not been analyzed are already in e-commerce, which is the fundamental problem of e-commerce.	Thank you, this has been added in the second order draft
Kühn, Ingolf	No	5	32	771	32	802	I cannot find any reference on this? Where does this come from?	Thanks for this suggested change. We have included it in the second order draft.
Shimura, Junko	No	5	32	1049	32	1049	Communication on hazardous commodity should include individuals involved in export -transport -import- use/retail (whole value chain and risk sufferers)	Thank you for your comment. We understand these individuals are already contemplated in the current text. We do not see the need to change the text.
Scalera, Riccardo	No	5	32	1051	32	1051	Implementing species-led management. There is a plethora of very important case studies for all taxa and environments in the hundreds of projects financed in the European Union with the LIFE programme, which would be fundamental to mention and discuss here	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Smith, Emily	No	5	32	1078	5	1146	A key part of determining the most suitable management approach is also considering the socio-ecological context. Only by understanding the intrinsic value placed on a species for example grey squirrel, or monk parakeet in the UK can you determine whether the management option will be seen as being accepted by the general public. Communication with the general public, and considering how humane the approach is, and possible impacts on the use of that site will also impact which management option is selected. As well as considering the ecological context, the economic and social consequences of management also	Thank you for making this point. It does not seem to require changes to the text.
Dudgeon, David	No	5	33	1082	33	1082	It would be good to know what the invasive species actually were; I guess some sort of trout. Also it would be helpful to know by what mechanism the apache trout was affected.	Thank you for the comment, we have expanded on this point in the second order draft.
Feest, Alan	No	5	33	1094	33	1095	Coast not cost!!!	Thank you for pointing that out. We have now corrected the text in the second order draft.
García Martínez, Margarita	No	5	34	845	34	852	For the writer's consideration: I'd add this at the end of the paragraph: "It is important to consider that, when prioritizing a site, many of the management actions must be carefully evaluated especially in NPAs. It has been seen that sites within NPAs are selected based on the number of hectares of invasion that does not accurately reflect biodiversity benefits, so both factors must be considered in order to maximize results".	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Shaw, Richard	No	5	34	1134	34	1135	It would be great to have some examples of local names.	Thank you for the suggestion. This section is being revised through a full assessment on Indigenous and Local Knowledge
Scalera, Riccardo	No	5	34	1147	34	1147	Implementing site-based management programs. The focus of the projects the hundreds of projects financed in the European Union with the LIFE programme, which would be fundamental to mention and discuss here (see comment above) are usually (though not exclusively) based on the site specific conservation needs of the so called "Natura 2000" sites, which form a network of protected areas over the EU (over 27,000 sites covering a total surface of about 1,150,000 km ² both on land and marine areas of all the EU Member States). This is also something fundamental to discuss here	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Kühn, Ingolf	No	5	35	897	36	905	This chapter does currently not describe at all how different source of uncertainty influence decision making. There is, though, a great paper that teases apart risk at different steps of the invasion process (sensu Blackburn et al.) and also quantifies uncertainty: Leung B, Roura-Pascual N, Bacher S, Heikkilä J, Brotons L, Burgman MA, Dehnen-Schmutz K, Essl F, Hulme PE, Richardson DM, Sol D, Vila M (2012) TEASing apart alien species risk assessments: a framework for best practices. <i>Ecology Letters</i> 15: 1475-1493. doi: 10.1111/ele.12003. (probably also suitable in some of the chapters above)	Thanks for this suggested change. We have included it in the second order draft.
Marchante, Elizabete	No	5	36	1224	37	1252	These paragraphs repeat what was introduced at the beginning of section 5.3 - page 28. I suggest deleting, summarizing or combining with page 28.	Thank you for pointing that out. We have now revised the text in the second order draft.
Shaw, Richard	No	5	37	1231	37	1236	This repeats earlier descriptions.	Thank you for pointing that out. We have now revised the text in the second order draft.
Mason, Peter	No	5	38	1280	38	1280	Should read "... 11 other terrestrial ..."	Thank you for pointing that out. We have now revised the text in the second order draft.
Mason, Peter	No	5	38	1283	38	1284	Suggest "... including the external introduction ..."	Thank you for pointing that out. We have now revised the text in the second order draft.
Marchante, Elizabete	No	5	39	1308	48	1652	This section (5.3.2) contains some repetition of the previous ones that also include examples of protected areas ... in addition, it includes urban ecosystems (line 1578) that seem a little out of place ... I suggest combining this section with the previous section (5.3. 1) since it is still the implementation of different management approaches and the previous one goes beyond the "when to implement ..." stated in the title. Specific contexts (such as Ramsar or UNESCO sites) can be included in boxes. In addition, having many levels of subheadings spread over many pages makes text interpretation more difficult to follow.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have moved the urban ecosystems subsection to section 5.3.1 where it is a better fit in the second order draft.
Scalera, Riccardo	No	5	39	1308	48	1652	Same comments as before, regarding the need to focus on the Natura 2000 network in the EU. There would be many examples which would perfectly fit in all sections	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Brooks, Thomas	No	5	39	1316	39	1316	I don't understand this clause. Is it saying that PAs are "directly threatened" by "raising standards GQL in areas surrounding protected areas"? I don't think that this is supported by the cited reference. Suggest deleting.	Thank you for this suggested change. We have considered it in the second order draft.
Catford, Jane	No	5	40	1078	40	1081	off target impacts e.g. weed shaped holes - reinvasion by other weeds, or control of species having negative effects on other trophic levels E.g. Buckley, Y. M., Bulker, B. M. & Rees, M. (2007) Disturbance, invasion and re-invasion: managing the weed-shaped hole in disturbed ecosystems. <i>Ecology Letters</i> , 10, 809-817. Lindenmayer, D. B., Wood, J., MacGregor, C., Buckley, Y. M., Dexter, N., Fortescue, M., Hobbs, R. J. & Catford, J. A. (2015) A long-term experimental case study of the ecological and cost effectiveness of invasive plant management in achieving conservation goals: Bitou Bush control in Booderee National Park in eastern Australia. <i>PLoS ONE</i> , 10, e0128482. Lindenmayer, D. B., Wood, J., MacGregor, C., Hobbs, R. J. & Catford, J. A. (2017) Non-target impacts of weed control on birds, mammals, and reptiles. <i>Ecosphere</i> , 8, e01804. O'Loughlin, L. S., Gooden, B., Foster, C. N., MacGregor, C. I., Catford, J. A. & Lindenmayer, D. B. (2019) Invasive shrub re-establishment following management has contrasting effects on biodiversity. <i>Scientific Reports</i> , 9, 4083.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Smaranda, John	No	5	40	1341	46	1593	For clarity, kindly consider to separate marine and terrestrial examples in the text.	Thank you for the comment. While we have retained an integrated format, we have aimed to make each of the examples clearer in the second order draft.
Smaranda, John	No	5	40	1341	46	1593	Kindly consider a better global representation of case studies. For example, there are few cases from Europe and Central Asia. See an example from Romania here: http://sesil.eu/en/home-2/	Thank you for this suggestion. Due to the need to balance case studies across the entire chapter, we are unable to give a wider balance of examples within one sub-section. Pending the selection of examples in the chapter, and word length restrictions, the example from Romania may be considered in the second order draft.
White, Michael	No	5	40	1341	40	1343	Can you please check if RAMSAR is now being used for sea turtle nesting beaches too?	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	5	40	1353	40	1355	It is unclear how exactly the information in these lines relates to the better management of IAS? It is suggested to instead refer to para 18 of Ramsar Resolution VII.14 and/or para 16 of Ramsar Resolution VIII.18 which, i.a., address the need to prepare inventories of alien species present in wetlands and urge Parties to develop/review programmes/legislation, etc. The Global Wetland Outlook points out that there is still considerable room for improvement in this regard: "In 2018, 40% of Parties reported a comprehensive national inventory of invasive alien species impacting wetlands. Even fewer (26%) have established national policies or guidelines on invasive species control and management for wetlands" specifically that (Ramsar Convention on Wetlands, (2018). (Global Wetland Outlook: State of the World's Wetlands and their Services to People, Gland, Switzerland: Ramsar Convention Secretariat.)	Thank you for the comment. We have revised the wording in the second order draft
Government of Germany	Yes	5	41	1357	41	1381	It is suggested to add to the examples the type of wetland (refer to Annex I of Ramsar Handbook 17 on the Designation of Ramsar Sites "Ramsar Classification System for Wetland Type"). It is further suggested that the examples cover different wetland types, including also marine/coastal wetlands (also refer to page 48 of the Global Wetland Outlook, 2018).	Thank you for the comment. Unfortunately due to the word length constraints we are unable to cover all system types, but aim to provide a generalised overview of invasive alien species control in Ramsar sites. The marine/coastal wetland types are being added.
Government of Germany	Yes	5	41	1357	42	1411	The examples provided in this sub-chapters should be reviewed with regional balance in mind. There are no examples from European or North/South American Sites while Australian sites are mentioned twice in the sub-chapter on Ramsar and again in the sub-chapter on UNESCO. In addition, the IAS <i>Eichhornia crassipes</i> (water hyacinth) is mentioned as an example once in the sub chapter on Ramsar and again in the subchapter on UNESCO. It is suggested to provide a range of different IAS examples in a more balanced manner.	Thank you for the comment. One of the examples has been removed. The chapter has been revised with a more balanced selection of example in the second order draft, within the constraints posed due to word length limitations. The hyacinth example under the Ramsar section is to illustrate the impact of an aquatic plant on livelihoods of people (fish). The example under the UNESCO biosphere section is aimed at illustrating that management in such areas may use classical biological control.
Mc Kay, Fernando	No	5	41	1357	41	1397	Line 1362, Instead of <i>Eichhornia crassipes</i> it should be <i>Pontederia crassipes</i> . <i>Pontederia</i> was recently re-circumscribe to include <i>Eichhornia</i> species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of <i>Pontederiaceae</i> (Comneliales) sheds light on the necessity of its re-circumscription and synopsis of <i>Pontederia</i> L. <i>Phyto Keys</i> 108: 25–83. doi: 10.3897/phytokeys.108.27652)	The name <i>Pontederia crassipes</i> has been adopted in the second order draft
Mason, Peter	No	5	41	1378	41	1378	"(see box 5.2)"	Thank you, this is addressed in the second order draft
Government of Germany	Yes	5	41	1383	42	1410	A recent publication discusses monitoring/reporting on IAS in UNESCO WH: Shackleton, R.T., Bertzky, B., Wood, L.E. et al. Biological invasions in World Heritage Sites: current status and a proposed monitoring and reporting framework. <i>Biodivers Conserv</i> 29, 3327–3347 (2020). https://doi.org/10.1007/s10531-020-01007-1	Thank you, we have revised the section accordingly in the second order draft
Government of Germany	Yes	5	41	1383	42	1410	The examples on BR selected here seem random. It is suggested to get in contact with the UNESCO MAB Secretariat for information on additional literature and/or examples.	Thank you, we have revised the section accordingly in the second order draft

Government of Germany	Yes	5	41	1383	42	1411	This sub-chapter, although it is titled UNESCO Man and biosphere reserves and World Heritage Sites, exclusively provides examples for IAS management issues in three BR. It is suggested to also include specific examples from UNESCO WH sites. The IUCN World Heritage Outlook Assessment 2017 revealed, that invasive alien species present one of two most significant current threats to WH sites. (and a 14 % increase between 2014 and 2017) Source: https://portals.iucn.org/library/sites/library/files/documents/2017-053-En.pdf . It is suggested to refer to IUCN (WH Programme) for suitable examples or consult https://worldheritageoutlook.iucn.org/explore-sites to reasearch examples that fit. One excellent example for management of IAS is the WH site Terres et Mers australes (France). Another one is the transboundary site The Waddensea (Germany, Danmark, The Netherlands) which in 2019 has adopted a Trilateral Wadden Sea Management and Action Plan for Alien Species (Source: WG-AS & Gittenberger, A. 2019. Trilateral Wadden Sea Management and Action Plan for Alien Species. Eds. Busch, J. A., Lüerßen, G., de Jong, F. Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany. see: https://www.waddensea-worldheritage.org/sites/default/files/2019_MAPAS.pdf)	Thank you, we have revised the section accordingly in the second order draft
Government of Germany	Yes	5	42	1402	42	1410	Both biosphere reserves mentioned here (Kakadu and Delta du Saloum) are also WH sites. It is suggested to add the reference to the designation.	Thanks for this suggested change. We have included it in the second order draft
Mc Kay, Fernando	No	5	42	1410	42	1410	Line 1410, Instead of Eichhornia crassipes it should be Pontederia crassipes. Pontederia is recently recircumscribe to include Eichhornia species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae (Comelinales) sheds light on the necessity of its recircumscription and synopsis of Pontederia L. Phytot Keys 108: 25–83. doi:10.3897/phytokeys.108.27652)	Thanks for this suggested change. We have included it in the second order draft
Damaseno, Gabriella	No	5	42	1413	42	1426	Maybe include a couple of sentences about how protected areas could be used as refuges for invasive animal species, then spreading into new non-invaded	Thank you for your comment, this has been addressed in the second order draft
Shaw, Richard	No	5	42	1428	42	1433	It would be good to give the area of origin of these species.	Thank you for your comment, more information is available in the references
Maillard Jean-Francois	No	5	43	1460	43	1460	I don't understand why islands are treated as a whole (depending of the size of the island).	Thank you for your comment, and we are sorry we do not understand this point.
Shaw, Richard	No	5	43	1460	46	1576	Maybe a few too many case studies here.	Thank you for your comment. As islands were identified as an important component of the assessment, different kinds of island systems and management issues (biosecurity, eradication, restoration) are highlighted.
Smith, Emily	No	5	43	1461	44	1746	Example of success through biosecurity - review of changes in angling behaviour since the launch of the national Check, Clean, Dry campaign in GB in 2011. Between 2011 and 2018 increase in the number of anglers that undertook biosecurity after every trip from 21% to just under a half 48% A similar study is currently underway for canoeists which will review changes in behaviour since the baseline in 2011. These might present examples that could be fed in as a box case study within the island section or Section 5.4.2.1. On Stakeholder community engagement. This campaign used stakeholders to design the materials and make sure they were relevant and tailored to their audiences and used feedback to improve the materials available.	Thank you for the comment. No reference has been provided to be considered in the second order draft
Hughes, Kevin	No	5	43	1471	44	1487	More references would be helpful in this section, particularly to understand the evidence upon which some of the later statements are made. The following is a key reference: Frenot Y, Chown SL, Whinam J, Selkirk PM, Convey P, Skotnicki M, Bergstrom DM (2005) Biological invasions in the Antarctic: extent, impacts and implications. Biol Rev 80:45–72. Also: Convey P, Lehouvier M (2009) Environmental change and human impacts on terrestrial ecosystems of the sub-Antarctic islands between their discovery and the mid-twentieth century. Pap Proc R Soc Tasmania 143:33–44	Thank you for your comment, agreed and added in the second order draft.
Hughes, Kevin	No	5	43	1477	43	1479	I agree that most sovereign nations have put in place some form of biosecurity within the sub-Antarctic islands under their jurisdiction. However, how strict these are vary greatly between locations, e.g. compare Kerguelen, where animal farming occurs, with Heard Island where any sort of visitation is stongly controlled and limited. I would suggest 'Considering this, rigorous biosecurity measures have GENERALLY been implemented by the sovereign nations. These measures MAY include strict quarantine protocols for all visitors and cargo to the islands.	Thank you for the comment. This section has been revised in the second order draft
Hughes, Kevin	No	5	43	1479	44	1481	The measures described are not applied across all islands. Observers are not used universally and may be limited to those islands under Australian jurisdiction (certainly not for South Georgia and the South Sandwich Islands, for example). The text here also contradicts the information provided in Chapter 6 page 49	Thank you, this has been revised in Cahapter 5 and 6.
Catford, Jane	No	5	43	general			where does ecosystem management fit in? eg. river flow regimes to keep myriad riparian wetlands healthy and dominated by native species? Such management actions re hydrology can be local (e.g. lowering wetland sils or watering directly) but can also regional (e-flow allocation), thus affecting multiple sites at once e.g. Catford, J. A., Downes, B. J., Gippel, C. J. & Vesk, P. A. (2011) Flow regulation reduces native plant cover and facilitates exotic invasion in riparian wetlands. Journal of Applied Ecology, 48, 432-442. Catford, J. A., Morris, W. K., Vesk, P. A., Gippel, C. J. & Downes, B. J. (2014) Species and environmental characteristics point to flow regulation and drought as drivers of riparian plant invasion. Diversity and Distributions, 20, 1084–1096. Ruhl, A., Catford, J. A., Cross, W. F., Escoriza, D. & Olden, J. D. (2019) Understanding the Nexus Between Hydrological Alteration And Biological Invasions. Multiple Stressors in River Ecosystems. (ed. by S. Sabater, A. Eljosefi and R. Ludwig), pp. 45-64. Elsevier.	Thank you for this suggestion. Ecosystem based management was covered in sections 5.2, 5.3, and 5.4. Added a specific discussion in 5.3.1.3
Hughes, Kevin	No	5	44	1484	44	1484	Again, "banning of outdoor clothes that have been used in other areas" is not applied universally across sub-Antarctic islands and certainly has not been applied to Antarctica and all the 30 nations active in the area.	Thank you, this has been corrected in the second order draft
Hughes, Kevin	No	5	44	1485	44	1487	This final sentence of the "box" softens some of the earlier statement, but it would be better if the variability in application of biosecurity measures was made	Thank you, we have adjusted this in the second order draft
Brooks, Thomas	No	5	44	1518	44	1518	Jones et al. (2016) PNAS; https://www.pnas.org/content/113/15/4033.short) would be a valuable reference to add here.	Thank you, this has been added in the second order draft
Mason, Peter	No	5	45	1552	45	1552	Awkward, suggest "... in planning, was shown to be ..."	Thank you, this has been corrected in the second order draft
Méndez-Sánchez, Federico	No	5	46	1561	46	1576	It should read: Box 5.8 Case study: National Program for Island Restoration in Mexico. The eradication of IAS—together with active restoration of seabirds (Bedolla-Guzmán et al. 2019), biosecurity protocols (Latofski-Robles et al. 2019), vegetation and soil restoration (Luna-Mendoza et al. 2019), and environmental learning with local communities (Aguirre-Muñoz et al. 2020)—was a crucial step of the National Program for Island Restoration in Mexico. Mexican islands are extraordinarily diverse, including semiarid islands in the Eastern Pacific Ocean, desert islands in the Gulf of California, and subtropical and tropical islands in the Pacific Ocean, the Gulf of Mexico and the Caribbean (Alfonso Aguirre-Muñoz et al., 2016). On these islands, 21 endemic species and subspecies of vertebrates have gone extinct in the last 100 years, and all but four of these extinctions were caused by invasive mammals (Alfonso Aguirre-Muñoz et al., 2011a). Priority islands were selected for restoration (i.e., whether control or eradication of one or several IAS) based on conservation value, management efficiency, social acceptance, and technical and financial feasibility (Mariam Latofski-Robles et al., 2014). Up to April 2018, 60 populations of invasive mammals were removed from 39 islands—30 of them being now completely free of invasive mammals—as follows: 32 populations of 12 species from 15 islands of the Pacific Ocean; 21 populations of 5 species from 18 islands of the Gulf of California; and 7 populations of 3 species from 6 islands of the Gulf of Mexico and the Caribbean. These actions protected at least 147 endemic taxa of	Thank you very much. This is corrected in the second order draft. Additional references not provided in detail
Government of Australia	Yes	5	47	1308	48	1338	Are there any examples or data on effects of IAS in marine protected areas? In Victoria (Australia) there have been several largely successful local eradication attempts inside MPAs (and outside MPAs), including for Asterias amurensis and Undaria pinnatifida. Is there also any evidence of protected areas (incl. MPAs) providing some sort of resistance to invasion or impacts of IAS? A desktop study for MPAs discussed at the Australian Marine Sciences Association conference several years ago failed to find any evidence of this, but it was focussed only on scientific literature and not grey literature.	Thank you for your comment. We have strengthened the discussion on MPAs in the chapter generally, and need to maintain an even representation of global regions.
Mason, Peter	No	5	47	1614	47	1614	Replace "insects" with "arthropods".	Thank you, this is addressed in the second order draft
Feest, Alan	No	5	47	1615	47	1616	what is a negative ecological impact?	Thank you, this has been corrected in the second order draft
Maillard Jean-Francois	No	5	47	1630	47	1630	Site-management in cities must be based on a dialogue with city manager about reappropriation of the nature in the cities using local flora to embellish green	Thank you, this has been added in the second order draft
Anderson, Freda	No	5	47	1634	47	1635	There is some problem with the wording here.	Thanks for this suggested change. We have corrected it in the second order draft.
Government of Ethiopia	Yes	5	48	1271	48	1294	Consider revising the content if Box 5.3 to maintain flow.	Thank you for pointing that out. We have now revised the text in the second order draft.
Government of Ethiopia	Yes	5	49	1653	49	1653	Evident redundancy under the sub-headings of "5.4. Review of key tools and technologies".	Thank you for your suggestion. Section 5.4 was completely reviewed and redundancies were eliminated in the second order draft
Government of Australia	Yes	5	50	1413	51	1458	The section "National parks, protected landscape and seascapes, and natural resource use areas" doesn't include any information on MPAs. This is a bit of a gap, as there has been a fair bit of work on IAS in MPAs. Happy to provide a case study for Asterias amurensis in Tidal River, Wilsons Promontory National Park (adjacent to Wilsons Promontory Marine National Park) in Victoria, Australia.	Thank you for pointing this out. We have increased the representation of marine environments in examples across the chapter and in the assessment
Mill, Aileen	No	5	50	1713	50	1713	Specific challenges of vertebrate IAS control and community engagement are outlined in Mill et al (2020) https://onlinelibrary.wiley.com/doi/full/10.1111/mam.12186	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here (but it is now included below in the
Mill, Aileen	No	5	50	1727	50	1727	this	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	51	1734	51	1746	Tailored use of popular media should be considered as a driver of societal awareness.	Thank you for your comment. We have covered this as best we can under section 2 - risk communication in the second order draft.
Government of Bulgaria	Yes	5	51	1750	51	1760	The social media (such as Twitter, Facebook, etc.) could also be monitored due to the information relevant to IAS.	Thank you for making this point. It does not seem to require changes to the text.
Verbrugge, Laura	No	5	51	1755	51	1755	How do you define the term citizen surveillance? I know this term is used in the literature to describe citizen observations of all kinds, but it may also be (mis)understood as citizens being watched themselves.	Thank you very much. This is added to definitions in the second order draft
Johnson, Brian	No	5	51	1756	53	1842	Chapter 5.4.2.2.2. has some overlap with Chapter 6.6.2. The authors may wish to review Chapter 6.6.2. so that the suggestions given related to citizen science and crowdsourcing are more consistent.	Thank you, this sections has been revised accordingly.
Johnson, Brian	No	5	51	1756	53	1842	I suggest to separate the explanation/discussion of crowdsourcing and citizen science a bit. Citizen science data, i.e. data contributed by citizens for scientific purposes, is only a small subset of crowdsourced data. Many other types of crowdsourced data (e.g. social media photos or text posts) are not typically considered citizen science data because they were not shared for scientific purposes. Both can be useful for IAS monitoring, but please try to explain the differences between them, as the more general crowdsourced data may be more challenging to use for scientific purposes.	Thanks for this suggested change. It is covered now in the section of the second order draft.
White, Michael	No	5	52	1791	52	1792	Good	Thank you for your comment
Mill, Aileen	No	5	52	1794	52	1794	Can reference be mase somewhere to the use of technology in identifying threats through some pathways e.g internet trade in seeds/plant. Selling of banned plants in garden centres. Identifying releases through the pet trade. I may have missed this elsewhere.	Thank you very much. This is covered now in the chapter under e-commerce in the second order draft
Scalera, Riccardo	No	5	52	1794	52	1794	Citizen surveillance – data input portals and diagnostics platforms: here it would be fundamental to explicitly discuss EASIN https://casin.jrc.ec.europa.eu/casin and its role in the implementation of the European Union regulation on Invasive alien species	Thank you, it has been added to the database

Caceres, Sarah	No	5	52	1795	52	1810	There could be an example of the citizen surveillance platform use in Reunion island. Please consult references (Triolo et al. 2014; Dievart et al. 2019).	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	53	1824	53	1825	Though the Ashtag app is an example where symptoms are such that public identification is possible.	Thank you, this has been added in the second order draft
Shaw, Richard	No	5	53	1830	53	1836	This problem can extend to countries and their Governments who do not wish to admit the arrival of a trade-threatening invader.	Thank you for your comment. We agree with your comment but we think we have this is well covered in the second order draft.
Scalera, Riccardo	No	5	53	1844	53	1844	Relevant current IAS databases: here it would be fundamental to explicitly discuss EASIN https://casin.jrc.ec.europa.eu/casin and its role in the implementation of the European Union regulation on Invasive alien species	Thanks for this suggested change. We have included it in the second order draft
Mason, Peter	No	5	54	1866	54	1867	Suggest adding " and BIOCAT which contains records of introductions of insect natural enemies, parasitoids and predators, for the control of insect pests."	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	54	1881	54	1881	An opportunity to highlight the need for sustained funding to ensure the database is not just a snapshot in time (e.g. DAISIE).	Thank you, this has been added in the second order draft
Brooks, Thomas	No	5	55	1910	55	1913	Under "Impact", add EICAT and SEICAT (see Ch 4, p147-148), which although not implemented yet, will revolutionise documentation of IAS impacts in the near-future. Key citations are Blackburn et al. (2014); https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001850 & IUCN (2020); https://portals.iucn.org/library/node/49101 for EICAT; Bacher et al. (2018); https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12844	Thank you very much. They are covered elsewhere in the chapter. Table is about extant databases
Brooks, Thomas	No	5	55	1910	55	1913	Under "Impact", add IUCN Red List of Threatened Species (https://www.iucnredlist.org/), which includes documentation of IAS as a threat to each assessed species within its Threats Classification Scheme (https://www.iucnredlist.org/resources/threat-classification-scheme ; see also Salafsky et al. 2008 Conserv Biol) and so in assessments of >120,000 species	Thank you, this has been added in the second order draft
Brooks, Thomas	No	5	55	1910	55	1913	Under "Spatial data", add IUCN Red List of Threatened Species (https://www.iucnredlist.org/), which includes spatial documentation of Introduced vs Native range within its documentation standards (https://www.iucnredlist.org/resources/mappingstandards) and so in assessments of >120,000 species	Thank you, this has been added in the second order draft
Catford, Jane	No	5	56	1644	general		Suggest include something on cautionary tales, i.e. need to take care with management that relies on spp harvesting as that develops a demand for the invasive species, - e.g. use of invasive plants for wood, fruit etc; game shooting for recreation	Thank you, this has been added in the second order draft
Franzoi, Marco	No	5	57	1916	58		Turbelin et al. (2017) measure the levels of IAS control in FTAs on a scale from 1-4, possible evidence addition to SPS section (also in chapter 6).	Thank you, this has been adjusted in the second order draft
Rüegg, Simon	No	5	57	1916			It may be worth mention that WTO regulations for animal disease trading are used more often to leverage economic interests than to actually contain diseases. There is a general lack of interest/knowledge about the significance of IAS in the larger political-economic context.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be
Smith, Emily	No	5	57	1916	58	1989	This section refers to vessel-in water cleaning but is limited to large ships. Does not refer to the extensive research that has occurred to determine the most effective approach of managing smaller recreational vessels e.g. canoes/kayaks and equipment (waders, nets) using chemicals such as Virkon Aquatic, Virasur (Sebire et al. 2017; Coughlan et al. 2018) and also hot water (Anderson et al. 2015; Shannon et al. 2018) (plus others). The use of thermal heat is mentioned briefly on 'line 1970' so could benefit with an extra sentence or two here to cover research in this area	Thank you for your comment. We have improved the text in section 5.5.2 and supplementary material 5.6. We cannot add additional text to the chapter due to word length restrictions.
Faulkner, Katelyn	No	5	57	1923	58	1974	Only ballast water/hull fouling management is discussed in this section, what about management for other pathways?	Thank you for your suggestion. We cannot add additional text to the chapter due to word length restrictions. We have chosen to include mainly the most important pathway management strategies as ballast water and hull fouling management.
Karayannis, Theofanis	No	5	57	1923	57	1923	Section 5.4.3.1 is titled "Pre-border/border" but its current content addresses only the two main shipping-related vectors (ballast water and hull fouling). If more content is intended to be added in this section then perhaps the section should be divided into sub-sections, with (for example) 5.4.3.1.1 covering the shipping vectors, etc. Alternatively, if this is the only intended content of section 5.4.3.1 then its title should change (I don't think this is the case of course). In addition, rather than going straight into the discussion on ballast water and hull fouling, it would be better to start with a very short introductory paragraph setting out that this (sub)section covers these two vectors.	Thank you for your suggestion. Section 5.4 was completely reviewed and re-organized in the second order draft
Mill, Aileen	No	5	57	1923	57	1923	This section is good - but perhaps too long?	Thank you for your suggestion. Section 5.4 was completely reviewed and re-organized, part of the content was sent to supplementary material in the second order draft
Karayannis, Theofanis	No	5	57	1924	57	1925	There are, for a finite amount of time, two (not 'several') main options (not 'optional systems') under the BWM Convention: ballast water exchange in accordance with regulation D-1, which is an interim option, and compliance with the discharge standard in regulation D-2, which is ultimately what all ships eventually have to comply with. This should be set out at the start of the paragraph; currently the text goes straight into the discussion on exchange and then suddenly brings up D-2, which is confusing for anyone not familiar with the topic.	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1924	57	1942	This paragraph has several issues and needs redrafting. Specific comments follow in the next rows of the spreadsheet but this is an overarching observation on the paragraph as a whole. In addition, this is a paragraph entirely on the BWM Convention and it does not include any mention of IMO nor lists the actual convention as a reference; these should be added.	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1925	57	1927	All three ballast water exchange methods are alternatives of equal standing and achieve the same objective which is described in lines 1927-1929; the current text as structured and worded links this objective with the sequential method giving the impression that it is the 'main' method, which is not the case; nor is ballast water exchange 'usually called the empty-refill method', that is just one of the three options.	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1925	57	1934	There are three methods for ballast water exchange: the "sequential" method, the "flow-through" method and the "dilution" method. The current text mentions only two of them and uses an incorrect name for the first one (calling it "empty-refill" rather than the correct "sequential").	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1932	57	1932	The text 'typically performed with 100% or 300% water replacement' is incorrect; if the flow-through method is used then three times the volume of the tank has to be pumped through, i.e. it has to be (at least) 300% water replacement.	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1934	57	1937	This sentence is factually incorrect. The standard in regulation D-2 is a discharge standard; the BWM Convention does not prescribe how it can be achieved and there is no provision that any ship has to install an on-board ballast water management system. This is how the vast majority of ships comply in practice, but this is fundamentally different to it being a requirement of the convention.	Thank you, this has been corrected in the second order draft
Feest, Alan	No	5	57	1937	57	1942	Heat-based BWMS (at least currently) do not have a separation stage (filtration); dominant technologies are filtration-UV and filtration-chlorination	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	57	1940	57	1942	Everything mentioned in this sentence would constitute the 'second step' after filtration, including any of these various physical or chemical treatment options; however the current wording gives the impression that the options mentioned in the first part of the sentence are part of the 'first step'. Moreover, electrochlorination and UV irradiation constitute the vast majority of systems whereas the way they are mentioned at the end gives the impression they are uncommon options, and conversely the way ultrasound and cavitation are mentioned gives the impression they are main features whereas in reality they are	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	58	1944	58	1974	Similarly to the previous paragraph, these two paragraphs are entirely about the management of hull fouling (biofouling) but they do not contain any mention of IMO and its Biofouling Guidelines, which is the global instrument addressing this topic aiming to provide a globally consistent approach to biofouling management; these should be mentioned and the Guidelines listed as a reference. There are also accompanying guidelines for recreational craft, which are a	Thank you, this is addressed in the second order draft
Scalera, Riccardo	No	5	58	1979	58	1979	Surveillance, detection, monitoring and automated response technologies: here it would be useful to report an example from a LIFE project implemented in the European Union aimed at the development of a radar to track asian hornets and find their nest to manage them, see https://www.vespavelutina.eu/en-us/the-project/The-radar	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these
Schaffner, Urs	No	5	58	1980	58	1980	Pollen monitoring is missing in Section 5.4.4	Thanks for this suggested change. We have included it in the second order draft, supplementary material 5.3.
Joshi, Chudamani	No	5	59	2005	62	2137	GIS and remote sensing technologies are highly advanced in mapping invasive species. Hence it would be useful to elaborate this section further with classified images and examples, new techniques, advantage/disadvantage etc etc. for eg. Ref. C.Joshi 2006, Indirect remote sensing of a cryptic forest understorey invasive species Forest Ecology and Management 225 (1-3), 245-256.	Thank you. This is covered now in the second order draft
Government of Germany	Yes	5	59	2006	62	2137	This section provides mostly generic information and little specific management-related advice (e.g. two cases from Australia). It is suggested to consider more case studies from different regions.	Thank you very much. This is covered as best we can within the word limit in the second order draft.
Feest, Alan	No	5	60	2049	0	0	Is there a role for NDVI here?	Thank you. This is not included
Government of Germany	Yes	5	60	2055	60	2055	Please mind: "to reduce the effects of invasions" holds true only for some specific species due to technical restrictions of the methodology to identify species on species level.	Thank you. We are constrained by word limit. Now reads 5.4.4.1 Earth observation - remote sensing detection - Thus, if applied correctly, UASs hold great potential to reduce the effects of invasions, identify priorities for management, support targeted monitoring, and control eradication efforts (Müllerová, Bartaloš et al., 2017).
Government of Germany	Yes	5	61	2098	61	2108	This case study is missing a reference (e.g. a source for the precise number of 223 interceptions in recent years).	Thank you, this has been added in the second order draft
Karayannis, Theofanis	No	5	63	2160	63	2163	Not a comment on this sentence as such, but this seems the most relevant point to make this point: There are robotic technologies currently available also for in-water hull cleaning to remove biofouling (which is the subject of two paragraphs in p.58); this is not captured anywhere in this section.	Thank you for your comment, we have added the text and link in the second order draft.
Catford, Jane	No	5	65	1924	general		I missed discussion of Weed risk assessment here, it seems like it should be included here as well as earlier if included, might be worth mentioning increased understanding of species invasiveness (dimensions) and also increased interest in developing WRA for e.g. tropical regions e.g. Carboni, M., Münkemüller, T., Lavergne, S., Cholet, P., Borgy, B., Violle, C., Essl, F., Roquet, C., Munoz, F., DivGross, C. & Thuiller, W. (2016) What it takes to invade grassland ecosystems: traits, introduction history and filtering processes. Ecology Letters, 19, 219-229. Catford, J. A., Baumgartner, J. B., Vesk, P. A., White, M., Buckley, Y. M. & McCarthy, M. A. (2016) Disentangling the four demographic dimensions of species invasiveness. Journal of Ecology, 104, 1745-1758. Junaedi, D. I., Guillera-Arroita, G., Vesk, P. A., McCarthy, M. A., Burgman, M. A. & Catford, J. A. (in review) Traits explain invasion of alien plants into tropical rainforests. Ecology and Evolution Junaedi, D. I., McCarthy, M. A., Guillera-Arroita, G., Catford, J. A. & Burgman, M. A. (2018) Traits influence detection of exotic plant species in tropical forests. PLOS ONE, 13, e0202254.	Thank you very much. All risk assessments are covered in section 2. Given to word restrictions we can't cover all risk assessments in detail as suggested by ER
Marterer, Beloni Terezinha Pauli	No	5	65	2234	65	2234	what does CSIRO mean? I couldn't find the reference to the meaning of "CSIRO" in the text. Also it could be to include in list of acronyms - Supplementary	Thank you, this has been corrected in the second order draft
Dudgeon, David	No	5	65	2246	65	2246	This is an issue that appears in many places: when used as a noun (as here), it is correct to say 'fresh water' but when used as an adjective, the correct use is 'freshwater'. Throughout these chapters, the adjectival form is used when the noun is what is required. Don't use the former as a default.	Thank you, this has been corrected in the second order draft
Scalera, Riccardo	No	5	68	2367	68	2367	Imaging, optical, movement sensors + telemetry: here it would be useful to report an example from a LIFE project implemented in the European Union aimed at the development of a radar to track asian hornets and find their nest to manage them, see https://www.vespavelutina.eu/en-us/the-project/The-radar	Thank you, we have included it in the second order draft

Government of Australia	Yes	5	69	2390	69	2392	There can be problems, however, when the assay for a non-native species cross-reacts with native species and can be compounded where there is taxonomic uncertainty.	Thank you for your comment. This is included in the second order draft under a new section on disadvantages
Government of Australia	Yes	5	69	2410	69	2420	There are also some limitations, especially in the marine environment which should not be overlooked such as eDNA does not find the actual location of the population, nor its size. There is also uncertainty about whether the detection is from a resident population or an organism on a passing ship. Some species have a strong seasonal release/availability of eDNA, e.g. crabs and some infauna. Also, procedures need to be developed to deal with Type I and Type II errors.	Thank you for your comment. We have included it in the second order draft under a new section on disadvantages
Shimura, Junko	No	5	70	2450	70	2451	Add a new subsection on next generation sequencing (NGS) and meta-barcoding to identify IAS, pests and pathogen agents. See references: https://www.nature.com/articles/ejhg2012172 https://link.springer.com/article/10.1186/s12866-019-1448-0 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0236077 https://hal-univ-perp.archives-ouvertes.fr/hal-02936634/document https://www.mdpi.com/1999-4915/12/6/607	Thank you for your comment. This was addressed in sections 5.4 and 5.5
Linnamägi, Merike	No	5	71	2464	71	2465	I am not very familiar with sentinel surveillance, but aerial bait dropping for wild animal rabies vaccination together with regular testing of wild animals (in Estonia and Latvia especially raccoon dog Nyctereutes procyonoides as very susceptible species) seems like good example for this or other similar efforts.	Thank you very much. This is wildlife disease management not IAS management so we considered it out of scope given word limit
Shaw, Richard	No	5	71	2474	71	2483	Isn't the sentinel network more of a horizon scanning approach - better in that section.	Thank you for your comment, but we respectfully disagree: for us it is more about preparedness surveillance. Section 2 links to this under Horizon scanning
Shaw, Richard	No	5	72	2504	72	2504	Could image based diagnostics and machine learning be considered here?	Thank you for your comment. It is discussed in 5.4.4
Mill, Aileen	No	5	72	2506	72	2506	Section 5.4.5 Is this needed? Is there a distinction between decision support tools and prioritisation frameworks? A careful look for overlap of this section with earlier sections is needed.	Thank you for your suggestion. The chapter was reviewed and re-organized, this is now covered in section 5.2 of the second order draft.
Government of Ethiopia	Yes	5	73	2544	74	2560	Good to revise for proper organization, clarity and rectification.	Thank you for your suggestion. Section 5.4 was completely reviewed and redundancies were eliminated in the second order draft
Will, David	No	5	74	2567	74	2570	These tools have also been used for cats (Ramsey et al 2011), invasive ear sliders (Garcia-Diaz et al 2017) and tools are currently under development to make publicly available tools for developing cost-effective decisions for managing invasive pest eradications (https://invasives.com.au/research/tools-developing-cost-effective-decisions-managing-invasive-pest-eradications/). Ramsey, D.S., Parkes, J.P., Will, D., Hanson, C.C. and Campbell, K.J., 2011. Quantifying the success of feral cat eradication, San Nicolas Island, California. New Zealand Journal of Ecology, pp.163-173. Garcia-Diaz, P., Ramsey, D.S., Woolnough, A.P., Franch, M., Llorente, G.A., Montori, A., Buenetxea, X., Larrinaga, A.R., Lascave, M., Álvarez, A. and Traverso, J.M., 2017. Challenges in confirming eradication success of invasive red-eared sliders. Biological Invasions, 19(9), pp.2739-2750.	Thank you, added in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	75	2600	75	2600	what does AI means? I couldn't find the reference to the meaning of "AI"	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	75	2617	105	3549	Perhaps a separate section is needed on ethics, humaneness and welfare of the control technologies is needed.	Thank you for your comment. This is covered now in Chapter 1 of the second order draft.
Mill, Aileen	No	5	75	2617	105	3549	The discussion/ review of non lethal trapping is very limited. Also missing is discussion of use of judas animals, conservation dogs and the use of modelling.	Thank you very much. We had included Judas animals but had to leave it out because of space - we have added it to the second order draft based on your comment.
Mill, Aileen	No	5	75	2617	75	2617	Would like to see this section summarised in a table or figure to demonstrate where in the management continuum each method is best placed/ where choice of management occurs. This could also be applied to section 5.4.4 to demonstrate where each technology is best used?	Thank you very much. Please see Table 5.7
Government of Germany	Yes	5	75	2626	76	2651	Please consider adding international agreements like FAO/WHO Code of Conduct, the Rotterdam Convention, the Stockholm Convention, since they also at least partly ban harmful pesticides.	Thank you very much. These are covered under Chapter 6 for international agreements in the second order draft.
Government of Germany	Yes	5	75	2626	76	2650	This chapter would benefit a lot from additional information and arguments that explain the need and the disadvantages of the use of chemicals in the context of nature conservation.	Thank you. This is done in section 5.4.6.1.1 of the second order draft. Use of chemical pesticides and Herbicides from managing alien invasive invertebrates and plant
Mason, Peter	No	5	75	2626	75	2627	Use "invasive alien" for consistency with the rest of the document.	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	75	2626	75	2626	The heading doesn't make sense.	Thank you, this has been corrected in the second order draft
Slade, Glen	No	5	75	2626	75	2626	Delete 'and Herbicides'	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	75	2626	76	2663	Pesticide is generally taken to mean insecticide, fungicide and/or herbicide (as used here in line 2662), so it does not make sense to single out herbicides alongside the term pesticide.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	75	2628	75	2628	Delete 'and Herbicides'	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	75	2632	76	2632	Better to begin with "In most countries" as there are some that really don't operate this efficiently.	Thanks for this suggested change. We have corrected it in the second order draft.
Bliss, Cebuan	No	5	76	2628	76	2628	suggest add 'and wider environmental risks' after social acceptability	Thank you, this is addressed in the second order draft
White, Michael	No	5	76	2628	76	2630	Also incidental death of non-target animal species	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	76	2632	76	2635	It may be worth referring to Emergency Use Authorisations, at least to acknowledge this can alleviate the pressure. (But not my area of expertise.)	Thank you for your comment. It varies by country
Mason, Peter	No	5	76	2634	76	2635	The statement is incomplete "... future threats as it takes a long ..."	Thank you for your comment, we have fixed it in the second order draft
Slade, Glen	No	5	76	2643	76	2645	The increasing cost and time to market of each new agrochemical active ingredient (see for example graphic on page 3 of https://croplife.org/wp-content/uploads/2016/04/Cost-of-CP-report-FINAL.pdf) means that the R&D firms must target ever larger markets. The public health applications including mosquito control are a clear victim of this dynamic.	Thank you, this has been added in the second order draft
Shaw, Richard	No	5	76	2663	76	2663	The rate of invention of new agrochemical active ingredients has been falling for decades, for example see Fig 2, page 3 of https://croplife.org/wp-content/uploads/2018/11/Phillips-McDougal-Evolution-of-the-Crop-Protection-Industry-since-1960-FINAL.pdf	Thank you for your comment. Key application may lead to benefit
Government of Germany	Yes	5	77	2670	79	2754	Please check: Information and discussion about "animal rights" are missing in this section. These are part of the basic law of e.g. Germany in the context of massive killings of invasive animal species, especially vertebrates. This often leads to societal conflicts/conflicting views.	Thank you, it has been addressed in the second order draft.
Mason, Peter	No	5	77	2670	77	2670	Use "invasive alien" for consistency with the rest of the document.	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	77	2670	77	2754	Should this be expanded to include non-lethal trapping? Live trapping followed by dispatch is common for some vertebrates - there are some good data available on this.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be
Bliss, Cebuan	No	5	77	2671	77	2674	references for evidence of effectiveness of lethal control missing - also evidence of where it is not effective. Also line 2692 says that the effects are short-lived, so this is contradictory. Lethal control is therefore only effective in the short-term	Thank you, this has been corrected in the second order draft
Bliss, Cebuan	No	5	77	2676	77	2676	suggest remove 'and humane' as it is an oxymoron - killing can never, ultimately, be humane	Thank you, this is addressed in the second order draft
Maillard Jean-Francois	No	5	77	2685	77	2685	when targets are also a food or a recreative sources.	Thank you for your comment, this has been changed in the second order draft
Mill, Aileen	No	5	77	2691	77	2697	Should also consider the spatial context for the removal. It is right to mention islands but removal to a geographic boundary has been undertaken. Thinking about the appropriate spatial scale for management to be applied across is needed - yes this an be lethal control but often undertaken with live trapping and dispatch which puts additional constraints on the resource planning. Please see : Robertson et al http://www.issg.org/pdf/publications/2019_Island_Invasives/PrintFiles/Robertson.pdf Bryce et al 2011	Thank you, this is addressed in the second order draft
Maillard Jean-Francois	No	5	77	2694	77	2694	Culling adult vertebrates can enhance productivity (decrease in the average weight of individuals participating in reproduction) = adjustment. Elimination could also select certain phenotypes making the control action more difficult.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be
White, Michael	No	5	77	2701	77	2701	Is there a problem with 1080 running off into rivers? NZ	Thank you. This is done in the second order draft - however, we can't get into specifics so we refer to regulated use
Bliss, Cebuan	No	5	77	2711	77	2711	suggest replacing 'excellent results' with 'significant reductions'	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	78	2714	78	2714	Is this statement only with reference to rats? See Mill et al (2020) for list of successful eradications in GB	Thank you, this has been added in the second order draft
Mill, Aileen	No	5	78	2717	78	2717	Availability and licence to use. This differs from country to country. Some toxins applied in NZ aren't licenced in UK/	Thank you, this has been added in the second order draft
Mill, Aileen	No	5	78	2748	78	2748	Need to consider the social acceptability of the methods and link to increasing awareness of humaneness and ethical considerations. This is multi-faceted.	Thank you. This is added in the second order draft. The ethics of this are now in Chapter 1.
Shaw, Richard	No	5	78	2754	78	2754	It would be good to acknowledge significant vocal groups of campaigners that are completely opposed to killing any animal.	Thank you for your suggestion. This was covered in section 5.5.10
Government of Ethiopia	Yes	5	79	2756	79	2756	No detail description about mechanical/physical and cultural control methods; good to consider providing a case study.	Thank you for your comment. This was addressed in section 5.5 with the inclusion of case studies in the second order draft
Mason, Peter	No	5	79	2758	79	2759	Incomplete statement "Manual and mechanical removal strategies for types, including ..." Types of ?	Thank you for your suggestion. Section 5.4 was completely reviewed and redundancies were eliminated in the second order draft
Mason, Peter	No	5	79	2761	89	3180	5.4.6.2 Biological Control. There is no coverage of augmentative biological control, biopesticides or conservation biological control all of which are established control strategies for IAS. It is recommended that sections covering each be included.	Thank you. We decided these were not strong enough practices outside of agriculture
Mill, Aileen	No	5	79	2761	79	2761	This section on Biological control overlaps with section 5.5.1.6.1	Thanks for this suggested change. We have included it in the second order draft
Mason, Peter	No	5	79	2764	79	2764	Biopesticides should be treated separately as there are major differences (i.e. formulation verse live organisms) between application technologies (release of large numbers of live arthropods compared to spraying components of microorganisms [parasitoid bodies of Bt])	Thank you, this is addressed in the second order draft
Brussaard, Lijbert	No	5	79	2767	83	2925	My comment relates the entire report that I glanced through, but it is perhaps best aligned to ch. 5 as indicated: There seems to be no reference to work that suggests that invasive alien plants become a nuisance because they lack (part of) the soil organisms in their area of origin that keep them under control by root pathogens and/or root herbivores. The following search string in Scopus yielded 50 hits: TITLE-ABS ("enemy release" AND soil OR root)	Thank you for your comment, mechanisms of invasions are explained in Chapter 4. Information on Classical biological control address this comment in Chapter 5.
Shaw, Richard	No	5	79	2767	79	2767	5.4.6.2.1 in general this section jumps around a bit with some repetition.	Thank you for your suggestion. Section 5.4 was completely reviewed and redundancies were
Slade, Glen	No	5	79	2771	79	2780	The other consideration here, relevant to permanent or seasonal strategies, is for how many pests does there exist a suitable predator/natural enemy. So if this is your strategy, how likely are you to succeed? (I don't know the answer or have a reference, but it is low, which is very relevant.)	Thank you very much. Seasonal introductions covered in next section

Slade, Glen	No	5	79	2771	79	2780	There are two strategies here - permanent introduction of the biological agent or seasonal introduction. The former has much higher risk and regulation and matches your comment that it is seldom suited to commercialisation. The latter is the basis of many companies' portfolios, eg. Koppert, Certis - at the end of the season the introduced species disappears due to climate and/or lack of target pest as food.	Thank you very much. Seasonal introductions covered in next section
Schaffner, Urs	No	5	79	2781	79	2781	In contrast to weed CBC, most natural enemies used in CBC of pest species are not highly specific	Thank you for your comment. We are afraid we disagree with statement. Please see 5.4.6.2.1 CBC "CBC agents for the control of weed and pest species are commonly microorganisms or invertebrate animals that are highly-specific to their target host organisms and are likely to establish within the environment inhabited by their recipient host."
Schaffner, Urs	No	5	79	2785	79	2789	Following the definition at the beginning of the section (Classical biological control (CBC) describes the use of a host-specific predator or natural enemy of an invasive weed or pest species, generally from the country of origin of that species), then the text on these lines has nothing to do with CBC, since the pest species were/are native species.	Thank you, this is addressed in the second order draft
Anderson, Freda	No	5	79	2790	79	2790	References for successful releases of fungi against weed targets: Evans, H. 2013. Biological Control of Weeds with Fungi. En: F. Kempen (Ed.) Agricultural Applications, 2nd Edition. The Mycota XI. Springer-Verlag Berlin; Hershshorn J, Cassella F & Vurro M. 2016. Weed biocontrol with fungi: past, present and future. Biocontrol Science and Technology 26: 1313-1328; Morin L (2020) Progress in Biological Control of Weeds with Plant Pathogens. Annual Review of Phytopathology 58:201-223	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	79	2790	79	2790	Like other sections some success examples would be appropriate and perhaps this section should be ordered by target rather than type of agent.	Thank you for your comment, we respectfully disagree
Government of Ethiopia	Yes	5	79	2914	79	2917	Redundant paragraphs under the same title - for instance line 2893 and 2914-2917 which needs rearrangement; Sub-headings under 5.2. and 5.5: overlapping	Thank you, this is addressed in the second order draft
Flevaris, Spyridon	No	5	80	2792	80	2795	The use of myxomatosis virus and rabbit hemorrhagic disease virus to kill rabbits in Australia as examples of "successful releases" of biocontrol agents is questionable and the language used in relation to these (e.g. "spectacular successes" in line 3018) should be adjusted. Box 5.1.5 in lines 4464 onwards gives a more complete picture and the information therein does not justify the use of "spectacular success" nor using it as an example of success. It should be put in context and explained that there are lessons to be learnt as the spread of myxomatosis and rabbit hemorrhagic disease to other parts of the world, including those where the European rabbit is endemic, has had very serious negative consequences, not only for rabbits, but also for other species and their environment. Finally, it should be pointed out that both myxomatosis and rabbit hemorrhagic disease lead to prolonged animal suffering, and are a very inhumane method of	Thank you, we have adjusted this in the second order draft
Mason, Peter	No	5	80	2803	80	2805	The statement "The initial R & D cost is generally high ..." is inaccurate. Compared to pesticides classical biological control, is a bargain!	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	80	2804	80	2804	high relative to which costs? As mentioned in the previous sentence, one of the advantages of CBC is its cost-effectiveness.	Thank you for your comment, we have clarified this in the second order draft.
Shaw, Richard	No	5	81	2835	81	2835	Not just conservation but also agriculture and ecosystem services.	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	81	2843	81	2845	As mentioned above, cane toads were released against native pests and should therefore not be discussed in the context of CBC	Thank you, this is addressed in the second order draft
Anderson, Freda	No	5	81	2848	81	2848	Morin et al. 2014 is not in reference list.	Thank you, we have corrected the references in the second order draft. Note that Morin et al. 2014 has been deleted.
Schaffner, Urs	No	5	81	2848	81	2848	the goal of CBC is not eradication	Thank you, this is addressed in the second order draft
Mason, Peter	No	5	81	2854	81	2855	Post-release monitoring is an important fourth component of a classical biological control program.	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	81	2854	81	2854	I suggest to refer to one of the published descriptions of the phases of CBC programs - there may be up to six, but the post-release monitoring & evaluation phase should certainly be added.	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	81	2856	81	2856	It may take 10+ years but it can also take much shorter	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	81	2862	81	2873	Is this information based on a certain national guidance document or on a publication? If so, please add reference. If not, I suggest to refer to a publication which describes the information that should be provided in a petition for field release.	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	82	2879	82	2879	There should be mention of the ISPM guidance documents and reference to box 5.6+G16.	Thank you, this is addressed in the second order draft
Bliss, Cebuan	No	5	82	2881	82	2885	Suggest also including a sentence about risks of using CBC	Thank you, this is covered in the second order draft
Anderson, Freda	No	5	82	2887	82	2887	CBC requires access to a secure (generally PC2-3 or even 4 when dealing with air borne plant pathogens) containment facility.	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	82	2887	82	2887	Not if testing is carried out in the native range of the target.	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	82	2897	82	2897	See comment above; do not cite the cane toad story in this context	Thank you, this is addressed in the second order draft
Schaffner, Urs	No	5	82	2910	82	2912	Such statements should be further elaborated; also, add references if available	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	83	2919	83	2919	and highly specific.	Thank you, this is addressed in the second order draft
Flevaris, Spyridon	No	5	83	2923	83	2925	I believe it would be useful to develop the "learnings" and overall give more emphasis on the need to follow a precautionary approach in any kind of releases (CBC, viruses etc.)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Slade, Glen	No	5	83	2927	84	2987	I suggest structuring this sections as (i) the SIT method (independent of how sterility is achieved) and key successful global projects; (ii) advantages of the SIT method (efficacy and environmental/ecological safety) which mean it is highly desirable when practical; (iii) challenges with traditional (irradiation) SIT (mainly sex sorting needed for flies and mosquitoes, and fitness penalty of sterilisation); (iv) technologies that try to overcome the challenges (mutant strains that facilitate sexing (historic approach, narrow success), genetic modification (traditional and gene drive), RNAi, Wolbachia IIT, automation/artificial	Thank you. This is done in the second order draft
Slade, Glen	No	5	83	2929	83	2930	Delete 'produced using irradiation or chemical sterilant' (because the technique does not depend on the method of sterilisation, although those are two common historic methods).	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2931	83	2931	Change '50 to 65'. The first demonstration of IAS elimination by SIT was in 1954 (New World Screw Worm on Curacao island).	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2933	83	2933	I suggest a paragraph break before 'The technique requires...'. I also suggest inserting lines 2956 to 2964 here (see below).	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2934	83	2936	Two factors that can cause a significantly larger number of males to be released are if they have suffered a fitness penalty in the sterilisation process and/or if sterile females are released at the same time. (Since modern solutions have neither of these problems these factors should be decoupled from the statement that they determine the release numbers.)	Thank you, this is now covered in the second order draft
Slade, Glen	No	5	83	2934	83	2935	While I appreciate that terms like 'overabundance' appear a lot in older literature, the development of modern methods mean it would be more accurate to say that the number of males released depends on several factors (explained below) and typically is chosen to be sufficient to achieve at least 50% of all matings by	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2943	83	2943	Add 'of SIT' after 'advantages' for clarity.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2944	83	2943	Split these two very different advantages into two separate bullets; publicly acceptable; non-toxic.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2945	83	2945	Split these two very different advantages into two separate bullets; target-specific; established efficacy to suppress or eliminate	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2946	83	2946	An important additional advantage is: not susceptible to insect resistance	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2947	83	2955	These are not all commonly applied, and some techniques (particularly automation/artificial intelligence) are not included. Building on my comment above, I think it is important to separate (a) sex sorting; and (b) sterilisation, and then for each describe the historical practice and shortcomings. Suggested text: Sex sorting has historically been impossible except for a few unusual cases - medfly mutants with female lethality and Aedes aegypti mosquitoes using sex dimorphism; the consequence is that SIT has not usually been practical for flies or mosquitoes where released females would do the damage whereas for moths bisex release is not damaging to the crop, but has a penalty in number of sterile males needed. Sterilisation has historically used x-ray or gamma irradiation with a resulting fitness penalty to the sterile male; there is typically a trade-off between sterility and fitness, with IAEA proposing guidelines for minimum mating fitness and minimum sterility for suppression (95%) and elimination (98%); reduced sterility and reduced fitness both require an increase in release rates to compensate, but many species are not amenable to traditional SIT because they do not have a 'window' where there is both sufficient sterility and sufficient fitness, including Aedes aegypti mosquitoes, as a high profile recent example (due to the Zika crisis). These disadvantages have been the driver for new	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	83	2956	84	2964	Suggest putting this earlier on, after the definition of what SIT is, eg. line 2933 before 'The technique...'	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2960	84	2960	Delete 'Globally'	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2960	84	2960	My understanding is that there are literature references (Knippling) to the idea of SIT as early as 1939, but it was first field tested in the early 1950s and then had its first definitive proof of efficacy in 1954 in Curacao.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than specific case studies, and we have already incorporated a few of these.
Mandivenyi, Wadzanayi; Araya Quesada, Mariana; McLoughlin, Austen	No	5	84	2966	84	2976	In section about SIT, RNA interference should additionally be mentioned as a genetic approach.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2966	84	2972	Conventional genetic modification has been demonstrated both for sterility and sex-sorting (Alphey). Oxitec has run field programs with their bisex lethal Aedes aegypti mosquito, relying on sex dimorphism to sort males by size. Oxitec has demonstrated sex-specific lethality for a number of agricultural pest species in cage trials and recently demonstrated this in the field for Aedes aegypti. (See website www.oxitec.com press releases.)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than specific case studies, and we have already incorporated a few of these.
Slade, Glen	No	5	84	2966	84	2976	I suggest reworking this paragraph, together with the list in lines 2950-2955, plus references to automation/artificial intelligence as ways that different researchers and innovators are trying to overcome the challenges of traditional SIT. I give my view on this in the next several comments.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2966	84	2966	Put a full stop after 'systems'. (We all want those; there is not strong demand for GMOs, which are just one possible way to improve on traditional SIT.)	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2970	84	2970	Supply chain efficiencies appears out of the blue and has not been seen as an historical shortcoming of SIT. This is presumably a reference to possible release of eggs, which would be possible with a number of technologies but has not yet been proven as an actual economic benefit. Although Oxitec recently trialled one approach, there is no published data regarding the financial impact of the technique. I therefore suggest creating a separate topic or paragraph about how new technologies might improve SIT in addition to overcoming the historical shortcomings.	Thank you for your comment, we have clarified this in the second order draft.
Slade, Glen	No	5	84	2972	84	2974	CRISPR technologies create three possibilities: (i) achieving a similar effect to Alphey/Oxitec but with a different process; (ii) transforming the sterility effect into a gene drive; (iii) other innovations. A key project for (ii) is the Target Malaria, supported by Gates Foundation and others, working towards a gene drive solution for malaria-transmitting Anopheles mosquitoes; see https://targetmalaria.org/our-work/our-approach/. An advanced project for (iii) is the start-up Agragene who published a method called pgSIT to create male only eggs, see https://doi.org/10.1038/s41467-018-07964-7.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than specific case studies, and we have already incorporated a few of these.

Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	84	2974	84	2975	The implication that only CRISPR can achieve SIT for other invertebrates is incorrect. Other genetic technologies can also accomplish this.	Thank you, this has been addressed in the second order draft
Slade, Glen	No	5	84	2974	84	2974	Insert progress with automation and artificial intelligence to overcome shortcomings of traditional SIT. Computers are better than humans at picture classification tasks (arXiv:1501.02876v3) so a number of recent innovators have applied this to solve sex sorting for SIT. Some are focused on solving this issue as an independent module, such as the Senecio adult sex sorting machine (https://www.senecio-robotics.com/). Verily's Debug project (see https://www.nature.com/articles/s41587-020-0471-x) has made its visual sex sorting of adult Aedes aegypti part of an automated rearing process that has been used with Wolbachia infected Aedes aegypti to provide the sterility aspect. BigSIS (see www.bigsis.tech) has developed a proprietary end-to-end automated insect rearing process that incorporates computer vision for sex sorting and a proprietary method for protecting insects from the deleterious effects of	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2974	84	2974	Insert progress with RNAi as a means to overcome traditional SIT shortcomings. A key example is Forrest Innovations (http://www.forrestinnovations.com/en/) that recently published trial results (https://www.medrxiv.org/content/10.1101/19010678v1.full.pdf) although note their method included the chemosterilant	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2974	84	2974	Insert progress with Wolbachia based solutions. MosquitoMate is the USA IP holder and proponent of IIT, eg. DOI: 10.1038/srep33846. It has achieved results and EPA approvals for Aedes albopictus. Outside USA, IAEA is running projects that additionally use irradiation to sterilise the females to reduce the chance of establishment, eg. https://doi.org/10.1186/s13071-018-3214-9 . The World Mosquito Program is using population replacement strategy https://www.worldmosquitoprogram.org/in-contract-to-sit .	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than specific case studies, and we have already incorporated a few of these.
Slade, Glen	No	5	84	2974	84	2975	Of the new technologies, it is not just CRISPR-based techniques that could represent a platform for addressing a much wider range of insect species. Traditional genetic modification has already been applied to several species (Oxitec). Automation platforms such as that of BigSIS have wide applicability since some changes will require just a software update rather than the more difficult biological equivalent.	Thank you, this is addressed in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	84	2975	84	2976	We would suggest the deletion of the word "fundamentally" to soften tone	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2977	84	2977	I suggest inserting here observations about the regulatory status of all the new technologies (not just CRISPR in lines 2983-2984). Genetic modification has been available to SIT for at least 18 years (Alphey) and produced working products; however, the regulatory process has impeded field trials let alone commercialisation. CRISPR may face similar issues, particularly where the Cas9 construct leaves the end product as a definitively genetically modified organism. RNAi has been field tested and potentially can be commercialised in Brazil (?). Wolbachia IIT is approved by EPA and held back more by production technology, especially cost effective sex sorting. BigSIS has successfully avoided or minimised regulatory hurdles by creating a process that works with native wild type strains: for example, it has been cleared by UK regulators to sell its SIT solutions without permit on this basis.	Thank you, this has been addressed in the second order draft
Slade, Glen	No	5	84	2977	84	2977	I suggest inserting here text about public opinion, which can provide an additional significant hurdle for genetically modified solutions in addition to regulators. As one example, Oxitec was due to release its OX513A Aedes aegypti mosquito in Florida Keys in 2012; local public opinion forced first regulatory intervention and then a series of postponements until the project was abandoned in 2018.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2978	84	2980	Many traditional SIT programs have been pioneered through the International Atomic Energy Authority (IAEA) who in combination with the Food and Agriculture Organisation (FAO) have promoted irradiation-based SIT as a project under the 'Atoms for peace' initiative. The expense of installing and operating gamma ray sources created a large minimum scale for their projects, but this matched well with their strong ties to national governments. This sometimes creates the false impression that SIT is exclusively a wide-area technique; however, there are many examples of SIT at small scale including De Groene Vlieg (http://www.degroeenvlieg.nl/home/) onion fly control service. Moreover, the newer technologies, which do not rely on gamma irradiators for sterilisation, are no longer constrained by this aspect and are offering commercial services at customer farm/residential property scale, eg. MosquitoMate back yard service	Thank you, this is addressed in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	84	2983	84	2984	Inclusion of "and other genetic approaches" after "CRISPR gene editing"	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2983	84	2984	Delete the sentence starting 'CRISPR' as the point is addressed more extensively above.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2986	84	2986	Delete 'landscape-wide' as noted above there is no need to constrain the application in this way.	Thank you, this is addressed in the second order draft
Slade, Glen	No	5	84	2988	84	2988	I suggest adding a conclusion about the use of SIT for IAS, particularly noting that new technologies are not only improving on the already-successful SIT but also offering platforms that could address any number of new species. However, the genetic modification approaches will have a very long lead time as evidenced by progress of the pioneers such as Oxitec; BigSIS is an example of a platform that could produce a SIT solution for a new target species in less than a year and need little or no regulatory permitting to be put into action.	Thank you, this is addressed in the second order draft
Flevaris, Spyridon	No	5	84	2992	84	2992	Same comment as for line 2792 above.	Thank you, this is addressed in the second order draft
Bliss, Cebuan	No	5	85	3009	85	3021	Advantages of VBC outlined but not disadvantages	Thank you, this is addressed in the second order draft
Flevaris, Spyridon	No	5	85	3018	85	3018	Same comment as for line 2792 above.	Thank you, this is addressed in the second order draft
Dudgeon, David	No	5	85	3021	85	3021	Say 'fresh waters' or 'waterways' (not both).	Thank you, this is addressed in the second order draft
Flevaris, Spyridon	No	5	86	3042	87	3085	The section fails to discuss the potential disastrous effects of the released viruses if they somehow arrive to the native range of the targeted species.	Thank you, this is addressed in the second order draft
Government of Australia	Yes	5	86	3044			Remove "the development of a release strategy and risk assessment are underway". Replace with "an assessment of the feasibility of using the carp virus as a biological control agent for carp in Australia is underway".	Thanks for this suggested change. We have corrected it in the second order draft.
Mason, Peter	No	5	86	3063	86	3063	OIE should be defined here not on line 3077	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	86	3068	86	3068	Where is the case study? Aahh Box 5.15.	Thank you for your comment.
García Martínez, Margarita	No	5	87	2756	87	2759	5.4.6.1.4 Mechanical/physical approaches for invasive alien invertebrates and plants. This topic includes only two lines, more content on these methods should be included as well as examples so that there is a balance with the other subtopics. e.g.	Thank you. In the second order draft, the section lengthened and example provided considered. notes added to draft. 5.4.6.1.4 Mechanical/physical approaches for invasive alien invertebrates and plants.
Linnamägi, Merike	No	5	87	3087	89	3180	Add some text on the trap-neuter-release (TNR) programs. Although being labor intensive and expensive this can be an useful tool. This requires capture of all or most animals and at this point euthanasia would be cheaper option but in cases of strong public opposition TNR program might be more feasible option, at least until other suitable options are developed. There is case study in Italy on the invasive gray squirrel Sciurus carolinensis (https://core.ac.uk/download/pdf/201752781.pdf), where recapture issue was solved by releasing treated animals in alternate location.	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	87	3087	89	3180	Overall a bit more synthesis / integration needed on this section. Consider having a separate humanness and ethical considerations section.	Thank you, this is covered in Chapter 1
Mill, Aileen	No	5	87	3088	87	3088	Not just decrease - could be to maintain... Management objective needs defined.	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	87	3101	87	3101	Which countries? Goats too see Cowan et al 2020 https://onlinelibrary.wiley.com/doi/10.1111/mam.12176	Thank you, this is addressed in the second order draft
Mill, Aileen	No	5	87	3114	87	3114	I'd argue that population modelling is needed to manage a population with immunocontraception in the long term (see Cowan et al 2020) https://onlinelibrary.wiley.com/doi/10.1111/mam.12176	Thank you, this is addressed in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	89	3188	91	3266	We suggest that the section on RNA interference (5.4.6.3.1) be more balanced, equally emphasizing the benefits and potential adverse effects. Some "disadvantages" are missing from the table (e.g. sequence homology in other species, lack of uptake by some species, etc.). The two approaches for RNAi (transgenic and topical applications) could be more clearly defined. New formulations for delivery and stability could be also briefly mentioned. Additionally, the current uncertainty regarding the regulation of topical applications (e.g. foliar dsRNA) in some jurisdictions could be additionally reflected.	Thank you, this is addressed in the second order draft
Shaw, Richard	No	5	91	3251	91	3252	Repeat of sentence from previous para.	Thank you, this has been corrected in the second order draft
Mason, Peter	No	5	91	3259	91	3260	I strongly disagree that this technology does not require regulation! Whether applied as a pesticide or by modifying an organism there will be stringent	Thank you. It is unregulated now in several countries including Australia
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	91	3268	97	3509	There are current discussions on living modified organisms containing engineered gene drives under the Convention on Biological Diversity: synthetic biology programme and the Cartagena Protocol on Biosafety's work on risk assessment and risk management. The recent conclusions of the Ad Hoc Technical Expert group meeting and the study on LMOs containing engineered gene drives contain relevant information for this section.	Thank you. This is done in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	91	3268	97	3509	We suggest that the section on Genetic-control approaches (including gene drives) be more balanced to equally emphasize the benefits and potential risks of the technology. Currently the discussion on potential risks has not been fully developed.	Thank you. This is covered in the second order draft
Slade, Glen	No	5	91	3269	91	3270	This is not the only possible aim of genetic and/or gene drive approaches to IAS. An important additional strategy is to change the disease transmitting properties; several projects targeting mosquito disease transmission are being researched including Target Malaria https://targetmalaria.org/our-work/our-approach/ . Also a sterility gene drive works differently to a sex bias gene drive. But I am not an expert on these systems.	Thank you, this has been added in the second order draft
White, Michael	No	5	92	3294	92	3296	Despite what follows this seems potentially capable of jumping species - who eats lampreys?	Thank you, construct would be lamprey specific
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	5	92	3309	92	3328	The document could benefit from a description of the different types of engineered gene drives.	Thank you, this is covered in supplementary materials
Government of Germany	Yes	5	93	3340		3341	Natural gene drives (in fungi) are known to overcome boundaries of sexual reproduction. The special spread mechanisms allow single transfer of genetic information between even genetically isolated species to spread in non-target species.	Thank you, this has been added in the second order draft
Government of Germany	Yes	5	93	3343	93	3345	This advantage assumes a suppression drive, which is only a subsection of drive categories and not valid for all gene drive interventions. Also modelling can show that suppression drive can exist in equilibrium, not leading to loss of the population and infite environmental exposure with the drive. Chamber, Jackson; Kim, Isabel; Chamber, Samuel E.; Clark, Andrew G.; Messer, Philipp W. (2019): Suppression gene drive in continuous space can result in unstable persistence of both drive and wild-type alleles (28). DOI: 10.1101/769810	Thank you, this has been added in the second order draft
White, Michael	No	5	93	3343	93	3345	Are they?	Yes, thank you

Government of Germany	Yes	5	93	3350	93	3353	Gene drives are per definition uncontrolled (Esvelt KM, Gemmill NJ (2017) and conservation demands safe gene drives. PLoS Biol 15(11): e2003850. https://doi.org/10.1371/journal.pbio.2003850). Gene drive systems with self limiting character are not developed yet, and it has not been demonstrated that they will be available in the future. The risks of environmental release of synthetic gene drives are complex and certainly not limited to "gene transfer into native populations of the same species" see e.g. Dolezel, Marion; Simon, Samson; Otto, Mathias; Engelhard, Margret; Züghart, Wiebke (2019): Gene Drive Organisms - Implications for the Environment and Nature Conservation. A joint report of the EPA/ENCA Interest Group on Risk Assessment and Monitoring of GMOs. Hg. v. Umweltbundesamt - Environmental Agency Austria. Vienna (REP-0704) ; Dolezel, Marion; Lüthi, Christoph; Gaugitsch, Helmut (2020): Beyond limits – the pitfalls of global gene drives for environmental risk assessment in the European Union. In: BR 15 (1817), S. 1–29. DOI: https://doi.org/10.1007/s11252-020-00385-0	Thank you, we have added more cautionary thinking to the text not developing uncontrolled gene-drives
White, Michael	No	5	93	3350	93	3353	True.	Thank you for your feedback.
Government of Germany	Yes	5	93	3355	93	3355	This is an overstatement. Genetic control in the form of gene drives are untested in the field. From natural gene drives it is known that even though the mechanism is efficient, the reaction of the population towards the drive remains unpredictable, probably hindering synthetic gene drives as well (Price TAR, Verspoor R, Wedell N. 2019 Ancient gene drives: an evolutionary paradox. Proc. R. Soc. B 286: 20192267. http://dx.doi.org/10.1098/rspb.2019.2267).	Thank you for your comment, this has been changed in the second order draft
Government of Germany	Yes	5	94	3382	94	3382	It should be indicated that extensive genome editing will nonetheless be necessary. If considering that efficient gene drives can usually not be detected because they have already swept through a population or species and looking at the challenges ahead for developers of synthetic gene drives, the modification of a natural gene drive seems far fetched given the current state of the art of gene drive systems.	Thank you for your comment, we respectfully disagree
Mandivenyi, Wadzanayi; Araya Quesada, Mariánela; McLoughlin, Austein	No	5	95	3403	95	3415	The lack of field trials is another challenge as one may not be able to control or confine the spread of a modified organism containing an engineered gene drive once released (depending on the type of engineered gene drive).	Thank you, this is noted
Government of Germany	Yes	5	95	3417	95	3420	Risk Assessment of gene drives is in its infancy with many unanswered questions. It is currently unknown due to the complexity of the intervention if sound risk assessment can be performed in the future. This is currently also discussed in the CBD under the Cartagena protocol. The difficulties with risk assessment and especially lack of comparators, difficulties to perform field trials, and difficulties to model spread and ecological outcome of gene drives should be recognized and given sufficient space in the current document. See e.g. Simon, Samson; Otto, Mathias; Engelhard, Margret (2018): Synthetic gene drive: between continuity and novelty. Crucial differences between gene drive and genetically modified organisms require an adapted risk assessment for their use. In: EMBO reports (5). DOI: 10.15252/embr.201845760.; Dolezel, Marion; Simon, Samson; Otto, Mathias; Engelhard, Margret; Züghart, Wiebke (2019): Gene Drive Organisms - Implications for the Environment and Nature Conservation. A joint report of the EPA/ENCA Interest Group on Risk Assessment and Monitoring of GMOs. Hg. v. Umweltbundesamt - Environmental Agency Austria. Vienna (REP-0704) ; Dolezel, Marion; Lüthi, Christoph; Gaugitsch, Helmut (2020): Beyond limits – the pitfalls of global gene drives for environmental risk assessment in the European Union. In: BR 15 (1817), S. 1–29. DOI: https://doi.org/10.1007/s11252-020-00385-0	Thank you, we have included the reports in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Mariánela; McLoughlin, Austein	No	5	95	3417	95	3420	This could be a placeholder the discussions of LMOs containing engineered gene drives under the Cartagena Protocol on biosafety (currently discussing the need for guidance on risk assessment) could be mentioned.	Thank you for your comment. This is covered more in Ch 6
Shaw, Richard	No	5	96	3443	96	3443	Worth also considering the morals and public perception of driving a species extinct rather than just the acceptability of GM as the tool.	Thank you, this is addressed in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Mariánela; McLoughlin, Austein	No	5	96	3471	97	3496	There are several other reports that discuss various issues surrounding gene drives that could also be included or referenced.	Thank you. It's a rapidly changing field with many references so we are sticking to the big reports and any critical new discoveries
Brooks, Thomas	No	5	96	3482	97	3484	Good use of Redford et al. (2019); https://portals.iucn.org/library/node/48408); this includes a number of case studies, and chapters on governance and evidence and the challenges facing these, which could also be usefully cited specifically in this section.	Thank you, this is addressed in the second order draft
Government of Germany	Yes	5	97	3501	97	3507	The comparison of gene numbers is unscientific. A synthetic gene drive might be able to lead to the extinction of a species regardless of how many genes it contains. Pests have a native range, where they are not considered harmful. One huge risk of gene drives is the escape into native range, which is not	Thank you, this has been corrected in the second order draft
Mill, Aileen	No	5	97	3511	97	3515	What is being integrated? define IPM.	Thank you very much. Definition clarified in chapter of the second order draft
Slade, Glen	No	5	97	3512	97	3512	Delete 'and weed' (since weeds are pests in the same way that herbicides are pesticides).	Thank you, this is addressed in the second order draft
Government of Germany	Yes	5	97	3513	97	3515	"Other practices including the use of alternative indigenous species to replace ornamental alien species that are potentially invasive in areas would reduce introductions and spread of IAS." The use of alternative indigenous species is a key method to reduce introduction of alien species into the wild. Given the relevance, this chapter needs more information than the given one sentence, especially about concepts and realised projects e.g. in Switzerland -- https://www.infoflora.ch/de/assets/content/documents/neophyten/neophyten_diverse/neophyten-ersatzarten.pdf	Good reference. We have added it in the second order draft.
Mill, Aileen	No	5	97	3517	98	3535	This section should also consider the review of extinctions prevented through conservation action where IAS control is highlighted as a success in preventing the extinction of some bird and mammal species. Bolam et al 2020 https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12762	Thank you. This is relevant for Section 5 evaluation of effectiveness
Mill, Aileen	No	5	97	3518	97	3518	Exotic= alien?	Thanks for this suggested change. We have included it in the second order draft. Exotic was replaced by alien wherever it was possible.
Lemaître, Charles-Frédéric	No	5	97	3522	97	3522	I don't understand the notion of "passive restoration". Restoration is considered as a voluntary or mandatory serie of actions to restore an area after being used.	Thank you, we have clarified the definition in the text.
Singheiser, Martin	No	5	97	3537	99	3538	Please check table concerning errors.	Thank you, this has been corrected in the second order draft
Lemaître, Charles-Frédéric	No	5	98	3533	98	3535	guidance documents, developed by professional organizations exist and are used to minimize risks with invasive alien species in France for instance: http://www.genie-ecologique.fr/wp-content/uploads/2020/09/Note-de-synth%C3%A8se-CCTP-EVEE-v14.pdf ; https://www.actu-environnement.com/media/pdf/fines-23735-guide-especes-invasives-unpg.pdf ; EU guidance and documents on the subject of invasive alien species: https://rm.coe.int/1680746248 ; https://rm.coe.int/1680746413 ; https://www.coe.int/t/web/bern-convention/recommandations-sur-les-especes-exotiques	Thank you. Reference to the first two reports added to text. Last two links more general and have been included as appropriate in other sections of the second order draft
Damascono, Gabriella	No	5	98	3536	103	3543	Summary tables are not properly displayed, despite looking complete in information.	Thank you, this has been corrected in the second order draft
Government of Ethiopia	Yes	5	98	3536	105	3549	The first column of Table 5.7, Table 5.8 and Table 5.9 needs correction.	Thank you, this has been corrected in the second order draft
Government of Germany	Yes	5	98	3536	105	3549	It is proposed to add some additional information on how these tables were generated and what data they are based on.	Thank you, this has been corrected in the second order draft
Mill, Aileen	No	5	98	3536	103	3543	Tables 5.7 and 5.8 not presented in suitable format for review - error in referencing. I suggest linking the summary to invasion stage too.	Thank you, this has been corrected in the second order draft
Castiño, Arbolada, Nicolás	No	5	98	3537	99	3538	Table 5.7 has an error.	Thank you, this has been corrected in the second order draft
Lemaître, Charles-Frédéric	No	5	98	3537	105	3549	Error! Reference source not found. : no references in the table	Thank you, this has been corrected in the second order draft
Pan, Xubin	No	5	98	3537	105	3549	Some text is missing.	Thank you, this has been corrected in the second order draft
Shaw, Richard	No	5	98	3537	105	3549	Table corrupted and impossible to interpret.	Thank you, this has been corrected in the second order draft
Mason, Peter	No	5	99	3536	99	3539	Table 5.7 Engineering and ICT column data is missing.	Thank you, this has been corrected in the second order draft
Joshi, Chudamani	No	5	100	3540	103	3543	Table 5.8 can be made more useful, rather than yes or no options only.	Thank you. Better notes have been added where there is a subtler context in the second order
Mason, Peter	No	5	100	3540	103	3543	Table 5.8 Engineering and ICT column data is missing.	Thank you, this has been corrected in the second order draft
Singheiser, Martin	No	5	100	3542	103	3543	Please check table concerning errors.	Thank you, this has been corrected in the second order draft
Rüegg, Simon	No	5	100				Table 5.8 There is increasing debate about the use of the term zoonotic disease (see Haider et al 2020 in press Frontiers in Public Health for an overview). In the light of the current pandemic this discussion has become more important. Conventionally, zoonoses are regarded as diseases transmitted from animals to people. Diseases such as COVID have also been named zoonoses although they probably have their origin in wild vertebrates but are now primarily within the human population. With classical zoonoses these represent two very distinct pathways that require completely different control strategies. The table might benefit, if the type of diseases addressed was clarified.	Thank you for your comment. It is addressed in Table legend of the second order draft
Mason, Peter	No	5	104	3544	105	3549	Table 5.9 Engineering and ICT column data is missing.	Thank you, this has been corrected in the second order draft
Singheiser, Martin	No	5	104	3548	105	3549	Please check table concerning errors.	Thank you, this has been corrected in the second order draft
García Martínez, Margarita	No	5	106	3536	106	3536	It was impossible to review tables 5.7, 5.8 and 5.9 as it marks the entire first column as an error.	Thank you, this has been corrected in the second order draft
Cudmore, Becky	No	5	106	3537	107	3538	Missing data in column 1.	Thank you, this has been corrected in the second order draft
Mill, Aileen	No	5	106	3550	106	2587	It would be useful to link this to the invasion stage too. E.g. what is the management goal/ objective and what is the role of different strategies at different stages. This is outlined in Mill et al 2020. https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12186 , see figure 1 where management objective is linked to the	Thanks for this comment. We have included it in the second order draft
Mill, Aileen	No	5	106	3550	106	2587	Would like to see adaptive management more thoroughly reviewed. See also review by Richardson et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12182 which focusses on IAS mammals and the published project description for the CONTAIN project	Thanks for this comment. We have included it in the second order draft
Taki, Hitomoto	No	5	106	3550	106	3550	Is it okay not to mention about the importance of monitoring for managements, somehow?	Thank you for this comment. We have chosen to include it in the section 5.5.3. of the second
White, Michael	No	5	106	3558	106	3560	Society 'advances' or 'changes'? (scientific knowledge advances)	Thanks for this suggested change. We have included it in the second order draft
Mandivenyi, Wadzanayi; Araya Quesada, Mariánela; McLoughlin, Austein	No	5	106	3583	106	3587	A neutral approach is suggested when discussing any new biotechnologies	Thank you for this suggestion. We will take care of this while revising the section.
Government of Germany	Yes	5	106	3589	109	3693	Any information about concepts of pathway regulation e.g. in the context of EU Regulation No 1143/2014 is missing.	Thank you for this suggestion. Most specific regulations are treated in chapter 6
Smith, Emily	No	5	106	3589	109	3693	Prevention references extensively to ballast water. Does not discuss biosecurity for other unintentional pathways such as small recreational vessels and angling equipment. See examples of national campaigns and approaches in the UK, New Zealand, Australia and the USA with the focus on immersing/spraying equipment either in water or disinfectant leaving it to dry.	Good comment and we will review these examples. However, it is important to note that the next paragraph discuss about other pathways and that this section is focus on the effectiveness of different management strategies to prevent new species introductions.
Government of Australia	Yes	5	107	3613	108	3637	The Ballast Water Convention introduced the Regulation D2 standard which means that most ships will have to install a ballast water management (=treatment) system (http://www.imo.org/en/MediaCentre/HotTopics/BWM/Documents/BWM%20infographic_FINAL.pdf for illustration)	Thank you for your comment. In agreement with the rest of the assessment, we followed the CBD's categorization, in which ballast water is considered as a pathway: https://www.cbd.int/doc/c/9d85/3bc5/d640f059d03acd717602cd76/sbsta-22-inf-09-en.pdf
Karayannis, Theofanis	No	5	107	3613	107	3613	Ballast water is a vector, not a pathway.	Thank you. In agreement with the rest of the assessment, we followed the CBD's categorization, in which ballast water is considered as a pathway: https://www.cbd.int/doc/c/9d85/3bc5/d640f059d03acd717602cd76/sbsta-22-inf-09-en.pdf
Shaw, Richard	No	5	107	3617	107	3617	Should the year be 1985 - the same year as the seminal publication?	Thank you for this suggestion, we have included it in the second order draft.

Karayannis, Theofanis	No	5	107	3621	107	3622	This sentence should be redrafted as it is not clear. Presumably it refers to the fact that not all countries have ratified the BWM Convention; however this is always the case for all international conventions and the current ratification of this convention does cover 91% of the world's fleet so it may be inaccurate to say that its implementation is not global.	Thanks for this suggested change. We have included it in the second order draft
Feest, Alan	No	5	107	3625	107	3630	Discussion of D-1 standards seem to be outdated. In some cases, exchange will still be used and necessary, but most ports will adopt a numerical-based standard (see Albert et al. 2013; https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/12-0669.1)	Thanks for this suggested change. We have included it in the second order draft
Karayannis, Theofanis	No	5	107	3625	108	3635	The points being made in this text are valid, however it should be noted that ballast water exchange is an interim option, the phasing-out of which started in September 2017 (entry into force of BWM Convention) and will conclude by September 2024, meaning that by that time all international ships will have to comply with the D-2 discharge standard and exchange will not be an option anymore. This context should be taken into account when talking about long-term evaluations of the efficacy of exchange as their necessity and value may be questionable.	Thanks for this suggested change. We have included it in the second order draft
Karayannis, Theofanis	No	5	107	3625	107	3626	These are 'methods' of ballast water exchange, not 'types'; and the first one is called "sequential" and not "empty refill".	Thanks for this suggested change. We have included it in the second order draft
Volpedo, Alejandra	No	5	108	3540	112	3546	The Tables 5.8 and 5.9 cannot be read.	Thank you, this has been corrected in the second order draft
Cudmore, Becky	No	5	108	3542	111	3543	Missing data in column 1.	Thank you, this has been corrected in the second order draft
Karayannis, Theofanis	No	5	108	3652	108	3652	The word "pathways" should be complemented by "and vectors", as this sentence mentions a mixture of pathways (e.g. aquaculture) and vectors (e.g. ballast water), and in fact biofouling itself is a vector.	Thank you. In agreement with the rest of the assessment, we followed the CBD's categorization, in which ballast water is considered as a pathway: https://www.cbd.int/doc/c/9d85/3be5/d640f059d03acd717602cd76/sbsta-22-inf-09-en.pdf
Government of Germany	Yes	5	108	3667	108	3668	Kindly check whether it should rather read "5 days without seawater".	Thanks for your comment. We have checked the reference and the sentence is correct.
Government of Germany	Yes	5	109	3676	109	3677	Please provide references/case studies (possibly referring to Box 5.12?) to support this statement.	Thank you for making this point. We have re-worked this paragraph to make it clearer than before in the second order draft
Schaffner, Urs	No	5	109	3676	109	3677	What does this imply? Which species does this sentence refer to? There are certainly IPLCs who support the release of certain species into their environment.	Thank you for making this point. We have re-worked this paragraph to make it clearer than before in the second order draft
White, Michael	No	5	109	3676	109	3677	Good	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Faulkner, Katelyn	No	5	109	3690	109	3692	A useful reference for this section: Eschen, R., Britton, K., Brockerhoff, E., Burgess, T., Dalley, V., Epanchin-Niell, R. S., ... Theyse, M. (2015). International variation in phytosanitary legislation and regulations governing importation of plants for planting. <i>Environmental Science & Policy</i> , 51, 228–237.	Thank you for this suggestion. Phytosanitary measures are discussed further in the chapter.
Shaw, Richard	No	5	109	3692	109	3692	Could mention wood packaging regulations.	Thank you for this suggestion. Regulations are discussed in chapter 6
Mill, Aileen	No	5	109	3694	109	3762	This paper also highlights the need for tracking invasions - not just surveying to inform prevention - useful for other aspects of management too. Pergl et al 2019 <i>Cons Biol</i> . https://onlinelibrary.wiley.com/doi/10.1111/cobi.13445	Thank you for making this point. It does not seem to require changes to the text.
Peck, Harry	No	5	109	3694	116	3977	This section doesn't outline the difficulties associated with monitoring. To an outside observer it may seem plausible that every IAS could be monitored, and certainly they may expect every managed species to be monitored in depth. However, this is often not the case (see Clayton & Cowan, 2010). Additionally, there are problems associated with interpreting monitoring data. For example, it may be difficult to conclude when eradication has been successful, rather than simply reducing an IAS population to a level where monitoring is difficult. (see Rout et al., 2014)	Thank you, we have revised the section accordingly in the second order draft
Pan, Xubin	No	5	109	3701	109	3701	It is better to use the "specific surveillance" rather than "targeted surveillance". (ISPM 06: https://www.ippc.int/static/media/files/publication/en/2019/02/ISPM_06_2018_En_Surveillance_2018-05-20_PostCPM13.pdf)	Thank you. Agree changed/ defined better in the second order draft
Rüegg, Simon	No	5	110	3720		3731	In animal health surveillance Rinderpest represents really an exceptional case, i.e. the only successful eradication. I think, the reader could benefit if monitoring and surveillance approaches for various classes of diseases, e.g. endemic, epidemic, high impact etc. were explained in detail as these represent a more adapted surveillance methodology.	Thanks for this suggested change. We have included some forms of surveillance systems for animal health in the second order draft though space is limited
Mason, Peter	No	5	111	3763	113	3863	(3 pages)	Thank you, the writing style has been improved in the second order draft
Shaw, Richard	No	5	111	3763	111	3763	Shouldn't the ant surveillance box example be under this section?	Thank you for your comment. Box 512 should stay in the surveillance / detection and monitoring section as it illustrates the success of eradication of invasive ants through early
Rüegg, Simon	No	5	111	3764			Active and targeted surveillance are not the same in animal health surveillance: active refers to the active search by the surveilling entity (e.g. health services), while passive refers to reporting obligation, where public participants, e.g. farmers report certain symptoms. Both are targeted at specific diseases or syndromes. A special form of surveillance is for freedom from disease, which may be interesting for protected areas threatened by IAS that are not yet present.	Thanks for this suggested change. We have added a theme on surveillance for disease freedom and syndromic surveillance in the second order draft.
Cudmore, Becky	No	5	112	3548	113	3549	Missing data in column 1.	Thank you, this has been corrected in the second order draft
Feest, Alan	No	5	113	3852	113	3852	decimate means to reduce by 1/10 th ! Devastate is a suitable alternative?	Thank you for your suggestion. We have included it in the second order draft
Rüegg, Simon	No	5	114	3868			As mentioned above, passive surveillance (here named general surveillance) in animals is targeted, i.e. symptoms and diseases that must be reported are specified. Admittedly they are relatively generic, but still with a disease target. It think this is rather important, because in the context of complex adaptive system surveillance in one health the reflection is to move from disease indicators towards health indicators that have a broader, more generic meaning for the system (e.g. productivity, growth rates, etc.) and are earlier warning signals.	Thank you for your comment. Agreed, we have defined passive surveillance for the animal health sector in the second order draft
Rüegg, Simon	No	5	114	3904			When referring to the NZ surveillance, it should be noted that it is quite a unique political and geographic situation where such a system is practical and supported by the topography. African Swine Fever in Eurasia shows, that the challenges are very different under continental conditions and that probably surveillance strategies need to be implemented differently.	Thank you for this comment. Although we agree, unfortunately, we have chosen not to add this level of detail to the chapter.
Smith, Emily	No	5	115	3925	115	3930	Surveillance programmes can also be designed to link with horizon scanning work. Once the priority 'high risk' have been identified, the general public can be told how to identify these species, helping to provide targeted surveillance for species identified as posing the greatest threat of introduction.	Thank you for your suggestion. We have included it in the second order draft
Faulkner, Katelyn	No	5	115	3927	115	2930	Alien quarantine pests are invasive species that simply have economic impacts, so surveillance for them would be similar for other invasive species	Thank you for your comment. Agree this has been stated in the text
Mill, Aileen	No	5	116	3979	116	3979	In the context of figure 5.1 please consider also using the term complete removal - eradication has been used both specifically and generally and not consistently. Complete removal allows us to talk about 'eradication' of established populations. Should consider teh 7 criteria assessed for feasibility in Booy et	Thank you for your comment. The term 'eradication' is used accordingly with its definition in the glossary.
Mill, Aileen	No	5	116	3980	116	3980	This is confusing 'IAS has established and becomes invasive' do you mean established and spreading?	Thanks for this suggested change. We have included it in the second order draft
Schaffner, Urs	No	5	116	3980	116	3980	See comment above regarding EDRR; as part of spatially explicit management strategies, eradication (as part of EDRR) can be a management goal at subnational level. I suggest adding this here or use the term 'area-wide management' which is introduced in the list of key terms and definitions but not used	Thank you for this suggestion, we have included it in the second order draft.
Mill, Aileen	No	5	116	3982	116	3987	Also considered a method for detection and for monitoring to establish that eradication has been successful.	Thanks you for your comment. Agree this has been discussed under surveillance, detection and monitoring sub section
Mill, Aileen	No	5	116	3988	117	3996	Surveillance at appropriate level to allow detection + a management / contingency plan already in place to be implemented. Also critical to the response is the need for clear lines of responsibility and decision making to respond in a timely fashion.	Thanks for this suggested change. We have included it in the second order draft
Sharma, Gyan	No	5	117	3995	117	3996	Please add- "A recent study by Goyal and Sharma (2019) suggest how habitat based management of species like Lantana camara which show tremendous plant structural variability can be managed in natural landscapes". Reference: N. Goyal, G. Sharma It takes two to tango: variable architectural strategies boost invasive success of Lantana camara L. (sensu lato) in contrasting light environments <i>Biological Invasions</i> , 21 (1) (2019), pp. 163-174	Thank you for your suggestion. We have included it in the second order draft
Mill, Aileen	No	5	117	3998	117	4006	Is this example pre establishment - (so defined as eradication) or is this an 'eradication' attempt of an established species.	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Mill, Aileen	No	5	117	3998	117	3998	This is true of all management not just eradication.	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft
Dudgeon, David	No	5	118	4041	118	4041	Is fresh water inundation or spraying meant here?	Thank you. The reference does not clarify this point (see https://doi.org/10.1016/j.aquaculture.2012.07.038)
Mill, Aileen	No	5	118	4045	118	4046	Needs citation. Which database is this from?	Thank you for your comment. A reference was added in the second order draft
Mill, Aileen	No	5	119	4063	119	4081	See also Robertson et al 2019 for review http://www.issg.org/pdf/publications/2019_Island_Invasives/PrintFiles/Robertson.pdf	Thank you for this suggested reference. We have included it in the second order draft
Mill, Aileen	No	5	119	4064	119	4046	Certain - needs elaboration on	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Brooks, Thomas	No	5	119	4072	119	4081	Add text here on the indicator of Trends in invasive alien species vertebrate eradications (see https://www.bipindicators.net/indicators/trends-in-invasive-alien-species-vertebrate-eradications)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions
Will, David	No	5	119	4072	119	4081	The DITSE data summarised here is out of date, database was updated in 2019, and does not appear to reflect some of the recommendation provided in Holmes et al 2019 about data quality parameters for summarizing these data. Please reach out to us at science@islandconservation.org so we can provide the appropriate summaries.	Thank you for your suggestion. We have included it in the second order draft
Mill, Aileen	No	5	119	4083	119	4091	Holmes, N.D., Keitt, B.S., Spatz, D.R., Will, D.J., Hein, S., Russell, J.C., Genovesi, P., Cowan, P.E. and Tershy, B.R., 2019. Tracking invasive species See Mill et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12186 for review of mammal eradications in GB (details in table). And Richardson et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12182 for a systematic review of the use of Adaptive management in IAS mammal management.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Pan, Xubin	No	5	122	4167	122	4167	Please delete "Taiwan", as "Taiwan is an indispensable part of China and has never been a country."	Thanks for this suggested change. We have included it in the second order draft
Mill, Aileen	No	5	122	4187	122	4188	This sentence is not needed.	Thanks for this suggested change. We have included it in the second order draft
Mill, Aileen	No	5	123	4217	123	4257	Should this section also deal with the social acceptability of the chosen control methods for eradication.	Thank you for the suggestion. Social acceptability of the certain control methods are discussed in 5.5.4.1. and 5.6.
Faulkner, Katelyn	No	5	123	4225	123	4228	The programme referred to here is the Working for Water programme. The aim of the programme is not eradication, but rather control of widespread invasive plant species. The Working for Water programme funds a separate unit which aims, in part, to eradicate emerging invaders. Information on this unit can be found in the following reference: Wilson, J. R. U., Ivey, P., Manyama, P., & Nnani, I. (2013). A new national unit for invasive species detection, assessment and eradication planning. <i>South African Journal of Science</i> , 109(5/6), 20120111	Thank you for the comment. We referred to the paper, and re-worked on the text which now sit in the control subsection of the second order draft

Takahashi, Yasuo	No	5	123	4237	123	4239	Recommend to cite the following paper to support the statement "the observable consequences can be complicated if the eradicated IAS have commercial, cultural or spiritual values": Kelschert et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. <i>Environ. Sci. Policy</i> . https://doi.org/10.1016/j.envsci.2020.06.014 .	Thank you for the comment. We have included it in the second order draft
Mill, Aileen	No	5	124	4241	124	4242	A bold statement. Is eradication of IAS not a conservation action? Note also the extinction preventions paper from Bolam et al 2020 https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12762	Thank you for the comment. We have included it in the second order draft
Shaw, Richard	No	5	124	4252	124	4252	"near eradication" not eradication.	Thanks for this suggested change. We have corrected it in the second order draft.
Mill, Aileen	No	5	124	4260	125	4293	Containment is a long term management measure. Refer to fig 5.1	Thank you for this suggestion. We have included it in the second order draft.
Mill, Aileen	No	5	124	4260	124	4260	Problem with the terminology here. 'containment, management or eradication responses' this sentences needs reconsidered.	Thanks for this suggested change. We have included it in the second order draft
Mill, Aileen	No	5	124	4262	124	4264	There is a problem here as containment is only for established species and eradication is for not yet established (Fig 1) need to decide on terminology. State what the management objective of containment is.	Thanks for this suggested change. We have included it in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	124	4304	124	4304	to correct <i>Lissachatina fulica</i>	Thanks for this suggested change. We have included it in the second order draft
Caplat, Paul	No	5	125	4295	126	4350	I am probably biased, but I find it weird that for a global assessment of cases where control is needed and implemented, there is no mention of invasive trees. See ample literature by Pauchard, Nunez etc., with huge implications for the economy.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Mill, Aileen	No	5	125	4295	126	4350	Control needs to be better defined. What is the management objective? How does the thinking here relate to figure 5.1? I'd argue that ongoing control is part of a long term management strategy and that a management objective of maintenance of a population within tolerable thresholds (e.g a specific density or linked to a specific impact) is needed to define the management. Control is too vague. Please see Robertson et al 2020 https://link.springer.com/article/10.1007/s10530-020-02298-2 for management terminology and Mill et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12186 . fig 1 for an example of linking	Thank you for your comment. Control section was modified in the second order draft
Mill, Aileen	No	5	125	4295	126	4350	The examples given need to be explained in relation to the management objective and how long term management was the best strategy.	Thanks for this suggested change. We have included it in the second order draft
Damaseno, Gabriella	No	5	125	4320	126	4350	In my opinion, control practices of traditional communities could be better presented within a new subtopic. Or maybe be included as examples using text box.	Thank you for this suggestion. We have chosen not to include it in the assessment to follow the same structure in the section
Mc Kay, Fernando	No	5	125	4321	125	4321	Line 4321, Instead of <i>Eichhornia crassipes</i> it should be <i>Pontederia crassipes</i> . <i>Pontederia</i> was recently recircumscribe to include <i>Eichhornia</i> species (Marco O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of <i>Pontederiaceae</i>	Thank you for this comment. We have included it in the second order draft
Shaw, Richard	No	5	126	4336	126	4339	I'm not sure this has a place in the control section.	Thank you for making this point. It does not seem to require changes to the text.
Marchante, Elizabete	No	5	126	4352	133	4621	CBC of invasive plants is not equally used around the world, with some continents, such as Europe, using it only recently - suggest to include some reference to this, e.g., line 4393. A REFs on this could be eg Shaw et al 2018 https://doi.org/10.1007/s10526-017-9844-6	The history of use is much broader than this as shown in Winton et al. 2014, however it is true the EU had been the slowest to adopt which has been added in the second order draft
Mill, Aileen	No	5	126	4352	133	4621	CBC doesn't need to be explained again - this was done in a previous section. The projects here should be presented in terms of the management objectives, rationale for choosing this management option and assessment of if the management methods has worked, given this background. This section is not currently focuses enough just on the case studies and some general background to the method overlaps with the earlier section. Revision to focus on the case studies is	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	127	4365	127	4367	This should not be in the classical biocontrol section.	Thank you for this suggestion, we have included it in the second order draft.
Government of Germany	Yes	5	128	4404	128	4404	What is "NZ"? It would be helpful to spell out such acronyms for ease of reading.	Thanks for this suggested change. We have included it in the second order draft
Pan, Xubin	No	5	128	4441	128	4441	Please delete "Taiwan", as "Taiwan is an indispensable part of China and has never been a country."	Thanks for this suggested change. We have included it in the second order draft
Pan, Xubin	No	5	128	4443	128	4443	Please change "Taiwan" to "China", as "Taiwan is an indispensable part of China and has never been a country."	Thanks for this suggested change. We have included it in the second order draft
Schaffner, Urs	No	5	129	4450	129	4452	I suggest reviewing also some more recent literature, e.g. van Wilgen et al. (2020) and Schaffner et al. (2020) both in Current Opinion in Insect Science.	Thank you for this suggestion. We have included it in the second order draft.
Flevaris, Spvridon	No	5	129	4454	132	4570	Same comment as for line 2792 above.	Thank you, this has been adjusted in the second order draft
Mason, Peter	No	5	129	4464	132	4570	Box 5.15 is rather lengthy (3 pages). While interesting reading it should be parsed to no more than 1 page, only mentioning the key points relevant to rabbit	Thanks for this suggested change. We have included it in the second order draft
White, Michael	No	5	129	4464	129	4464	Rabbits were introduced to Australia by British aristocrats (n=24 rabbits)	Thank you for your comment
Marterer, Beloni Terezinha Pauli	No	5	129	4468	129	4468	check spelling of "anishi"	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	132	4575	132	4575	Could reference somewhere Clewley, G. D., Eschen, R., Shaw, R. H., & Wright, D. J. (2012). The effectiveness of classical biological control of invasive plants. <i>Journal of Applied Ecology</i> , 49(6), 1287-1295.	Thank you for this suggestion, we have included it in the second order draft.
Shaw, Richard	No	5	132	4576	132	4577	Triple bottom line?	Thanks for this suggested change. We have corrected it in the second order draft.
Faulkner, Katelyn	No	5	132	4591	132	4593	This information has been provided elsewhere in the chapter, in the biocontrol section under the technology section. Consider removing the repetition.	Thanks for this suggested change. We have included it in the second order draft
Government of Germany	Yes	5	132	4591	133	4595	The statement "Historically there have been a small number of high profile early cases of negative direct impacts upon non-target native species from released generalist predatory "biocontrol agents" (e.g. the release of cats and mongoose on islands and cane toads against agricultural pests). These were all at a time when the concept of biological control was applied in an unregulated way, that is there was no required risk assessment." does not hold true in general. There are several recent negative examples known, which should be analysed and discussed, e.g. release of coccinellid beetle <i>Harmonia axyridis</i> in Europe.	Thanks for this suggested change. We have included it in the second order draft
Schaffner, Urs	No	5	132	4591	133	4603	Repetitive, as mentioned above. If the target pests were native species, then these cases should not be discussed in the context of CBC.	Thank you for this suggestion, we have included it in the second order draft.
Schaffner, Urs	No	5	133	4614	133	4618	Ray (2011) tested augmentative releases of a biocontrol agent, not an integrated approach. Rather, I suggest referring to the integrated weed management work done in "Working for Water" in South Africa	Thank you for your comment. We have referred to Working for Water program in 5.5.6
Shaw, Richard	No	5	133	4614	133	4618	This looks like an afterthought and does not sit well at the end.	Thank you for this suggestion, we have included it in the second order draft.
Mill, Aileen	No	5	133	4623	134	4640	I didn't follow this section. Perhaps review the studies were extinctions were prevented due to IAS management from Bolam et al 2020 https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12762	Thank you for your comment. We improved this section in the second order draft but we cannot add additional text to the chapter due to word length restrictions.
Government of Germany	Yes	5	134	4642	134	4642	The subchapter on "management-costs" has not been written yet. When preparing this chapter, it is recommended to contrast the management costs with the estimated benefits of IAS control as discussed in other chapters in order to highlight that often, measures are cost-effective and benefits outweigh the costs. For an interesting case study, please consult: Jardine, Sunny L., Sancharioo, James N. (2018): Estimating the Environmental Economics and Management 87, pp. 242-257. DOI: 10.1016/j.teen.2017.07.004.	Thanks for this suggested change. We have included it in the second order draft, section 5.5.8.
Ahimisibwe, Inran	No	5	134	4645	134	4646	Environmental Protection Information Centre (EPIIC)-NonGovernmental Organization in partnership with the Institute for Global Environmental Strategies (IGES) and local authorities of Jinja and Buikwe districts in Uganda are supporting farmers and local communities in the lake Victoria catchment to identify pathways of <i>Eichhornia Crassipes</i> (water hyacinth weed) and control its spread on the lake. The project aims at reversing soil nutrients loading which triggers the growth and spread of Water Hyacinth Weed, through treatment of farmers' crop fields in the surrounding watersheds and landing sites with Vetiver grass (<i>Vetiveria zizanioides</i>) hedgerows. At the same time, Vetiver hedgerows block and retain nutrients loaded runoff behind the hedge hence enhancing soil nutrients and moisture retention levels in crop fields, thus mitigating the effects of climate change, boosting crop yields and food security. The project was supported financially by Satoyama Development Mechanism (SDM) to establish a 2-ha Vetiver grass nursery (Mother garden) in Kikondo village in March 2019 that serves as a source of plant material. Preliminary findings in the following link shows the effectiveness of nature based Vetiver grass technology on controlling nutrients loaded sediment flowing into the lake through runoff. https://u.peludink/publink/show?code=XZKXsFXZ53JGhQb35f1YX4pc5GrVzpzMI7 Vetiver slips are offered to farmers free of charge. Hands-on training in a field set-up for farmers and Village Based Trainers (VBT) was carried to equip them with skills for pegging out contour lines in their fields, planting and maintaining Vetiver hedgerows. A total of 4,870 farmers (2,690 men, 1,450 women and 730 youth) has benefited from the training program so far. Establishment of Vetiver grass hedgerows in crop fields and on landing sites is implemented in all the five villages targeted by the project initially. Many farmers have adopted Vetiver Grass Technology (VGT). Kikondo has 1,563 farmers that have adopted VGT, the highest number among the five villages participating in the project. Tongolo has 1,118 farmers, Ripon has 821 farmers, Wanyange 233 farmers and Masse has 1,646 farmers that use vetiver hedgerows in their crop fields. see the following link for	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Smith, Emily	No	5	134	4647	5	4656	In this section could refer to the national biosecurity campaigns used to engage the public e.g. success of the CCD campaign in New Zealand and the UK	Thank you for your comment. We have included as many examples as possible in this second
White, Michael	No	5	134	4654	134	4656	Good to include failures - add in poor communication as one reason	Thank you for your comment. We have included as many examples as possible in this second
Brooks, Thomas	No	5	134	4658	134	4676	Useful discussion of ISSG.	Thank you for your comment
Shaw, Richard	No	5	134	4658	134	4658	no mention of GISP in the historical efforts section	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We have chosen some networks to exemplify their role to assist in management
Verbrugge, Laura	No	5	134	4658	136	4743	I am involved in a research effort to map organisations and networks for invasive species research and management. The findings (early 2021) could be of importance to include in this section as now it contains some examples only. You can contact Laura Garzoli (laura.garzoli@cnr.it) and Laura Verbrugge	Thank you for your comment. We have included as many examples as possible in this second order draft
Shaw, Richard	No	5	135	4673	135	4673	If we are including resources in the network section than CAB's ISC also provides an open access compendia of thousands of IAS datasheets.	Thank you for this suggestion, we have included it in the second order draft.
Damaseno, Gabriella	No	5	136	4320	136	4321	I think summary tables, similarly to the ones presented at the end of the item 5.4 would be of great value for the reader.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Mill, Aileen	No	5	136	4745	137	4775	There is a history of local action groups in the UK where IAS control is 'bottom up' self organising groups seeks funds to support action they deal necessary. See some details in Mill et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12186 . GB NNSP support local action groups and facilitate networking between them/ sharing of best practise etc. Also see the work of EU LIFE funded Red Squirrels United project. https://www.redsquirrelsunitied.org.uk/	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Germany	Yes	5	136	4746	137	4775	As "citizen science" can play a major role in generating societal awareness for environmental issues, it is suggested to broaden discussions in this subsection.	Thanks for this suggested change. We have included it in the second order draft
Shaw, Richard	No	5	136	4746	136	4746	This section needs a little introduction before examples are given.	Thank you for this suggestion, we have included it in the second order draft.
White, Michael	No	5	137	4768	137	4772	You can eat lionfish	Thanks for this comment. We have included it in the second order draft
Marchante, Elizabete	No	5	137	4777	137	4793	Table 5.10 (and the corresponding text) could also include funding (including for human resources), as this is a major constraint on management. I think that it is not only funding (or lack of it) per se, but also the way in which public (and even private) funding is structured (at least in some countries) that is not suitable for IAS management, particularly in terms of flexibility (to allow adaptive management), time scale (often very short, although some tools start to change, for example, LIFE projects in the EU), public procurement procedures (often too long for a rapid response), low value for more specific and dedicated methods, etc. Perhaps some reference to this could be included? There is a need for some "pressure" to change the way financing is structured (at least in some countries).	Thanks for this suggested change. We have included it in the second order draft

Mill, Aileen	No	5	137	4777	142	4976	Agree with the points made in this section. I think another important point is transparency and clarity of who is making decisions and when. Re. Animal management (4903) there is need to better understand and communicate around the social acceptability of managings IAS. Awareness and engagement from early states are needed - skills in conflict management are often needed by project managers as often the context can be broader than the apparent issue in hand. These issues are not unique to IAS but also wildlife management more generally.	Thank you for making this point. It does not seem to require changes to the text.
Marterer, Beloni Terezinha Pauli	No	5	137	4782	137	4782	what does NCP mean? I couldn't find the reference to the meaning of "NCP" in the text.	Thank you, this term is defined in the glossary.
Shaw, Richard	No	5	137	4792	137	4792	Inadequate funding should be added to capacity-related lines.	Thank you for this suggestion, we have included it in the second order draft.
White, Michael	No	5	138	4798	138	4803	This will worsen from 1 st January 2021 when Brexit/EU transition period ends	Thank you for making this point. It does not seem to require changes to the text.
Faulkner, Katelyn	No	5	138	4804	138	4807	This is not an example of a geo-political boundary	Thank you for the comment. We revised the title of the subsection in the second order draft
Government of Germany	Yes	5	138	4819	138	4821	The statement "Therefore, in contrast to 'white lists' that reject the introduction of all species except for those are considered low-risk, dirty lists are unlikely to serve as an effective prevention measure." should be discussed in more detail in the context of the new EU Regulation No 1143/2014 on invasive species, which only uses a "dirty list" as basis for prevention measures etc.	Thank you for your comment. We have added a short mention to the use of dirty lists however, we cannot add additional text to the chapter due to word length restrictions.
Maillard Jean-Francois	No	5	138	4819	138	4819	in 2018 and 2019 France adopted white lists for its overseas territories : Martinique, Guadeloupe, La Réunion, Guyane Française (and in the future in Saint Martin and Saint Pierre et Miquelon), see for example https://www.legifrance.gouv.fr/orf/id/JORFTEXT000036610617/	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
White, Michael	No	5	139	4831	139	4832	Small countries struggle with overwhelming bureaucracy – what to prioritise	Thanks for this suggested change. We have included it in the second order draft
White, Michael	No	5	139	4842	139	4845	Profit over nature	Thank you for your comment
Niemiec, Rebecca	No	5	139	4847	139	4860	This seems very industry focused, but there is a growing body of research on how engaging private landowners is also critical for invasive species management, especially in places like New Zealand (e.g. Glen et al. 2017, "Landholder participation in regional-scale control of invasive predators," Biological Invasions). Maybe this is not the scale you want to focus on here though.	Thank you for the comment. We have discussed private landowner engagement in the second order draft
White, Michael	No	5	139	4856	139	4860	'Polluter pays' principle might be a useful shift	Thank you for the comment. "Polluter pays" principle and relevant policy options will be discussed in Chapter 6.
Linnamägi, Merike	No	5	139	4872	140	4875	As all previous examples had location mentioned it would be useful to add it here as well (as well as possibly mention the native native species it was confused	Thanks for this suggested change. We have included it in the second order draft
White, Michael	No	5	140	4889	140	4891	And unannounced releases by government (public assumed ignorant)	Thank you for your comment
White, Michael	No	5	140	4893	140	4901	A real issue for subsistence communities, especially where nature is sacred	Thank you for your comment
Bliss, Cebuan	No	5	140	4903	140	4914	see re animal rights - In general, there is a lack of discussion of the welfare implications of IAS management. Also, an animal rights perspective which takes into account IAS is lacking or at least is only seen as negative - i.e. animal rights views got in the way of IAS management, but there may also be positive implications from taking into account the rights of IAS (see Litin, 2010; Donaldson and Kymlicka, 2011; Sagoff, 2011; Büscher, 2019; Cowan et al., 2011)	Thank you for your comment, this topic was covered in Chapter 1
White, Michael	No	5	140	4907	140	4912	I think Britain had a grey squirrel pelt buy-back scheme in 1960's; they outcompeted red squirrels	Thank you for your comment. We cannot add additional text and examples to the chapter due to word length restrictions.
García Martínez, Margarita	No	5	141	4620	141	4621	For the comment about more potential examples, I would not include more examples as indicated because the text is already quite long, or perhaps I could mention them in a very general way in 2 lines with their respective reference for consultation.	Thank you for your comment, agreed
Catford, Jane	No	5	141	4623	general		Might be helpful: Funk, J. L., Cleland, E. E., Suding, K. N. & Zavaleta, E. S. (2008) Restoration through reassembly: plant traits and invasion resistance. Trends in Ecology & Evolution, 23, 695-703. Laughlin, D. C. (2014) Applying trait-based models to achieve functional targets for theory-driven ecological restoration. Ecology Letters, 17, 771-784.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Niemiec, Rebecca	No	5	141	4915	141	4923	Communication to the public? Or to whom? See Warner and Kinslow, 2013, Public Understanding of Science, for a case study of how unsuccessful science communication prevented an effective invasive species control program	Thanks for this comment. We have re-worked the paragraph in the second order draft
White, Michael	No	5	141	4916	11	4920	Language to be culturally acceptable, especially for IPLCs	Thanks for this comment. We have included it in the second order draft
Mill, Aileen	No	5	141	4922	141	4922	Issues related to management of species and species charisma are reviewed in Jaric et al 2020	Thank you for this suggestion. The reference was added in the second order draft
White, Michael	No	5	141	4925	141	4933	Very important where central remote governments won't listen to remote archipelagic islands	Thank you for your comment.
Verbrugge, Laura	No	5	141	4931	141	4933	The two final sentences express strong views on stakeholder engagement but lack references to back them up. I would like to see what literature and or experiences those statements are based on. But even then, I would argue that there are examples that support the opposite view. Generally the Assessment as a whole seems to lack a review of studies on public perceptions of IAS impacts and IAS management.	Thank you, stakeholder engagement are treated in Chapter 6
Linnamägi, Merike	No	5	141	4935	142	4876	For the ease of reading it would be better to list the ISPM standards in the numerical order under the subheadings. E.g. General ISPM 1, 5, 20 (not 1, 20, 5), for pest status 2, 8, 11, 19 (not 2, 11, 8, 19) and last one 4, 6, 9 (not 6, 9, 4).	Thank you for this comment. We have included it in the second order draft
White, Michael	No	5	141	4935	142	4976	Such things are rarely in indigenous languages	Thank you for your comment. The text was re-arranged and changed to another section in the second order draft
Catford, Jane	No	5	142	4637	142	4640	off target impacts e.g. weed shaped holes - reinvasion by other weeds, or control of species having negative effects on other trophic levels E.g. Buckley, Y. M., Bolker, B. M. & Rees, M. (2007) Disturbance, invasion and re-invasion: managing the weed-shaped hole in disturbed ecosystems. Ecology Letters, 10, 809-817. Lindenmayer, D. B., Wood, J., MacGregor, C., Buckley, Y. M., Dexter, N., Fortescue, M., Hobbs, R. J. & Catford, J. A. (2015) A long-term experimental case study of the ecological and cost effectiveness of invasive plant management in achieving conservation goals: Bitou Bush control in Booderee National Park in eastern Australia. PLoS ONE, 10, e0128482. Lindenmayer, D. B., Wood, J., MacGregor, C., Hobbs, R. J. & Catford, J. A. (2017) Non-target impacts of weed control on birds, mammals, and reptiles. Ecosphere, 8, e01804. O'Loughlin, L. S., Gooden, B., Foster, C. N., MacGregor, C. I., Catford, J. A. & Lindenmayer, D. B. (2019) Invasive shrub re-establishment following management has contrasting effects on biodiversity. Scientific Reports, 9, 4083.	Thank you for your comment. We improved this section in the second order draft but we cannot add additional text to the chapter due to word length restrictions.
Mill, Aileen	No	5	143	4977	143	4977	What is meant by context specific challenges?	Thank you. Challenges based on different management contexts. The second order draft discusses management of different taxa and across ecosystems for example, eradication of terrestrial plants and mammals, aquatic plants, and the scenarios under which it was achieved.
Mill, Aileen	No	5	143	4985	143	4986	There is some evidence of this from Booy et al 2018 and 2020	Thank you for your comment, we have added these references in the second order draft
Takahashi, Yasuo	No	5	143	4985	143	4985	Suggest insertion after the sentence "An analysis of ... (Pluess, Jarosik et al., 2012)": "IAS eradication in production lands and seas often faces opposition from local people who rely on IAS harvest and use for their livelihood, particularly in developing countries (Kelsch et al. 2020) Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy.	Thank you, this has been added in the second order draft
Dudgeon, David	No	5	143	4987	143	1988	The meaning of this sentence is not very clear. And it might be helpful to explain how the freshwater fishes had been eradicated. This is not easy to	Thank you, the sentence has been deleted from the second order draft
Rüegg, Simon	No	5	143	4999			The use of the term prevention in the context of diseases is not straight forward. As pointed out in Haider et al 2020 in press Frontiers in Public Health, prevention of spillover from wild species into humans or domestic animals (like SARS-CoV2) is a different task than preventing farmers to contract brucellosis, a classic zoonosis. While the first requires serious policy changes, the latter can be covered largely by behavioural change. In other words, a vaccine represents a preventive measure for endemic diseases, while prevention of emerging pandemics requires different land use, extraction policies, transportation intensities. And now even less attention on what caused zoonotic species jump in the first place: habitat loss	Thank you. The context of this paragraph has since changed in the second order draft. We do not discuss the role of prevention in the management of zoonotic diseases now in the manner the reviewer took exception to
White, Michael	No	5	143	4999	143	5003	Hence the need for site by site risk assessments	Thank you, this theme is covered in other sections of the second order draft
White, Michael	No	5	143	5014	143	5016	As with parts of section 5.5.5 (animal management) the issues raised in 5.6.1.2 are not unique to IAS management and value based management of a well developed part of wildlife management in a broader context.	Thank you for your comment. Region by region perhaps but not site by site
Mill, Aileen	No	5	144	5018	144	5042	Suggest to add a citation to support the statement "This context dependency ... generally prevent effective management"; Kelsch et al., 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Takahashi, Yasuo	No	5	144	5021	144	5024	Suggest to add a citation to support the statement "This context dependency ... generally prevent effective management"; Kelsch et al., 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy.	Thank you, added in the second order draft
White, Michael	No	5	144	5024	144	5025	Spiritual	Thank you, this has been added in the second order draft
Takahashi, Yasuo	No	5	144	5025	144	5025	Suggest insertion of a sentence after "These conflicts in values ... (Estevez et al. 2015): Furthermore, several factors affect these value perceptions, such as people's beliefs, knowledge and use of IAS, traits of IAS, effects of the invasion, social and cultural context, landscape context, and policy context (Shackleton et al. 2019. Explaining people's perceptions of invasive alien species: A conceptual framework. J. Environ. Manage. 229, 10–26.	Thank you, this is added in the second order draft
Shaw, Richard	No	5	144	5030	144	5030	As well as between nations and regions.	Thank you, added in the second order draft
Ahimbisaw, Imran	No	5	144	5044	147	5056	Authors of chapter 5 should make a clear distinction between management of programs designed to control and eradicate IAS and management of IAS. The latter is a misinterpretation of the convention on biological diversity. Intentional introduction of IAS for short term economic gains at the expense of biological diversity is among other things what triggered the development of CBD. For instance introduction of the predator Nile perch in Lake Victoria for economic purposes in 1950s resulted in extinction of native endemic fish species of haplochromine Cichlids which feed on detritus and algae hence controlling the growth of algae in the water. The disappearance of most algae eating cichlids allowed algae to flourish and when it dies it sinks in the water where it's decomposition absorbs oxygen available for aquatic life including the Nile perch itself. Some places in the lake have been declared dead zones. CBD was developed to address such environmental problems and not to capitalise on ecological menaces. In future, terms of reference for authors should emphasise consistency with CBD articles. Furthermore authors may consider to present appropriate management options under each identified IAS, since not all IAS scenarios require similar management responses, in order to make the report easy to use rather than describing an exhaustive long list of management practices that is more of academic theories than for implementation purposes.	Thank you. No Nile perch reference was provided so we could not include the extra details without a reference
Mill, Aileen	No	5	144	5044	147	5048	Not all of the examples in the table were intentionally introduced for beneficial purposes (and this is generally a broad claim....could suggest many species introduced to the UK - deer, squirrels, coypu etc....for beneficial purposes). Cats were introduced as biological control - this is dealt with in another section.	Thank you. We don't include cats as the pet movement and trade is a whole different story
Shaw, Richard	No	5	144	5044	144	5044	Tempting to add in the mink story wrt EU IAS Regulation! Or Hedgehogs on Uist.	Thank you for your comment. We cannot add additional text to the chapter due to word length

García Martínez, Margarita	No	5	145	4792	145	4792	Table 5.10 About capacity-related. At this point I would consider "Inadequate communication and Lack of expertise" in the pathways. At least in Mexico, communication between institutions to detect pathways and/or take responsibility for managing them is still a problem. On the other hand, sometimes there are not enough specialists to determine the presence of pests or it takes a long time to determine them at our borders.	Thank you for the comment. We agree that inadequate communication and lack of expertise can inhibit pathway management. We revised the text and table accordingly in the second order draft
García Martínez, Margarita	No	5	145	4792	145	4792	Table 5.10 About Societal. At this point I would consider "Lack of awareness" in the pathways. I believe this is where more awareness is needed to avoid the movement or introduction of IAS.	Thanks for this suggested change. We have included it in the second order draft
Schaffner, Urs	No	5	145	5047	145	5048	Table 5.11: Prosopis example needs revision; make clear that some statements refer to the situation in Kenya. Castillo (2019) is missing in the reference list. The last sentence appears to imply that the situation in India is different; however, charcoal is also made from Prosopis by local people in Kenya, but a national management plan can nevertheless be developed.	Thank you for your comment. This has been addressed in the second order draft.
Schaffner, Urs	No	5	147	5049	147	5056	The resolution of conflict should be elaborated in more detail, because it is one of the main problems regarding sustainable management of invasive weeds (as most exotic plant species have been deliberately introduced).	Thank you for your comment. Due to the lack of space prevents us doing this and the reviewer provides no extra refs to include
Takahashi, Yasuo	No	5	147	5059	147	5059	Conflicts in perceptions ... can be substantiated by referring to the following paper: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy. https://doi.org/10.1016/j.envsci.2020.06.014 .	Thank you, this is added in the second order draft
Mill, Aileen	No	5	147	5068	147	5079	There needs to be some IAS context in this paragraph.	Thank you. This is re-written in the second order draft
White, Michael	No	5	147	5078	147	5079	Consumer dependent	Thank you very much. This is added in the second order draft
Mill, Aileen	No	5	148	5093	148	5102	I find this section rather weak - what is novel here? Need to address public acceptability of methods in more detail..	Thank you. This is noted
Guareschi, Simone	No	5	148	5104	149	5155	Knowledge gap barriers to implementing management The presence of new invasive species represents a great challenge for the biological monitoring of freshwater ecosystems worldwide. Biological invasions could have major implications for the management and conservation of freshwater systems if they lead to a misclassification of waterbodies. Briefly, fish, macrophytes and macroinvertebrates are among the mostly widely used biological indicators in rivers. However, IAS can be very abundant and/or cryptic in some rivers and directly affect biotic index calculation and reliability (Gabriels et al. 2005; Cuk et al., 2019; Guareschi and Wood, 2019). What can we do about IAS when biomonitoring? How to integrate IAS in river biomonitoring systems when they share the same taxonomic level (family) as native taxa? Moreover, the integration of their presence and associated information into official biomonitoring and management frameworks has been applied heterogeneously internationally (Boon et al. 2020). The topic should be at least briefly discussed as a clear example of the contrasts and knowledge gap between biological invasions and resource management. Please see: - Boon, P.J., Clarke, S.A. & Copp, G.H. (2020). Alien species and the EU Water Framework Directive: a comparative assessment of European approaches. <i>Biological Invasions</i> , 22, 1497–1512. - Gabriels et al. 2005. Implications of taxonomic modifications and alien species on biological waterquality assessment as exemplified by the Belgian Biotic Index method. <i>Hydrobiologia</i> , 542(1), pp.137-150. - Guareschi S & PJ Wood (2019). Taxonomic changes and non-native species: An overview of constraints and new challenges for macroinvertebrate-based indices calculation in river ecosystems. <i>Science of the Total Environment</i> 660, 40-46 - Cuk et al. 2019. Biocontamination of benthic macroinvertebrate assemblages in Croatian major rivers and effects on ecological quality assessment. <i>Knowledge</i>	Thank you, this has been added in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	148	5121	148	5121	what does IAP means? I couldn't find the reference to the meaning of "IAP" in the text.	Thank you, this has been corrected in the second order draft
Damasceno, Gabriella	No	5	148	5126	148	5126	I think the concept of weed-shaped hole, by Buckley and collaborators (2007) would be another good example for this topic. https://doi.org/10.1111/j.1461-0248.2007.01067.x	Thank you, this has been added in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	149	5143	149	5143	what does UAV means? I couldn't find the reference to the meaning of "UAV" in the text.	Thank you, acronyms have been spelled out in the second order draft
White, Michael	No	5	149	5144	149	5151	Many people do not trust American industrial-pharmaceutical companies and political lobbyists	Thank you, perception have been added to the chapter and are also covered in chapter 1 and 6 of the second order draft
Shaw, Richard	No	5	149	5151	149	5151	Could mention co-design here.	Thank you, this is addressed in the second order draft
Peterson, Garry	No	5	149	5158	149	5169	Along with describing how modes and scenarios have been used. It would be also useful to assess what is missing from existing scenarios and what types of scenarios could be developed that would be more useful in helping respond to IAS by different types of response. In the IPBES models and scenarios assessment, we identified that most models were focussed on decision making, but there were few tools available for problem definition, implementation or evaluation. There should also be a consideration on how well existing tools bridge different academic disciplines, connect to practitioner expert knowledge outside academia (e.g. farmers, urban planners, shipping companies, logistics operators, etc), as well as bridge to indigenous and local knowledge.	Thanks for this suggested change. We have included it in the second order draft
Peterson, Garry	No	5	149	5158	149	5169	It would be useful here to discuss how the lack of consideration of IAS in current global IAM models (such as IMAGE) and global scenarios (such as SSPs) is problematic or not. My understanding that their absence is a problem. In particular are there outcomes or issues for IAS that are made worse because they are not included in existing models or scenarios as well as mentioning ways that IAS impacts or policies are captured in current models and scenarios.	Thanks for this suggested change. We have included it in the second order draft
White, Michael	No	5	151	5219	151	5221	This is vital	Thank you very much
Marterer, Beloni Terezinha Pauli	No	5	151	5220	151	5220	what does LIK means? I couldn't find the reference to the meaning of "LIK" in the text.	Thank you, this has been corrected in the second order draft
Mill, Aileen	No	5	151	5223	151	5228	Yes - for AM please also see also review by Richardson et al 2020 https://onlinelibrary.wiley.com/doi/abs/10.1111/mam.12182 which focusses on IAS mammals and the published project description for the CONTAIN project which uses AM. doi: 10.3897/neobiota.59.52022	Thank you, we have included it in the second order draft
Bliss, Cebuan	No	5	151	5238	152	5287	alien knowledge species may have to relocate due climate change making their native habitat unsuitable for them - they may have to live in new areas or become extinct - this is an irreversible movement	Thank you. This is covered and a reference included in the second order draft
White, Michael	No	5	151	5238	151	5246	In a financial economy everyone is competing for funding, each believes their remit is most important	Thank you. This is noted
Copp, Gordon	No	5	151	5252	152	5253	this line should be revised to include mention of pre-introduction risk assessment for aquaculture, as follows: "Horizon scanning and scenario modelling can be used to forecast/predict future changes in actual 5253 and potential IAS risks and impacts, and assessment of the potential risks of using a species in aquaculture can be undertaken to inform the decision on whether or not to introduce the species using the ENSARS scheme (Copp et al., 2016a; Tarkan et al., 2020)." Copp, G.H., Russell, I.C., Peeler, E.J., Gherardi, F., Tricarico, E., MacLeod, A., Cowx, I.G., Nunn, A.D., Occhipinti Ambrogi, A., Savini, D., Mumford, J.D. & Britton, J.R. 2016a. European Non-native Species in Aquaculture Risk Analysis Scheme – a summary of assessment protocols and decision making tools for use of alien species in aquaculture. <i>Fisheries Management & Ecology</i> 23, 1–11. (doi: 10.1111/fme.12074) Tarkan, A.S., Yoğurtuoğlu, B., Ekmekçi, F.G., Clarke, S.A., Wood, L.E., Vilizzi, L. & Copp, G.H. 2020. First application of the European Non-native Species in Aquaculture Risk Analysis Scheme in Turkey to evaluate farmed non-native striped catfish <i>Pangasianodon hypophthalmus</i> . <i>Fisheries Management and Ecology</i> 27, 123–131. (doi: 10.1111/fme.12387)	Thank you for your comment, this has been changed in the second order draft
Alejandra Grez Villarroel, Audrey	No	5	152	4059	152	4062	Yes. A very relevant issue to address is the need to advance the interaction among biological invasions and other drivers of biodiversity loss (e.g., habitat loss and fragmentation).	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions and this issue is treated in chapter 3
Kühn, Ingolf	No	5	152	5019	152	5024	This is also crucial in prioritizing species for management, based on different sectoral views: Kumschick S, Bacher S, Dawson W, Heikkilä J, Sendek A, Pluess T, Robinson T, Kühn I (2012) A conceptual framework for prioritization of invasive alien species for management according to their impact. <i>NEOBOTA</i> 15: 69-100. doi: 10.3897/neobiota.15.3323.	Thank you, this theme is covered in other sections of the second order draft
Government of Germany	Yes	5	152	5274	152	5287	We encourage the authors to expand on how to address ongoing or possible climate change-induced changes to biodiversity and ecosystems. Rationale: Climate change will probably impact local species and ecosystems/protected areas. How can management (conservation) and economy respond to such processes? This discussion could also take place against the background of Figure 5.10 (p. 154).	Thank you. Without extra references from the reviewer we did not expand due to lack of space
White, Michael	No	5	153	5307	153	5310	Bring in Stockholm Resilience Centre's Planetary Boundaries concept (land-use changes)	Thank you for your comment, but this is Beyond the scope of this section and chapter.
Government of Germany	Yes	5	154	5311	154	5312	Deep orange column titled "Policy & large scale response": As you are using both terms "rehabilitation" and "restoration" in this column, kindly ensure that the terms are not being used interchangeably. Please, also check the definitions of these terms provided in the IPBES glossary and the IPBES assessment of "Land Degradation and Restoration" (2018).	Thank you. The figure has been edited in the second order draft.
Papadopoulou, Paraskevi	No	5	154	5312	154	5313	May want to consider changing the colors of the table so it is better readable.	Thank you. This is considered in the second order draft.
Shimura, Junko	No	5	155	5316	157	5404	Importance of cross-sectoral communication on alien species (environmentally hazardous living organisms), their risk on biodiversity, impacts and gap of effective measures need to be highlighted and present best practices of IAS management within the governments and beyond. e.g. Australia, New Zealand, Canada, Japan, Mexico, South Africa, USA etc., referring to OECD DPSRB model and CBD guiding principles. Relevant sections within Biodiversity Strategies and Action Plans and National Reports may provide information sources. This provides a good linkage to Chapter 6 as a conclusion of Chapter 5.	Thank you for this suggestion. Part of this was discussed in sections 5.2, 5.4 and as suggested, in the conclusion section 5.7 of the second order draft.
Mill, Aileen	No	5	155	5323	155	5358	I think this could be framed in the context of adaptive management. Modelling is key to understanding the uncertainties in the system and integration of data from management action are needed to help reduce these.	Good point. This section has been rewritten in the second order draft
Shaw, Richard	No	5	155	5353	155	5353	Could include socioeconomic and perception data uncertainty and political uncertainty and probably plenty more here or in another table not restricted to data.	Thank you, this has been added in the second order draft
Riegg, Simon	No	5	156	5362	157	5378	maybe the arguments brought in line 4999 are more adequate to be discussed here also in the broader sense of IAS.	Thank you, this has been added in the second order draft
Smith, Emily	No	5	156	5362	5	5378	There is also the difficulty that it is hard to prove that prevention measures are working. Unless you capture an IAS within a biosecurity treatment it is hard to demonstrate to the general public and stakeholders/managers that the prevention measures they are carrying out are being effective.	Thank you, this has been added in the second order draft
Mill, Aileen	No	5	156	5365	156	5378	Prevention is hard for some species - but should be focussed on in terms of horizon scanning and pathway management. What is meant by the IAS management game? And setting false expectations - this needs evidence/ citation.	Thank you, this has been corrected in the second order draft
Shimura, Junko	No	5	157	5365	157	5365	COVID should be spelled out COVID-19 based on the definition of ICTV.	Thank you, this is addressed in the second order draft
White, Michael	No	5	157	5368	157	5371	Good	Thank you.
Shaw, Richard	No	5	157	5372	157	5372	Also hard to prove value as something prevented is harder to shout about than something controlled.	Thank you for your comment.

Mill, Aileen	No	5	157	5373	157	5378	I wouldn't say this is emerging evidence - this is best practice in terms of contingency planning.	Thank you for your comment, this has been changed in the second order draft
Alaux, Christine	No	5	157	5380	157	5381	Paragraph 5.6.5.2 is not sufficiently developed.	Thank you, the content is increased in the second order draft
Guillao, Jo Ann	No	5	157	5381	157	5381	In the management of IAS, the bottom-up approach often results in success. It is good to take into consideration customary law and other cultural practices like holok. Holok refers to a distinctive pest management system practiced by the Ifugao people of Hingyon that utilizes the various parts of more than 25 plants to produce a pesticide against army worms and other rice pests. The holok, as traditionally practiced, was part of the longan di pagah, the system of Ifugao rituals on rice culture. (Source: Value Indigenous Knowledge, by TPIP, Tebteba, BSU-ISRD and PTKN)	Thanks for this suggested change. We have included it in the second order draft.
Lemaire, Charles-Frédéric	No	5	157	5381	157	5381	examples to follow could be useful here: most of time professional organizations work on guidance (extractive industries, civil engineering, forestry...) there is a lack of monitoring on how much are used and how effective these guidance documents are, but bottom up examples could be found there	Thank you, this has been added in the second order draft
Shaw, Richard	No	5	157	5381	157	5381	Presumpt this will be expanded.	Thank you for your comment.
Takahashi, Yasuo	No	5	157	5381	157	5381	Suggest to mention that local people need reward for their active participation in IAS control. It is common to pay for local people's labor contributions to eradication efforts. However, voluntary and continuous engagement of local people can be expected if the target IAS negatively affect their livelihood or other aspects of life, or if IAS harvest and use generate income, so that IAS control directly or indirectly benefits people. A possible citation: Kelsch et al. 2020. Invasive alien species and local communities in socio-ecological production landscapes and seascapes: A systematic review and analysis. Environ. Sci. Policy.	Thanks for this suggested change. We have included it in the second order draft
White, Michael	No	5	157	5381	157	5381	True.	Thank you.
Castaño Arboleda, Nicolás	No	5	157	5392	157	5393	It's not clear how IPBES recommends "utilising IAS as an economic resource to ameliorate the effects on agriculture", look like an contra information about	Thank you. IPBES does not provide recommendations but assesses the available knowledge
White, Michael	No	5	157	5402	157	5403	Right on the mark. Always ask IPLC what they want	Thank you.
Méndez-Sánchez, Federico	No	5	158	5439	158		Aguirre-Muñoz, A. Latofski-Robles M, Maldonado-Flores IY, Marichal-González AE. Literatura, arte y conservación ambiental en las islas de México. (2020). Decisio.53. Available at: https://www.crefal.org/decisio/images/pdf/decisio_53/decisio-53-art03.pdf	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Méndez-Sánchez, Federico	No	5	161	5574	161		Reference to be added: Bedolla-Guzmán Y, Méndez-Sánchez F, Aguirre-Muñoz A, Félix-Lizárraga M, Fabila-Blanco A, Bravo-Hernández E, et al. Recovery and current status of seabirds on the Baja California Pacific Islands, Mexico, following restoration actions. In: Veitch CR, Clout MN, Martin AR, Russell JC, West CJ, editors. Island invasives: scaling up to meet the challenge. Occasional Paper SSC no. 62. Gland, Switzerland: IUCN; 2019. p. 531-8.	Thank you, added in the second order draft
Government of Germany	Yes	5	173	6181	173	6181	instead of "Gollasch, S. (2006)" please write "Gollasch, S. & Nehring, S. (2006)".	Thank you for your comment, references and citations style have been harmonized in the second order draft.
Méndez-Sánchez, Federico	No	5	182	6607	182		Reference to be added: Latofski-Robles M, Méndez-Sánchez F, Aguirre-Muñoz A, Jáuregui-García C, Koleff-Osorio P, González-Martínez AI, et al. Mexico's island biosecurity programme: collaborative formulation and implementation. In: Veitch CR, Clout MN, Martin AR, Russell JC, West CJ, editors. Island invasives: scaling up to meet the challenge. Occasional Paper SSC no. 62. Gland, Switzerland: IUCN; 2019. p. 484-8.	Thank you, added in the second order draft
Méndez-Sánchez, Federico	No	5	184	6714	184		Reference to be added: Luna-Mendoza L, Aguirre-Muñoz A, Hernández-Montoya J, Torres-Aguilar M, García-Carreón JS, Puebla-Hernández O, et al. Ten years after feral goat eradication: the active restoration of plant communities on Guadalupe Island, Mexico. In: Veitch CR, Clout MN, Martin AR, Russell JC, West CJ, editors. Island invasives: scaling up to meet the challenge. Occasional Paper SSC no. 62. Gland, Switzerland: IUCN; 2019. p. 571-5.	Thank you, added in the second order draft
Copp, Gordon	No	5	205	7719	205	7720	Add the following between "AUV" and "CABI": AS-ISK Aquatic Species Invasiveness Screening Kit	Thank you. We have removed all the acronyms in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	205	7720	206	7791	To include the following abbreviations / acronyms used in Chapter 5 and that not appear in Supplementary Material: AIM Autonomous insect monitoring ; APFC Asian Pacific Forestry Commission; APFISN Asian-Pacific Forest Invasive Species Network; ASEAN Association of Southeast Asian Nations; BWC Ballast Water Management Convention; CAPS Cooperative Agricultural Pest Surveys; DAFA Department of Agriculture, Fisheries and Aquaculture of Canada; DSS Decision support systems; EMPRES-AH Emergency Prevention System for Animal Health; FTIR Fourier-transform infrared spectroscopy; GBIRD Genetic Biocontrol of Invasive Rodents; I&T Introductions and Transfers Committee; IABIN Inter-American Biodiversity Information Network; IBIS Island Biodiversity and Invasive Species Database; IMO International Maritime Organization; IOT Internet of things; IPM Integrated Pest Management; IPSN International Plant Sentinel Network; ISPM International Standards for Phytosanitary Measures; ISSG Invasive Species Specialist Group; KFRI Kerala Forest Research Institute ; MS Mass spectrometry; NAMP Australian's National Arbovirus Monitoring Programme; NBII National Biological Information Infrastructure; NIAS New Zealand's National Invasive Ant Surveillance programme; NPPOs National Plant Protection Organisations; PEI Prince Edward Island; PIAT Pacific Invasive Ant Toolkit; RFID Radio-frequency identification devices; RIDL Dominant lethal gene; SET Surveillance Evaluation Tool; SSC Species Survival Commission; TALEN Transcription activator-like effector; TWG Technical Working Group; TYC Trojan y-chromosome; USGS United States	Thank you. We have removed all the acronyms in the second order draft
Copp, Gordon	No	5	205	7733	205	7734	Add the following between "EICAT" and "EPP0": ENSARS European Non-native Species in Aquaculture Risk Analysis Scheme	Thank you. We have removed all the acronyms in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	205	7755	205	7755	to correct: ISSG Invasive Species Specialist Group	Thank you. We have removed all the acronyms in the second order draft
Marterer, Beloni Terezinha Pauli	No	5	206	7767	206	7767	to correct: ISPMs International Standards for Phytosanitary Measures	Thank you. We have removed all the acronyms in the second order draft
Mason, Peter	No	5	2240	2240	65	2241	Cane toads are not frogs!	Thank you, this has been corrected in the second order draft
Catford, Jane	No	5	general				For section on management, important to discuss off-target impacts of invasive species management. E.g. Buckley, Y. M., Bolker, B. M. & Rees, M. (2007) Disturbance, invasion and re-invasion: managing the weed-shaped hole in disturbed ecosystems. Ecology Letters, 10, 809-817. Lindenmayer, D. B., Wood, J., MacGregor, C., Buckley, Y. M., Dexter, N., Fortescue, M., Hobbs, R. J. & Catford, J. A. (2015) A long-term experimental case study of the ecological and cost effectiveness of invasive plant management in achieving conservation goals: Bitou Bush control in Booderee National Park in eastern Australia. PLoS ONE, 10, e0128482. Lindenmayer, D. B., Wood, J., MacGregor, C., Hobbs, R. J. & Catford, J. A. (2017) Non-target impacts of weed control on birds, mammals, and reptiles. Ecosphere, 8, e01804. O'Loughlin, L. S., Gooden, B., Foster, C. N., MacGregor, C. I., Catford, J. A. & Lindenmayer, D. B. (2019) Invasive shrub re-establishment following management has contrasting effects on biodiversity. Scientific Reports, 9, 4083.	Thank you for your comment. We improved this section but we cannot add additional text to the chapter due to word length restrictions.
Government of Portugal	Yes	5		779		780	Non-native species always negatively impact the biodiversity of the new environment they are introduced into even if it is simply by taking up physical space that otherwise would be used by native species and "biologically polluting" the composition of the native community(ies) and ecosystem(s).	Thank you, this has been revised and further discussed in Chapter 1 in the second order draft
Government of Portugal	Yes	5		5258		5259	According to Steven D. Frank and Michael G. Just (Can Cities Activate Sleeper Species and Predict Future Forest Pests? A Case Study of Scale Insects. Insects 2020, 11, 142; 1-16) "sleeper species" are defined as "(...) innocuous native or naturalized species that exhibit invasive characteristics and become pests in response to environmental change." Is this what is meant by "current "sleeper" IAS of low apparent risk"?	Thank you, this has been added in the second order draft
Government of Portugal	Yes	5		5259		5261	Since there is always a chance, however small, of species escaping from containment, it might be better to monitor these sleeper species in the areas where they currently occur and act immediately should a more aggressive spreading behaviour be detected.	Thank you, this is addressed in the second order draft
Government of Portugal	Yes	5		5266		5269	Should not changes in temperature also be included in this list?	Thank you for your comment, this has been added in the second order draft
Daguitan, Florence	No	5					From the initial findings that whether an alien species is invasive or not is determined by socio-ecological and cultural context of a given community/territory, it is important to build capacities and support local initiatives of assessment, control and management of IAS.	Capacity building needs are better addressed in Chapter 6. We do discuss the SEICAT prioritization tool under section 2 which helps address this
Faulkner, Katelyn	No	5					Would be good to highlight in this chapter which pathways/species/sites require management, but are not being managed. To what extent does what is being managed reflect the current trends for introductions/invasions?	Thank you for your comment. We cannot do a full literature review on which pathways/species/sites require management, but are not being managed beyond comparing key biomes and illustrating these with case studies. Our case studies are also there to illustrate where things have worked well not where they are not working well. As our chapter is solutions focussed we do not have the space to address this issue targeting and trends issue directly
Akhtar-Schuster, Mariam	No	6	0	0	0	0	The chapter should be more practically oriented. Perhaps the theoretical aspects of the text could be moved to an appendix.	Thank you for this comment. It has been taken into account in the second order draft.
Akhtar-Schuster, Mariam	No	6	0	0	0	0	When previous assessments were discussed, the question of graphs came up. There should be more graphical representation of the information in this chapter.	Thank you for this comment. It has been considered in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	Building bridges between local-level realities and national-level policy processes is a key concern for many IPLC. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcol, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There was a review of the literature and we have reported what is indicated in this literature about the actual experiences of IPLC vis a vis bridges between local-level realities and national-level policy processes. The results of the dialogue workshop have also been incorporated into this review in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	Efforts to build policy and management systems around IAS should include attention to IPLC values including linguistic, cultural, religious, aesthetic, moral, ethical and spiritual. The concept of 'indigenity' may be important to understand and elaborate in terms of decisions on the future by IPLC. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcol, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There was a review of the literature and we have reported what is indicated in this literature about IPLC values. Much of this is covered, as well, in Chapters 1, 4 and 5 of the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	Government processes and regulations can be very complex and it is time consuming to engage with them. IPLC may need support in order to do this successfully. Partnerships with researchers, lawyers, NGOs and others may also be needed. There needs to be further deep discussion on IPLC co-governance, co-management, etc for IAS. IPLCs need further internal discussions and sharing on this. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcol, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of	Thank you very much. The experts have conducted a review of the literature and we have reported what is indicated in this literature about co-management and needs for collaboration. The knowledge section also includes a discussion, and the results of the dialogue workshops have been incorporated in the second order draft.

Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	0	ILK and customary governance and management are under threat in many communities. Efforts to understand and manage IAS through ILK could also have preservation, support to and revitalization of ILK transmission and customary governance as additional goals. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There was a review of the literature and we have reported what is indicated in this literature about IPLC customary governance. The results of the dialogue workshops have been incorporated. Much of this is covered, as well, in Chapter 3 of the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	0	Indigenous peoples are developing their own case studies and examples of adapting to and managing IAS, as a means to show the international and national governance systems that they have knowledge, skills, experience, and capacity to share. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. The experts have conducted a review of the literature and we have reported what is indicated in this literature and have also covered what is contained in the dialogue workshops as well as the call for contribution submissions. Much of this is covered, as well, in Chapter 5 of the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	0	IPLC groups want to assume an active role in defining issues around IAS, and in defining, developing and implementing management strategies and policies. The full and effective engagement of indigenous peoples, local communities, women and youth should be ensured at all levels of decision-making processes. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There was a review of the literature and we have reported what is indicated in this literature about the IPLC experiences via a visit their role in defining and implementing management strategies and policies. The results of the dialogue workshop have also been incorporated into this review in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	0	It is important to discuss human rights and self-determination of IPLCs, including around efforts to control and manage IAS using IPLCs' own governance systems and traditional ways of life. It will be important to highlight that recognition of IPLC rights, including land rights, has a direct impact on how IPLC can adapt to and manage IAS. More information in IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There was a review of the literature and we have reported what is indicated in this literature about the actual experiences of IPLC regarding self-determination in efforts to control and manage IAS. The results of the dialogue workshop have also been incorporated into this review in the second order draft.
Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	0	0	0	0	0	Many IPLCs are happy to coordinate, participate and collaborate to provide the knowledge, management and governance needed to understand, monitor and manage IAS. However, this collaboration should also enhance and support IPLC knowledge systems and other concerns, as discussed in the following comments that could be addressed in Chapter 6. IPBES (2020) Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. There has been a review of the literature on co-management and we have reported what is indicated in this literature about the actual experiences of IPLC vis a vis support for their knowledge systems and concerns, as well as respect for their recognised rights. The results of the dialogue workshop have also been incorporated into this review in the second order draft.
Butchart, Stuart	No	6	0	0	0	0	0	I would have expected this chapter to also include coverage of the various efforts that have been undertaken to compile data on the distribution of IAS and the native species they impact, in order to underpin regional and global exercises to prioritise eradication efforts, particularly on islands. (Sorry if it is included and I missed this). See the data in the Threatened Island Biodiversity Database at http://tib.islandconservation.org/ which includes information on the distribution of all vertebrate IAS and native highly threatened species (Critically Endangered and Endangered) on each island, and the impacts of the former on the latter on each island. Plus the various papers based upon these data to prioritise eradication efforts, including: Holmes et al (2019) Globally important islands where eradicating invasive mammals will benefit highly threatened vertebrates. PLoS ONE 14: e0212128. Dawson et al. (2014) Prioritising islands for the eradication of invasive vertebrates in the UK overseas territories. Conserv. Biol 29: 143-153. Spatz et al. (2017) Managing invasive mammals to conserve globally threatened seabirds in a changing climate. Conserv. Letters. 10: 736-747.	Thank you for the comment. This topic is dealt with extensively in earlier Chapters and picked up on in Section 6.7
de La Harpe, Marylaure	No	6	0	0	0	0	0	General comment regarding all the boxes: very informative and well chosen. However, I might think that due to their length, no one will consider reading them.	Thank you for this comment, we have addressed these in the second order draft
de La Harpe, Marylaure	No	6	0	0	0	0	0	General comment to all subsections (6.2, 6.3, 6.4, 6.5, 6.6): in my opinion they are equally important and well exemplified. However to me the key messages are still cryptic, especially for 6.6. To me it could have an impact to the reader if the key-messages would be given from the beginning of each subsection, which would be structured according to it.	Thank you very much. The executive summary outlines all the key messages
Government of Australia	Yes	6	0	0	0	0	0	Suggest Chapter 6 refer to the importance of engaging with the shipping industry, especially over their management of biofouling. Strengthening evidence of the importance of engaging with the major vectors of invasive marine species would enhance the review.	Thank you for your comment: stakeholder engagement is covered in 6.4 (but we have chosen to remain general and did not mention the example of biofouling)
Government of Germany	Yes	6	0	0	0	0	0	Question: Ch 6 uses the terms "transformative change" and "transformative progress". Are the terms used interchangeably? If not, then it would be useful to provide a definition of "transformative progress".	Thank you for the comment, transformative progress indicates a change in a positive direction. We have tried to clarify this point in the second order draft
Government of Germany	Yes	6	0	0	0	0	0	For better understanding, the term 'policy instruments' kindly insert the definition used by IPBES (see glossary) in a footnote, and consider discussing it against societal management needs for IAS.	Thank you, the definition has been added in the main text of the second order draft.
Government of Germany	Yes	6	0	0	0	0	0	Herrick 2019 is quoted a lot in the text but does not show up in the literature: Herrick, Charles N. (2019). A review of the U.S. invasive species policy mix: Questioning the prospect of an integrated regime. In <i>Env Pol Gov</i> 29 (4), pp. 262-278. DOI: 10.1002/et.1852.	Thank you. This has been dealt with in the second order draft.
Kanneh, Ambrose Bockarie	No	6	0	0	0	0	0	How does this assessment considered native species which are becoming invasive in their native ranges and what are the future options for the prevention and management of such species.	Thank you, but for purposes of the assessment, invasive alien species are defined as animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, generating an impact on local ecosystems and species (scoping document).
Kanneh, Ambrose Bockarie	No	6	0	0	0	0	0	What are the future options considered by this assessment to support research and knowledge generation on IAS as there are limited available data and few studies on most taxa.	Thank you very much. Section 6.6.2 details the options to support research and knowledge generation
Lieurance, Deah	No	6	0	0	0	0	0	GENERAL COMMENT: Overall I found the text portion of this chapter is very well-written. I think the figures and tables some editing.	Thank you for this comment. We have refined the tables and figures in the second order draft
lieurance, Deah	No	6	0	0	0	0	0	GENERAL COMMENT...all figures should be edited to have a similar look/style and text needs to be reduced. The amount of text in these figures makes them difficult to follow.	Thank you for this comment. We have revised some of the figures, taking your comment into account in the second order draft
Papadopoulou, Paraskevi	No	6	0	0	0	0	0	Check the figure and table legend formatting.	Thank you for this comment. We have checked the formatting throughout the assessment for the second order draft
Papadopoulou, Paraskevi	No	6	0	0	0	0	0	May want to consider changing the colors of the figure 6.2 so it is better readable and improve figures 6.7 & 6.8 (perhaps add colors too) Overall, ch 6 needs more editing and to make an effort to avoid repetition.	Thank you for this comment, agreed where possible
Paulsch, Axel	No	6	0	0	0	0	0	Perhaps the scenarios should include risks from modern genetic technologies. New species we create, such as genetically modified mosquitoes, could potentially become invasive.	Thank you, this issue and precautionary approach are included in the second order draft.
Peterson, Garry	No	6	0	0	0	0	0	I realize this is 1st draft, but I suggest that feedbacks, especially social-ecological feedbacks need to be better integrated into the discussion of options. Feedbacks are mentioned in the text, but not integrated into the possible responses. I suggest an overview figure that relates the response options to one another, and either the IPBES conceptual framework, or a conceptual diagram that shows how options will reshape social-ecological connections to promote good options - ie weakening or eliminating perverse connections or vicious cycles, while strengthening or adding virtuous cycles or positive connection. It would be also be useful to link these response options to different nature values (e.g. biocultural production, or biodiversity).	Thank you. In the second order draft, this topic has been better integrated in the chapter and figure 6.2.3 show the connections and shared responsibility in decision making
Romero, José	No	6	0	0	0	0	0	This chapter could be an opportunity to highlight the narrative of the report as a whole - from problems to solutions. Perhaps the chapter can condense, emphasize and mirror this narrative.	Thank you for your comment. Chapter 6 picks up on the challenges highlighted in the previous chapters. The SPM provides an overview of the entire assessment
Rüegg, Simon	No	6	0	0	0	0	0	This chapter could benefit from a discussion of how much money is in the drivers described in chapter 5 and how much money it would take to overcome them.	Thank you for your comment. A section on economic and financial options has been added in the second order draft and addresses this point
Sarat, Emmanuelle	No	6	0	0	0	0	0	The assessment does not bring yet innovative options to improve prevention and management of IAS for countries which have already developed policies on IAS. Once you have a strategy, a multistakeholder governance, knowledge, a prevention approach and dialogue between researchers, managers and decision-makers, how do you concretely make this happen?	Thank you for this comment. It has been considered in the second order draft.
Timpte, Malte	No	6	0	0	0	0	0	The post-2020 Global Biodiversity Framework (GBF) addresses the issue of invasive alien species as well. The overlap could be productively exploited in this chapter. The same goes for the subchapter on SDGs. This is an opportunity to highlight the entry points from a policy-oriented point of view. The EU 2030 agenda also has targets and goals regarding IAS.	Thank you. These points have been embedded in the second order draft
Shackleton, Ross	No	6	0	0	0	0	0	The paper by Bennett and Satterfield might be highly useful for this chapter https://conbio.onlinelibrary.wiley.com/doi/pdf/10.1111/conl.12600	Thank you, we have added the suggested reference to Chapter 6
Shackleton, Ross	No	6	0	0	0	0	0	This recently published paper might be very useful for this chapter: Global guidelines for the sustainable use of non-native trees to prevent tree invasions and mitigate their negative impacts	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Shackleton, Ross	No	6	0	0	0	0	0	Well done on the great work :-)	Thank you for your comment.
Thompson, Ian	No	6	1	0	0	133	0	The methodology for this review relies heavily on published research in refereed journals. However, this brings with it a bias when dealing with on-ground and policy responses and community, including Indigenous engagement. Much of the work in this area is not summarised or reviewed in journal articles, and where it is, it can be dated because of delays in publications or only exist in one journal as government and agencies and non government organisations are under no pressure to publish. Public material may be available in grey literature, conference proceedings or websites. Short of an extensive web crawl, the only other way to overcome this would be with interviews with government or non government authoritative sources. Addressing or acknowledging the absence of this information may be important in how the report is received when published.	Thank you, IPBES has developed methodological approaches to include indigenous and local knowledge and other grey literature sources. https://ipbes.net/indigenous-local-knowledge
Akhtar-Schuster, Mariam	No	6	1	1	2	52	0	The issue of scale and the fact that there will not be a 'silver bullet' solution was discussed in the foregoing chapter. This should also be reflected in the executive summary. Perhaps the executive summary of CH6 should be written in consultation with the authors of the other chapters to ensure that options presented here reflect the issues that emerge in the other chapters.	Thank you, the executive summary has been revised and developed in consultation with the other chapters too in the second order draft.
Mariño, Juana	No	6	1	1	2	52	0	In general, a very good synthesis of actions that, in a coordinated and complementary way, could allow a better control of the causes and effects of invasive species. Eventually, a point could be included regarding consumer education or, in general, the promotion of responsible consumption practices through which the consumption of goods associated with invasive species is rejected.	Thank you, the role of consumers has been addressed in Section 6.5 on economic and financial options in the second order draft
Setsaas, Trine Hay	No	6	1	1	1	52	0	Building on comment in row 15, the executive summary should perhaps have more focus on the governance issue, such as prerequisites for successful multilevel governance, future options for using collective action to improve governance, enabling policy environment, etc.	Thank you for your comment. The executive summary has been revised in the second order draft

Soubeyran, Yohann	No	6	1	1	2	52	It would be good if a key message building on section 6.4.6 could highlight how the One Health approach would help mainstreaming IAS management into various sectors.	Thank you for your comment, holistic approaches (including One Health) have been included in the executive summary
Castaño Arboleda, Nicolás	No	6	1	2	1	42	Alien species education needs to be incorporated into society at large. One of the major problems is the misinformation on alien species in sectors other than the environmental. It is very important to consider citizen science strategies in alien species management.	Thank you, this theme is developed under 6.6 (Knowledge options) of the second order draft.
Government of Ethiopia	Yes	6	1	5	1	5	Perhaps important to modify the wording in the title of the strategy in a manner that expresses prevention, control, and eradication of IAS.	Thank you, the executive summary has been revised in the second order draft
Setsaas, Trine Hay	No	6	1	5	1	14	The importance of developing and implementing NISSAPs on country level is acknowledged. However, the important issue of developing policies and ensuring collaboration and action across sectors should also be emphasized in an own bullet point in bold, covering governance, legal and regulatory frameworks etc. Cross sectoral collaboration is also one of the main recommendations in the Global Assessment.	Thank you, the executive summary has been revised in the second order draft taking this comment into account.
Shin, Thant	No	6	1	5	1	6	National Invasive Species Strategy and Action Plans (NISSAP) should be incorporate in to National Biodiversity Strategy and Action Plans (NBSAP)	Thank you, the executive summary has been revised in the second order draft
Timpte, Malte	No	6	1	15	1	18	When you mention "different sectors", there should be a reference to the sectors in question by their name.	Thank you, we have revised this paragraph accordingly
Government of Ethiopia	Yes	6	1	18	1	18	Why only in the Marine realm? It is important in the fresh water situation in Africa as well.	Thank you, we have removed the mention to "marine realm" in the executive summary of the second order draft
Government of Ethiopia	Yes	6	1	19	1	20	"Specifying the distribution of responsibility", besides improving resourcing, it can also improve governance.	Thank you, this paragraph has been revised in the second order draft and the comment no
Thompson, Ian	No	6	1	32	1	36	Reference could be made to addressing the accessibility of information in the context of debates over benefit sharing. Purely financially-based benefit sharing and intellectual property debates may impede public access to data in the wider public good	Thank you for your comment. We have revised the executive summary and chapter to address this comment in the second order draft, though the regulations in this context are far from stable. We certainly advocate for open sharing of data on invasive species and for sharing genetic resources that might alleviate the problem.
Government of Ethiopia	Yes	6	1	37	1	40	Such research initiatives are required for correcting not only the north versus central and South America imbalance but also for other regions including Africa.	Thank you, the executive summary has been revised in the second order draft
Thompson, Ian	No	6	1	37	1	42	A point could be made about the need for collaborative research about potential spread, establishment and impacts of IAS outside of natural range as being important to securing attention and funding.	Thank you, agreed
Shackleton, Ross	No	6	2	43	2	44	It is not so obvious what is meant in this point, could summarising it help. "Ensure targeted and long-term monitoring"	Thank you, this paragraph has been revised in the second order draft and the comment no
Shackleton, Ross	No	6	2	46	2	47	Compared to the other points this one is also a little wordy and a bit ambiguous. Summarising might help a bit :) or just bolding a small part so it is similar to	Thank you, this paragraph has been revised in the second order draft
Mariño, Juana	No	6	3	53	3	61	In general, the content of the Chapter seems very well structured.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Acosta-Michlik, Lilibeth	No	6	3	54	3	61	I think beginning the chapter with questions is not very convenient for readers, especially if each chapter is planned to be standalone document. It should first provide the context of the assessment for this chapter, and link it to the highlights of analysis in the previous chapters, explaining why there is a need for this chapter to talk about future options.	Thank you very much. Questions have been removed from the text, but a box has been added to introduce the rationale and guiding questions of the chapter in the second order draft
Mariño, Juana	No	6	3	54	3	64	For an outside reader it is very useful to have these leading questions at the beginning of the chapter.	Thank you, a box has been added with the guiding questions in the second order draft.
Day, Roger	No	6	3	65	3	65	prevent, manage, and control. Here, and in several other places in the document the use of the term "management" as distinct from prevention or control, is potentially confusing, partly as the definition of management according to the glossary has two alternatives? If there is something implied within management that is different from prevention or control it might be better to specify that/those activities.	Thank you for your comment. We now refer to management as the collection of prevention, eradication, and control following the conceptual framework developed in Chapter 1.
Acosta-Michlik, Lilibeth	No	6	3	69	4	89	I understand Table 6.1 and Figure 6.1 provides an overview on the concept and methods for the assessment in Chapter 6. They are indeed very useful materials for this purpose. But I think this is not the appropriate place for them, in the very beginning of the chapter, without having provided the context for these concepts and methods. I suggest to put them in section below introduction, maybe as a section on methods of analysis. By dedicating a section on this, authors can first explain what are these governance models, and the basis for selecting the categories of policy instrument and families of support tools for each of the model. It can also provide a more detailed explanation on what Figure 6.1 intends to inform the readers and how it guides the assessment.	Thank you. We respectfully disagree. This is not a methodology, but a summary of known Governance models, Categories of Policy Instruments, and Families of support tools and methods that anyone can draw upon to manage IAS.
Government of Germany	Yes	6	3	69	3	71	Please provide some background information on the four governance models: E.g. how were they identified? Do they cover the whole spectrum of governance models? What is the definition of governance used in this context? Also please insert references where this typology stems from.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions, but we add the reference from which we draw the four governance models.
Day, Roger	No	6	3	72	3	72	Table 6.1. I suggest removing the horizontal lines to avoid the impression that items within one row are somehow linked.	Thank you for your comment. We have redesigned the table to accommodate this comment.
Genovesi, Piero	No	6	3	72	3	73	Table 6.1 doesn't seem clear to me. I would not put the 3 columns into a single table to avoid confusion on the lines. Also, the first column on the models is not very informative and clear in my opinion.	Thank you very much. We have redesigned the table to accommodate this comment.
Government of Ethiopia	Yes	6	3	72	3	73	'Awareness' needs to be included under the 'Families of support tools and methods' column.	Thank you for this suggestion. We have chosen not to include it in the section as we consider "Public discussion, involvement and participatory process" encapsulates awareness.
Government of Germany	Yes	6	3	72	3	73	Table 6.1 should be improved graphically and better related to / explained in the text.	Thank you. We have redesigned the table to accommodate this comment. In the second order
Government of Germany	Yes	6	3	73	3	73	Table 6.1: The logic of the table is unclear. It is suggested to convert the table into a chart/diagram which illustrates the different categories of governance models, policy instruments and families of support tools/methods, and which elucidates the interconnections between all elements within the categories.	Thank you. We have redesigned the table to accommodate this comment in the second order draft
Government of Germany	Yes	6	3	76	4	77	As control is also a management measure, it is suggested to rephrase this sentence according to: "The goals of these is to prevent, eradicate and control IAS". This would also align with the wording used in Fig. 6.1, p. 4.	Thanks for this suggested change. We have included it in the second order draft
Mariño, Juana	No	6	3	76	3	76	In this paragraph, international and national efforts could be linked with local efforts and practices, which are mentioned in the following paragraphs.	Thanks for this suggested change. We have included it in the second order draft
Shackleton, Ross	No	6	3	76	3	76	It might be good to define governance here? The term is used commonly throughout the chapter, but it is never obviously defined or explained in the	Thank you. This term is defined in the glossary of the second order draft
Shackleton, Ross	No	6	3	76	3	76	Linking to the comment about, maybe also discuss how governance is similar and/or different to management, co-management etc. Work by Derck Armitage might be very useful to draw on	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Also all these terms are defined in the glossary of the second order draft
Mariño, Juana	No	6	4	77	4	87	Despite being explicitly mentioned in the introductory paragraph (Evaluated policy instruments include legal and regulatory frameworks), and being the content of chapter 6.3, policy instruments do not explicitly appear in Figure 6.1, which makes it confusing.	Thank you very much. We now add "legal and regulatory frameworks" to the blue box in figure 6.1
O'Brien, Karen	No	6	4	85	4	8	The term "anthropogenic values" does not make sense here, as anthropogenic means created by people or caused by human activity. Perhaps "human values" or "universal values" (i.e., those that apply to all humans and non-humans).	Thanks for this suggested change. We have included it in the second order draft.
Government of Germany	Yes	6	4	86	4	86	Figure 6.1: If instruments are intended not only to limit invasion (their spread, impact, etc.) but also to control the (anthropogenic) drivers, than this has to be shown in the figure, too. This could be achieved by inserting an arrow indicating the impacts instruments put on drivers.	Thank you very much. We have added the suggested arrow in the second order draft
Lieurance, Deah	No	6	4	86	4	87	I think this figure could be improved or removed. The flow chart is cluttered and hard to follow	Thank you very much. We believe this figure is necessary to place the chapter in the context of
Government of Ethiopia	Yes	6	4	87	4	87	Figure 6.1 doesn't clearly depict drivers and impacts of IAS.	Thank you very much. We believe this figure is necessary to place the chapter in the context of the report, not to define the possible drivers of invasions. This is done in Chapter 3
Mariño, Juana	No	6	4	91	5	123	Good summary of structure and contents of the chapter, including explicit relationship with the previous assessments and previous chapters, which facilitates the general understanding of the assessment. As mentioned before, a point on "responsible consumption" could be useful.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Ethiopia	Yes	6	4	96	4	98	The term "governance" indicated in section 6.1 encompasses ideas indicated in 6.2, 6.3, 6.4, 6.5. In other words sections 6.1-6.5 should be discussed under the topic IAS governance. Moreover, governance need to be discussed from the perspectives of some of the basic dimensions of effective governance that most development literatures have adopted (participation, transparency, etc.).	Thank you. The point made in this comments is the focus of section 6.2
Government of Ethiopia	Yes	6	5	104	5	106	In the sentence "These strategies provide future options for increasing the efficacy, equity, and sustainability of and NCP" is goof add the concept of 'efficiency' as this can indicate the financial performances of the measures taken.	Thank you for this suggestion. We have chosen not to include it in the assessment, as it is not clear what is the problem
Government of Germany	Yes	6	5	125	8	273	Although the IAS-relevant messages from previous assessments are extremely important, it is suggested to repeat them here only briefly (more compactly) so as to put the focus on the relevant messages emerging from this chapter. It may be useful to structure the main findings from previous chapters in a Table or graph.	In the first order draft, sections 6.1.2 and 6.1.3 evaluate the similarities and differences between options about IAS identified in previous/other assessments and in this one. These two sections have been merged and synthesized in a table in the second order draft.
Government of Germany	Yes	6	5	128	5	128	References to different 2018 IPBES reports should be named: 'IPBES 2018a', 'IPBES 2018b' etc.	References were adjusted in the second order draft as suggested.
White, Michael	No	6	6	146	6	146	Armed conflict needs mentioning somewhere as a driver for biodiversity loss & IAS	Thank you for your comment. Chapter 3 on drivers deals with this at length. Here we refer to the Global assessment.
Camacho, Rulo A.	No	6	6	153	6	153	Cross-border migration seems ambiguous. Is this only human-related migration?	Thank you for making this point. It does not seem to require changes to the text.
Government of Ethiopia	Yes	6	6	170	6	171	"In Africa, spread of IAS is one of the causes of land degradation where" This is arguable or too general!	Thank you for making this point. We cannot add additional text to the chapter due to word length restrictions. We feel the statement, although general, provides the context of IAS a driver of landdegradation (and impact).
Government of Ethiopia	Yes	6	7	203	7	207	The implication of IAS control and mangement from the perspective of reclaiming different land uses and water bodies for agricultural production, fishery, and pasture need to be discussed.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Also, our goal is to draw general examples from the previous IPBES assessment
de La Harpe, Marylaure	No	6	8	275	12	344	I am questioning if this makes sense to reformulate here the outcomes of each chapter. Would it be possible e.g. to formulate it in terms of key messages only?	Thank you very much! In the first order draft, sections 6.1.2 and 6.1.3 evaluate the similarities and differences between options about IAS identified in previous/other assessments and in this one. These two sections have been merged and synthesized in a table in the second order draft.
Shackleton, Ross	No	6	9	280	9	280	"add "and" beofre "their". In this sentecne, I would also add "and people" or "and "society" to this sentence?"	Thank you very much! We added "and" suggested. But do not add "and people" or "and society" as we are referring to specific terms in the IPBES conceptual framework (GOL and NCP).
Shackleton, Ross	No	6	9	280	9	280	What about guiding future research/knowledge creation?	Thank you for this suggestion. We have chosen to incorporate it between management of IAS and mitigation of impacts to IAS.
Mariño, Juana	No	6	9	293	9	298	The dataset mentioned in the PLACEHOLDER sounds really promising.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Camacho, Rulo A.	No	6	9	299	9	300	Table 6.2 line 8. Why is there an emphasis on PAs? There are also Key Biodiversity Areas and Important Bird and Biodiversity Areas in some countries that are not PAs. Stakeholders are people, so the differentiation confuses me here.	Thank you very much. As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Camacho, Rulo A.	No	6	10	322	10	323	Table 6.3 Line 4. Correct grammatical error 'highly'	Thank you very much. This is corrected in the second order draft as suggested

de La Harpe, Marylaure	No	6	10	322	10	323	A summary of the key messages is what one can expect to see from the beginning of this chapter. Would it be conceivable to create a final list of all key messages grouped by big topics? E.g. biological (databases: gaps and challenges, drivers, harmonized terminology, habitats, etc.), social- economics (prevention, citizen sciences, evidence- based management, etc.), governance (support tools, methods, policy/instrument, international management, etc.), financial sector (negative incentive, resources, cost of doing nothing or too late, etc.). This could be useful to get a clear overview of the situation.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Ethiopia	Yes	6	10	322	10	322	The expression "High IAS emerging from tropical regions (strength of evidence?)" deserves proper attention since it is stated in the chapter that most of the assessments were made in the temperate regions, not in the tropical regions including Africa.	As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Lieurance, Deah	No	6	10	322	10	322	are 6 and 7 placeholders?	Yes, thank you
Smith, Emily	No	6	10	322	6	323	A suggestion of something to include in Table 6.3. That management of pathways is more effective in the long term than management of individual species. i.e. pathway management tackles all of the species associated with those pathways, including those that, under climate change could become invasive in the	Thank you very much. As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Thompson, Ian	No	6	10	322	10	322	It may be necessary to address or be ready for the arguments around the benefits of potential invasive species. At one end of the spectrum may be well managed introductions useful for restoration, wind breaks, or fodder crops or in agriculture or aquaculture but at the other extreme some are arguing that all plant material is good for the environment and soil. Tane, H. (2010) The Crucial Role of Willows in Sustainable River Management. Watershed Foundation.	Thank you very much. As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Government of Germany	Yes	6	10	324	12	344	Please consider to better harmonize messages across chapters. GMO and gene-editing in Chapter 3 has a negative connotation, whereas in Chapter 5 gene-editing is discussed as a serious and promising option for the management of IAS.	Thank you for pointing this out. The topic has been expanded and harmonised across Chapter in the second order draft
Mariño, Juana	No	6	10	324	10	325	The statement "Prevention of invasion is the most effective approach to prevent IAS associated problems" with Figure 6.1 is not clear.	The figure was redrawn and the statement re-written in the second order draft.
Ahimbisbew, Imran	No	6	11	87	11	89	Besides being a repetition of the previous chapter, chapter 6 is an attempt to mislead report users into rewriting the convention on biological diversity. The chapter should not be allowed to appear in this report simply because it contradicts the treaty. CBD seeks to control pathways of AS and eradicate them while chapter 6 advocates for management of IAS for short term economic benefits. Experience shows that not everything that is perceived to have anthropogenic value is good for the environment in the long term. Take for example the current oil powered economy and the associated prosperity, which have caused global warming and pollution with far reaching economic social and environmental repercussions. The recurrent effects of climate change in USA in form of seasonal hurricanes and wildfires that cost USA economy billions of dollars annually serve as a lesson. We should avoid a situation from raising in which economic norms override ecological ones. gambling with IAS is totally unacceptable.	Thank you for your comment, following the Information on scoping for a thematic assessment of invasive alien species and their control (IPBES/6/INF/10), Chapter 6 explores future options for the prevention and management of invasive alien species, including policy options for handling complex intersectoral trade-offs.
Government of Germany	Yes	6	11	333	11	333	A reference to Chapter 4 quoting the chapter's key messages is missing.	Thank you. This section has been rewritten, and appropriate links with Chapter 4 are made in the following sections of the second order draft
Mariño, Juana	No	6	11	334	12	344	Although chapter 5 of this assessment does not seem to correspond exactly to the 11 content provided in the Assessment guide for chapters 5 - scenarios and models: it seems to follow a clear storyline between the first chapters - definitions and diagnosis - and chapter 6 - policy options.	Thank you - the second order draft follows the scoping document and has also increased links between chapters
Government of Ethiopia	Yes	6	11	343	11	343	Consider adding 'resistance to bio-control' (Row number 8 of the table)	Thank you. As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Thompson, Ian	No	6	11	343	11		Point five on the diverse public perspectives is potentially quite important. Point 9 suggests behavioural science could be an important research area.	Thank you very much. As part of the chapter restructuring/re-writing to meet the length restrictions, the element referred to in the comment was removed, so the point is not relevant.
Government of Germany	Yes	6	12	345	12	345	An aspect which has not been discussed at all are public-private partnerships. These governance approaches might be able to support IAS response due to the fact that they act as risk-sharing mechanisms. Not much scientific evidence exists on this argument but this publication could be a good starting point: Mato - Amboage, Rosa; Pitchford, Jonathan W.; Touza, Julia (2019): Public-Private Partnerships for Biosecurity: An Opportunity for Risk Sharing. In J Agric Econ 70 (3), pp. 771-788. DOI: 10.1111/1477-9552.12315.	Thanks for this suggested change. We have included it in the second order draft
Government of Germany	Yes	6	12	345	12	345	The chapter quotes Graham, Metcalfe et al. 2019 several times but does not mention the article in the literature list: Graham, Sonia; Metcalf, Alexander L.; Gill, Nicholas; Niemce, Rebecca; Moreno, Carlo; Bach, Thomas et al. (2019): Opportunities for better use of collective action theory in research and governance for invasive species management. In Conservation biology : the journal of the Society for Conservation Biology 33 (2), pp. 275-287. DOI: 10.1111/cobi.13266.	Thanks for picking this up. We have included it in the second order draft
Government of Germany	Yes	6	12	345	35	954	The whole chapter is very theoretical / abstract. It might benefit from the integration of a few practical examples for illustration. Some of the tables, e.g. table 6.5 and 6.6 should be revised, as they contain a large number of bullet points, and the reader might not be able to understand and follow the content easily.	Thanks for this suggested change. We have considered this while editing the second order draft
Government of Germany	Yes	6	12	345	35	955	This section intends to discuss "Governance response options" as one group of future options for the prevention and management of IAS. This section as it currently stands however, conveys the impression of a purely political science discourse which generally describes governance systems and options completely disconnected from the much more needed specific information regarding IAS management aspects. Terms like 'IAS', 'biodiversity' or 'ecosystems' seem to be replaceable with any other political issue. It is therefore strongly suggested to consider more specific IAS-related policy options in this chapter.	Thanks for this suggested change. We have included it in the second order draft
Mariño, Juana	No	6	12	345	35	955	The definition, interpretation and use of the concept "governance" constitutes a key challenge in the various assessments, directly related to policy responses. In them, governance is considered an enabling or restrictive condition, a context factor, an objective to be achieved or, as in this case, a specific challenge and a response option itself. Addressing governance in the opening part of the sixth chapter and assessments referring to "IAS governance" in particular, not to "governance" in general", narrows the issue and contributes to the clarity of the whole chapter. Despite the above, the length of the sub-chapter, the large number of subtitles and tables, make it difficult to understand and reduce clarity and force.	Thanks for this suggested change. We have considered this while editing the second order draft
de La Harpe, Marylaure	No	6	13	389	14	417	Very impressive literature review for the purpose of the Draft! However I cannot see clearly what are the conclusions of this immense digest. It would be useful to highlight the challenges and options founds in the analyses and that are mentioned from the first paragraph of this sub-section	Thank you for the comment. We have considered this while editing the second order draft
Shackleton, Ross	No	6	13	391	13	393	"Governance is used 4 times in the same sentence and it does not read so well. To remove one may change it to "... assess challenges and opportunities to strengthen IAS governance"	Thanks for this suggested change. We have included it in the second order draft
Government of Germany	Yes	6	13	397	13	399	Abbreviations and methods used here are unclear. Please explain in more detail.	Thanks for this suggested change. We have clarified the methodology in the data management
Shackleton, Ross	No	6	13	397	13		In general the prefer / more commonly used term in invasion science is "management" where it may even refer to governance, I feel not including "management" this may have limited your results. I am not sure if there is time to address this though?	Thank you for this comment. Management is dealt with in Chapter 5, and Chapter 5's challenges and options integrated into Chapter 6.
Government of Germany	Yes	6	13	407			Abbreviations used here are unclear. Please explain in more detail.	Thanks for this suggested change. We no longer use acronyms in the assessment
Shackleton, Ross	No	6	14	412	14	414	I think that "governance type" in figure 6.2 need to be better explained - what are these "governance types" also maybe change "level of governance" to "scale of	Thank you for this comment. We have taken it into consideration in the second order draft
Day, Roger	No	6	14	413	14	416	Explanation of colours needed in fig legend	Thank you for this suggestion, we have included it in the second order draft (in the data management report)
Government of Ethiopia	Yes	6	14	420	17	538	Challenges indicated in these sections are challenges that are commonly observed in traditional environmental governance and are not exceptional for IAS and that is why a paradigm shift in governance or effective governance is needed.	Thank you for this comment. It has been taken into account in the second order draft.
Rüegg, Simon	No	6	14	420			The authors may consider including a section on evaluation of governance. In the frame of articulating One Health, we have developed sets of indicators to assess knowledge integration capacities and projected the indicators on the policy cycle. To document the added value of such an integrated approach, they are then compared to the results obtained through the theory of change. A broader effort to evaluate integrated approaches and develop evidence for their added value with benchmarks may help improving existing governance practices towards a broader knowledge integration. References: https://doi.org/10.3389/fvets.2018.00023 ; https://www.who.int/bulletin/volumes/96/3/17-202705.pdf ; https://www.ecologyandsociety.org/vol24/iss2/art36/ ;	Thank you for this comment and references. This point is now being covered by Chapter 1, and the focus on integration is now a key theme in Chapter 6 of the second order draft.
O'Brien, Karen	No	6	14	426	14	426	A tenth key feature challenging governance to consider would be values, as in what is considered important, significant and meaningful.	Thank you for this important point. Values have now been mentioned explicitly in this section of the second order draft.
Shackleton, Ross	No	6	14	431	14	438	A potential useful paper to draw on here (Woodford et al 2016) http://opus.sanbi.org/bitstream/20.500.12143/5584/1/Confronting%20the%20wicked%20problem%20of.pdf	Thank you for this suggestion, it is now included in the second order draft
Shackleton, Ross	No	6	14	431	14	438	I also miss the idea of trade-off between benefits and costs of IAS creating complexity.e.g. see http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0006-82412017000200020	Thank you for this important point and reference. Trade-offs have now been mentioned explicitly 6.2.3 (second order draft)
Bliss, Cebuan	No	6	15	440	15	450	Could add literature on 'wicked problems'	Thank you for this point. The term wicked problems has been used in the literature to describe the challenges outlined in 6.2.3. In this section we focus on describing the nature on describing the detail of the challenges so that its various components can be dealt with, rather than amalgamating it into a single concept as a wicked challenge. Nonetheless, this term was used as
Maclean, Kirsten	No	6	15	461	15	464	It is not clear who 'those who bear the costs of IAS' are, nor who are "the actors responsible for exacerbating the risk... this is an important point because there are other reference that could be added that focus on the fact that it is local farmers and other land managers who are often the ones who actually carry out the risk management practices and that are the ones who often find the invasive species, bear the personal costs, and have to manage those species on their land/property . Eg references : Enticott, G., Franklin, A., & Van Winden, S. (2012). Biosecurity and food security: spatial strategies for combating bovine tuberculosis in the UK. The Geographical Journal, 178(4), 327-337. doi:10.1111/j.1475-4959.2012.00475.x ; Maclean, K., Farbotko, C., & Robinson, C. J. (2019). Who do growers trust? Engaging biosecurity knowledge to negotiate risk management in the north Queensland banana industry, Australia. Journal of Rural Studies, 67, 101-110. doi:https://doi.org/10.1016/j.jrurstud.2019.02.026	Thank you for this point and reference. The text has been elaborated in this section, and the topic is dealt with in further detail in section 6.4. of the second order draft
Government of Germany	Yes	6	15	468	16	486	The term "traditional governance" may lead to misunderstandings with the IPLC / ILK approaches within IPBES. It may therefore be useful to briefly expand on the meaning of traditional governance.	Thanks for this suggested change. We have considered this in the second order draft
Smith, Emily	No	6	15	469	15	481	Include something within the paragraph about the needs to work with stakeholders to identify practices that are practical on the ground to implement. Using local knowledge and expertise of these groups will improve the uptake rather than just top-down inflicted policies and measures.	Thank you for this point. The text has been elaborated in this section, and the topic is dealt with in further detail in section 6.4.

Thompson, Ian	No	6	15	469	16	481	The Landcare movement which has been active in Australia, but also the Philippines and parts of Africa may provide a model for information sharing and action from the community level, through researchers and with government. It can also contribute to changed public attitudes. It has addressed soil and IAS issues. Landcare in Australia – founded on local action. Rob Youl Sue Marriotti Theo Nabbenhttps://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/natural-resources/landcare/communiques/landcare_in_australiaJune08.pdf	Thank you for this point, example and references. The text has been elaborated in this section, and the topic is dealt with in further detail in section 6.4 of the second order draft
White, Michael	No	6	15	469	16	481	Landcare. Local action – global progress. Catacuan D, Neely C, Johnson M, Poussard H, Youl R. 2009. Landcare:Local action – global progress. Nairobi, Kenya: World Agroforestry Centre http://apps.worldagroforestry.org/downloads/Publications/PDFS/B16017.pdf	Yes, thank you for this comment, implementation is a key challenge and a focus for options in
Franzoi, Marco	No	6	16	494	16	503	Rename Externality paragraph to Conflict of Interest/Lack of inclusion in economic studies? The paragraph is supposed to be a type of issue stopping action, but is titled Externality, referring to negative externalities. It mostly discuss The Lack of economic-social studies to include IAS in economic impact assessments.	Thank you for this point, we have revised the paragraph to match the title in the second order draft
White, Michael	No	6	16	494	16	503	Same story with pollution and CO2 emissions: they are not factored into the real cost of things	Thank you for this suggestion. We have chosen not to include it explicitly as it is outside of the scope of this section.
Government of Germany	Yes	6	16	507	16	508	It is suggested to replace the second mention of the term "national" with the term "sub-national".	Thank you for your comment. This has been addressed in the second order draft.
White, Michael	No	6	17	518	17	528	Good	Thank you very much. This is done in the second order draft
Maclean, Kirsten	No	6	17	520	15	528	Is there space here for the authors to note that some governments (e.g. Australian) are transiting policy and practice to a paradigm of Shared Responsibility, whereby all actors share the responsibility for biosecurity (invasive species) risk management (Beale, R., Fairbrother, J., Inglis, A. R., & Trebeck, D. (2008). One Biosecurity: a Working Partnership.) However, policy and practice change take time as the different actors work out what their roles and responsibilities are (e.g. Farbotko, C., Maclean, K., & Robinson, C. (2016). Performing a plant biosecurity emergency: The generation of disease absence and presence in Northern Australia banana plantations. Environment and Planning A: Economy and Space, 48(4), 771-788. doi:10.1177/0308518x15623275) and arguments exist around neoliberal approaches to management of risk whereby government cutbacks put more responsibility on the shoulders of local land managers. Another factor to consider is the role of trust (in government, in community, in knowledge, in other actors) to inform decision making for biosecurity/invasive species risk management. For example, there is evidence that farmer trust in governments, and others, is low (e.g. Fisher, R. (2013). 'A gentleman's handshake': The role of social capital and trust in transforming information into usable knowledge. Journal of Rural Studies, 31, 13-22. doi:http://dx.doi.org/10.1016/j.jrurstud.2013.02.006) and research shows that farmers, for example, are more likely to trust certain people and organisations over others, to gather information to inform their risk management practices. Maclean et al (2018) discuss how different forms of trust can be developed, and others can be downplayed, to ensure information sharing for risk management (eg. Maclean, K., Farbotko, C., & Robinson, C. J. (2019). Who do growers trust? Engaging biosecurity knowledges to negotiate risk management in the north Queensland banana industry, Australia. Journal of Rural Studies, 67, 101-111).	Thank you for these points, examples and references. Shared responsibility has become a central theme to Chapter 6 now and these points are now drawn upon throughout the Chapter in the second order draft
White, Michael	No	6	17	531	17	538	Honesty and transparency are often missing	Thank you for this suggestion. We have chosen not to include it explicitly as it is outside of the scope of this section. However, the options in Table 6.5 would help overcome this challenge.
White, Michael	No	6	18	54	18	544	And Indigenous Peoples (you can say Traditional if easier)	Thank you. Indigenous and local knowledge sources have been included in the second order
Day, Roger	No	6	18	539	18	540	Fig. 6.4. Clarify legend. What are the brown ovals (blue ones are mentioned)? How do the coloured ovals relate to the grey text within the graph?	Thanks for this suggested change. We have made the change to colors in the new version.
Government of Germany	Yes	6	18	539	18	539	Figures 6.3 and 6.4 could be integrated directly under the respective challenge where they are mentioned.	The figures have been positioned appropriately in the second order draft
Government of Germany	Yes	6	18	539	18	539	In the Y-axis of Figure 6.4 the term 'Adaptiveness' is used. It is suggested to explain this term in the accompanying text.	Thank you - this has been done and is also discussed in section 6.4 of the second order draft
Thompson, Ian	No	6	18	539	18	539	It could be useful to flag the potential for economic or commercial incentives for addressing the movement of IAS. Social licence issues, reputational issues or speed of passage across borders may encourage traders to clean-up trade. This may be particularly effective with pests that stowaway or hitchhike such as invertebrates and sticky seeds. It is likely to be most effective with commercial enterprises that are large where small losses add up or the companies where good reputation is part of their business model	Thank you. Economic incentives are dealt with in further detail in the SOD.
Franzoi, Marco	No	6	18	540	21	589	Possible mention of enshrining legally binding national requirements on trade and the spread of IAS through parliamentary action, similarly to those done for biosecurity issues.	Thank you. This point is now covered in section 6.3 of the second order draft.
O'Brien, Karen	No	6	18	542	18	544	Since the chapter is calling for engagement with policymakers and practitioners, a quote about transdisciplinary approaches may be more appropriate here.	Thank you. The section has been edited accordingly in the second order draft
Government of Germany	Yes	6	19	546	19	549	Clarification required: Which are the twelve categories? Are these listed in the left column, under the heading "response types" in Table 6.5? Where are the five general topics mentioned in Table 6.5? Currently, the topics don't really correspond with items outlined in Table 6.5, nor with the sub-headlines in the following text of section 6.2, e.g. is "involving strategy" the same as the sub-headline "strategic governance" (Page 20, L552)?	Thank you. This has been clarified in the second order draft
Mariño, Juana	No	6	19	546	20	551	The idea and the purpose of Table 6.5: "Overview of governance response options" are very good, but the concepts under "Response Type" are not very clear, neither the type of tools and the relation to specific enabling policy environments (options?) addressed in the following subchapters.	Thank you. This Table has been updated with further detail, and many of the points are elaborated on in the rest of the Chapter.
Day, Roger	No	6	19	550	19	550	Table 6.5. First row NISSAPs as an example. Regional strategies could also be mentioned - eg Africa https://ec.europa.eu/knowledge4policy/publication/strategy-managing-invasive-species-africa-2021-2030_en	Thank you. Regional strategies have been considered in the second order draft
Government of Germany	Yes	6	19	550			Response types (e.g. "Strategy", "Dealing with complexity") are not explained in the text. Please specify.	Thank you. This Table has been updated with further detail, and many of the points are elaborated on in the rest of the Chapter of the second order draft.
Maclean, Kirsten	No	6	19	550			include following references to do with 'network analysis, cooperation and co-ordination - McAllister, R. R. J., Robinson, C. J., Maclean, K., Guerrero, A. M., Collins, K., Taylor, B. M., & De Barro, P. J. (2015). From local to central: a network analysis of who manages plant pest and disease outbreaks across scales. Ecology and Society, 20(1). doi:10.5751/ES-07469-200167; McAllister, R. R. J., Robinson, C. J., Brown, A., Maclean, K., Perry, S., & Liu, S. (2017). Balancing collaboration with coordination: Contesting eradication in the Australian plant pest and disease biosecurity system. International Journal of the Commons, 11(1), 330-354. doi:http://doi.org/10.18352/ijc.701	Thank you for this suggestion. We have considered it in the second order draft
Rüegg, Simon	No	6	20	553	20	564	This section resonates work conducted on the governance of one health, where knowledge integration has been articulated as an essential feature of inclusive, participatory governance: https://www.who.int/bulletin/volumes/96/3/17-202705.pdf	Thank you for this comment and references. This point is now being covered by Chapter 1, and the focus on integration is now a key theme in Chapter 6 of the second order draft.
Government of Ethiopia	Yes	6	20	560	20	564	Include "sectoral integration and international collaboration" in the list.	Thank you - changes have been made in the second order draft.
O'Brien, Karen	No	6	20	560	20	564	This description of how to govern is quite mechanistic, and later sections of the report draw attention to some of the "how" factors that include the quality or manner of interactions and processes (building trust, social norms, adaptive management, etc.). It may be a good idea to link to these qualities here.	Thank you, we have improved the cross-section references and linkages in the second order draft
White, Michael	No	6	20	562	20	564	Polluter pays' principle. Strict levies for pollution, carbon and IAS built in to any approval plans.	Thank you. Economic incentives are being covered in more detail in the second order draft.
Government of Germany	Yes	6	20	568	21	573	There are three references to Figure 6.5 in one paragraph. Please consider reducing the number of references to the same Figure.	Thanks for this suggested change. We have considered this while editing the second order draft
Catford, Jane	No	6	21	420	21	428	biosecurity challenges for species already in country but that are being bred to become more invasive - i.e. loopholes/gaps in legislative/biosecurity frameworks e.g. alien pasture plants being bred in-country; cultivars are not subject to biosecurity because already there, even though species listed as invasive and plant breeding will give them traits that facilitate further invasiveness. Trend holds across multiple countries and continents. Driscoll, D. A., Catford, J. A., Barney, J. N., Halme, P. E., Inderjit, Martin, T. G., Pauchard, A., Pyšek, P., Richardson, D. M., Riley, S. & Visser, V. (2014) New pasture plants intensify invasive species risk. Proceedings of the National Academy of Sciences 111, 16622-16627.	Thank you for this important point and the useful example. It connects to Chapter 3 (Drivers) and the need for a policy response (Ch 6), and is dealt with in Section 6.3 of the second order draft
White, Michael	No	6	21	576	21	576	& world-views	Thank you. This point has been considered in the second order draft.
Rüegg, Simon	No	6	21	579	21	581	This has also been articulated for One Health. https://doi.org/10.3389/fpubh.2017.00020	Thank you for this suggestion. We have considered it in the second order draft
White, Michael	No	6	21	579	21	579	& Traditional interests	Thank you. This point has been considered in the second order draft.
Ieurance, Deah	No	6	21	587	21	588	Figure 6.5 This figure is difficult to understand. It is not clear how the orange and blue elements correspond. I would expect some kind of flow with what is in the vertical (orange) to the blue (horizontal)	Thanks for this suggested change. We have considered this while editing the second order draft
Government of Germany	Yes	6	21	588	21	588	The grey pillars in Figure 6.5 don't seem to describe elements of a socio-ecological system. The pillars merely show aspects of a socio-economic system. Please check and reformulate as necessary.	Thank you for this comment. We have taken it into consideration in the second order draft.
Schaffner, Urs	No	6	21	588	21	588	Fig. 6.5. This Figure needs harmonisation with Fig. 1.6 in Chapter 1 which suggests that impact is not a stage of invasion.	Thank you, we have consulted across chapters and revised chapters 1 and 6 accordingly
Government of Germany	Yes	6	21	589	21	590	Text seems to be missing under the heading 6.2.2. Or is the text in L599 a sub-headline in a section "Multilevel and multisectoral governance"? Please check, the structure of this section isn't clear	Thank you. This has been corrected in the second order draft.
Abdul Wahid Arimiyyaw	No	6	21	590	21	594	The works of CBD in IAS governance is worth commendation. However, as a threat of IAS increases, there is the need for more international actors or organization such as UNEP-WCMC to step up effort on the governance of IAS at the international and regional level.	Thank you. This point has been considered in the second order draft
Kanneh, Ambrose Bockarie	No	6	21	590	22	596	For this assessment I suggest that reports from CBD member states on their achievement or strategies to prevent the introduction and control or eradication of IAS be called for and included in the assessment report.	Thank you. This point has been addressed in the second order draft
Singh, Bajjinder	No	6	22	430	23	438	Instead of focusing only on "gene drives" it might be more accurate to use the more inclusive term "Genetic Biocontrol", which refers to techniques that alter the genetic material of an organism to control invasive species in the environment. This includes four different genetic biocontrol approaches to control invasive species: sterile-release, YY Males, Trojan Female Technique, and gene drive. Consider including the review article, "Genetic Biocontrol for Invasive	Thank you for this point. Chapter 5 and 6 now address this theme more explicitly and in Chapter 6 in more depth.
Day, Roger	No	6	22	599	22	602	There is mention of international actors and conventions here, which makes sense in that international agreements are a type of governance mechanism. But they also crop up in various other places, including figure 6.10 and the discussion around it in section 6.3 on legal and regulatory options. I think it would be clearer if international conventions/agreements could be dealt with in a section on their own somewhere, and then other sections refer to that as necessary. Somewhere, even if in an annex, there should be a list of all the relevant international agreements and conventions.	Thank you for this comment. It has been taken into consideration in the second order draft, in particular in section 6.3.
Setsaas, Trine Hay	No	6	22	599	22	604	It is good that these other relevant international actors are mentioned. However, should some positive aspects arising from these also be explicitly mentioned, as well as some of the gaps and inconsistencies identified by CBD COP.	Thank you. This point has been considered in the second order draft
Day, Roger	No	6	22	602	22	604	Decision VI/23 did identify gaps and inconsistencies, but that was quite a long time ago and work has been done on that since. So it would be worth commenting on what the gaps were, and whether they have been adequately addressed or not. This could be part of a section on international conventions.	Thank you for this comment. It has been taken into consideration in the second order draft, in particular in section 6.3.
Government of Ethiopia	Yes	6	22	602	22	602	The international Convention on Environment and Development (UNCED) and on climate change (UNFCCC), are also relevant institutions.	Thank you. This point has been considered in the second order draft and UNFCCC has been

White, Michael	No	6	22	615	22	620	Good	Thank you for your comment.
White, Michael	No	6	22	626	22	626	Emphasising positive effects better than constant fear-based messaging: people just switch off	Thanks for this suggested change. We have included it in the second order draft
Brooks, Thomas	No	6	22	630	22	637	Excellent. This work is now completed and available at http://www.issg.org/pdf/Report_Invasive-Species-Integration-of-IUCN-data_Policies.pdf and https://www.bipindicators.net/indicators/adoption-of-national-legislation-relevant-to-the-prevention-or-control-of-invasive-alien-species . Incorporate into this section accordingly. This is particularly important given the role of this material in generating official Sustainable Development Goal indicator 15.8.1 (see metadata at https://unstats.un.org/sdgs/metadata/files/Metadata-15-08-01.pdf).	Thank you for this suggestion. We have considered it in the second order draft
Day, Roger	No	6	22	630	22	637	This will be an important section.	Thank you for your comment.
Lieurance, Deah	No	6	23	638	24	680	Is box 6.1 finished? There is extensive information in the early guiding principles and little information at the end. I think this entire box could be simplified with some carefully written bullets to reduce some of the text, while clarifying the concepts.	Thank you. This point has been considered in the second order draft
Day, Roger	No	6	23	641	24	680	Box 6.1. The brief descriptive notes look a bit random - it's not clear why there aren't relevant notes for several of the principles for which there are currently	Thank you for this suggestion. We have included it in the second order draft.
Lieurance, Deah	No	6	23	648	23	651	Reads as a three tiered approach and then lists prevention (1), EDRR and eradication AND containment (is this a single element, or all in one? I am guessing the latter but it's confusing), and then Long term control and cost benefit analysis (3?). There are 7 elements in three tiers. I think that could be presented more	Thanks for this suggested change. We have presented it as a table in the second order draft
Schaffner, Urs	No	6	23	653	23	654	Chapter 6 provides a lot of useful and important information, but the text and the recommendations often remain at the conceptual level. For example, while an ecosystem-based approach to governance and management is repeatedly proposed (also here in Box 6.1), the chapter does not really provide examples or ideas on how to do this. There are numerous challenges related to this approach and some of these challenges are similar to that of Sustainable Land Management (SLM) in general (i.e. irrespective of whether IAS are involved or not). For example, how should IAS management be implemented and by whom if initial or continuous costs are higher than the short-term benefits the land can provide? E.g. in the Great Plains in the US, the costs of chemical or mechanical control that would be required to manage invasive alien plants are higher than the maximum yield of the rangeland. In the frame of the Working For Water Program, South Africa has tried to implement payment for ecosystem service schemes to fund IAS management, but the program gradually changed from an environmental program to a job creation program with allocation of finances not linked to management goals and recommendations based on Monitoring&Evaluation. Numerous low-income countries do not even have existing PES schemes. Also, a huge challenge in terms of uptake of SLM practices (and IAS management) is if those people who invest in IAS management will not necessarily benefit from it, not even in the long-term. This is a serious problem in many communal land-tenure systems in Sub-Saharan Africa, e.g. in grasslands (not because of the communal land tenure system, but because of the lack of enforcement of communal land use rights). These are just a few examples. The ecosystem approach is briefly discussed in the context of IPLC, but	Thank you for this comment. The second order draft includes more examples.
White, Michael	No	6	23	672	23	674	Good	Thank you for your comment.
Schaffner, Urs	No	6	24	4	24	682	The framework sounds logical, but the choice of indicators should be explained in more detail; e.g. what is the scientific evidence that the sheer number of IAS is a good indicator for the 'realized' Pressure on biodiversity? This somehow implies that IAS tend to cause comparable pressure on biodiversity, but this is very unlikely, given the variation in per-capita impact, density and range among IAS. For example, while countries in Eastern Africa have a reasonable number of invasive alien plant species (IAPS), policy documents/NISAPs tend to list the same small number of widespread IAPS with high impacts on biodiversity. Some of these IAPS have invaded very large areas, including biodiversity hotspots.	Thank you, we have revised the section in the second order draft with your comment in mind
Government of Ethiopia	Yes	6	24	681	24	681	The 'Pressure- State - Response' chart needs an additional indicator 'hactare of land affected by IAS' in addition to the number of species per country. In the same chart the response indicator needs to have amount of financial and material resources mobilized.	Thank you for this comment. This is from a published example. The topic of indicators is dealt with in further detail in the second order draft
Government of Germany	Yes	6	24	681	25	683	Figure 6.6 and Table 6.6: Both figures are meant to present DPSIR Frameworks. However, currently they do not correspond perfectly. What are the terms in the lower figure? Examples of indicators? If so, examples are not at all comprehensive.	Thank you for this comment. We have taken it into consideration in the second order draft (see Box on the DPSIR Framework in the second order draft)
Mandivenyi, Wadzanayi; Araya Quesada, Marianela; McLoughlin, Austein	No	6	25	684	25	686	We would appreciate having an additional opportunity to review this text on governance of biotechnology once developed. As a reminder, the CBD and CPB are relevant instruments to this topic and could be included. A balanced text is suggested.	Thank you for your comment. There will be an external review of the second order draft (tentatively planned late 2021)
Genovesi, Piero	No	6	25	688	26	707	I suggest to consider the models proposed in https://www.eea.europa.eu/publications/information-system-invasive-alien-species .	Thank you. This point has been considered in the second order draft
White, Michael	No	6	25	698	25	700	This is the problem ...	Thank you for your comment.
White, Michael	No	6	25	700	26	706	... and this the solution	Thank you for your comment.
Schaffner, Urs	No	6	26	706	26	706	Something seems to be missing here; which knowledge gaps?	Thanks for this suggested change. We have corrected it in the second order draft.
de La Harpe, Marylaure	No	6	26	710	26	713	To me this is very important info for the potential readers of the final version. Intergovernmental synergies seems to play a key- role in the strategic management of IAS. This could be highlighted more strongly in my opinion. The "Adaptive-collaborative" approach from fig. 6.5 could be therefore here	Thank you. More detail on this topic is covered in section 6.4 in the second order draft
White, Michael	No	6	26	710	26	712	'Transboundary' is a problem caused by humans (i.e. countries), rather than just wider spp distribution EOO (extent of occurrence)	Thank you. It is indeed caused by humans
Guillao, Jo Ann	No	6	26	730	26	730	Add: Indigenous and local knowledge (ILK) is vital for inclusive governance and management of AIS.	Thank you very much. A literature review on IPLC and ILK and governance and management across the assessment, and especially in chapters 5 and 6, answers this issue
White, Michael	No	6	26	746	27	752	i.e. 'direct democracy' rather than unrepresentative 'democracy'. It is a 'top-down' problem	Thank you for your comment.
White, Michael	No	6	27	761	27	761	And understanding	Thank you. This point has been considered in the second order draft (though this specific paragraph has been deleted)
de La Harpe, Marylaure	No	6	27	763	27	766	Again to my view this is a key-message for strategic implementation of IAS management by each country. To me the all paragraph might be shortened and the key message brought forward.	Thank you, the key messages are presented in the executive summary of the second order draft
Yiu, Evonne	No	6	27	2390	74	2435	You can refer to the International Partnership of the Satoyama Initiative (PSI) for a collection of more than 190 case studies on implementing landscape approaches and also grey literature synthesizing the on the ground experience. https://satoyama-initiative.org/	Thank you, but these are not specifically about invasive alien species and therefore will not be included in the second order draft
Day, Roger	No	6	28	773	28	778	It would be good if the tools and methods discussed could address the issue of how effectively to achieve coordination without necessarily having a command and control arrangement.	Thank you for this useful point. It has been considered in the second order draft, and in particular in section 6.4
White, Michael	No	6	28	784	28	785	Westernised law is based on property rights - very unlike traditional values (IPLC)	Absolutely, and this is considered wherever appropriate across the assessment and in Chapter 6, based on the results of the literature review, which includes tenure and access as variables.
Government of Ethiopia	Yes	6	28	788	29	793	Arranging forums for debates and dialogues, whereby relevant actors come together and discuss and debate on critical issues of IAS that can create a fertile ground and favourable environment for improved collaboration.	Thank you. This has been considered in the second order draft, in particular in section 6.3.
White, Michael	No	6	28	788	29	793	Good	Thank you for your comment.
Shackleton, Ross	No	6	28	788	28	788	Maybe define collective action?	Thank you very much. This term is defined in the glossary of the second order draft.
Rüegg, Simon	No	6	29	780	30	812	It may be an option to consider governing IAS through the lens of health and well-being, i.e. in a one Health framework with outcomes defined for health and well-being at the levels of humans, animals and ecosystems and further outcomes in the realms of environment, society and economy. Focussing on a positive co-constructed definition of health rooted in values and constructs prevailing in the concerned site (relating to the definition in Chapt 5), indicators which leverage motivation can be identified to align efforts. This builds on the leverage points in complex systems by donella meadows in conjunction with non-equilibrium social science and policy. Refs: http://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/	Thank you, please refer to section 6.7 where we have developed this theme
Niemiec, Rebecca	No	6	29	786	29	787	It's also challenging because there are often norms against reaching out to others to coordinate efforts: social perceptions that others aren't interested in invasive species control and willing to cooperate can be a significant barrier (e.g., Niemiec et al. 2019; Ma et al. 2018)	Thank you, this point has been considered in sections 6.2 and 6.4 of the second order draft.
Niemiec, Rebecca	No	6	29	788	29	793	This is a great review. Some additional citations that might be relevant are: Ravnborg, H. M., & Westermann, O. (2002) Agricultural Systems, Niemiec et al. (2019), Conservation Biology, and Graham et al. (2019), Conservation Biology. These highlight the importance of demonstrating to actors how invasive species create interdependencies, emphasizing positive incentives over enforcement of sanctions, and building community social capital and developing new norms around cooperation. The Ravnborg and Westermann and Niemiec et al. (2019) papers report specifically on effective interventions for promoting community-scale collective action for invasive species.	Thank you. This has been considered in the second order draft, in particular in section 6.3.
Maclean, Kirsten	No	6	29	793	29	793	Consider adding in text about processes to build trust - e.g. Maclean, K., Farbotko, C., & Robinson, C. J. (2019). Who do growers trust? Engaging biosecurity knowledges to negotiate risk management in the north Queensland banana industry, Australia. Journal of Rural Studies, 67, 101-110. doi: https://doi.org/10.1016/j.jrurstud.2019.02.026 draw on the work of Stein and Coleman (see later for ref) to consider how the four kinds of trust (dispositional, affective, procedural, rational) can build or erode trust of growers in biosecurity risk management information and knowledge. They argue that governments can aim to build different forms of trust, and down play others. Stern, M.J., Coleman, K.J., 2015. The multidimensionality of trust: applications in collaborative natural resource management. Soc. Nat. Resour. 28 (2), 117-132. https://doi.org/10.1080/08954202.2015.1041110	Thank you, this issue has been included in the second order draft, but our systematic literature searches returned other references
Maclean, Kirsten	No	6	29	793	29	793	Suggest adding in 'understandings of and conceptualisation of risk' here as well. As different groups may have different understandings of risk and this then influences how they may choose to get involved in collection action, or place based action for biosecurity risk management. This also then relates to the kind of knowledge and information they see as valuable and useful for their on ground management activities. The following reference, yet to be published (anticipate early 2021) speaks directly to this issues, and suggests ways to overcome it, with Indigenous Australians involved in biosecurity risk management. Maclean, K., C.J., R., Bock, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. Journal of Cultural Geography another reference that would be useful to cite here is: Muller, S., Power, E. R., Suchet-Pearson, S., Wright, S., & Lloyd, K. (2009). "Quarantine Matters!": Quotidian Relationships around Quarantine in Australia's Northern Borderlands.	Thank you. This has been considered in the second order draft
Thompson, Ian	No	6	29	795	29	805	Effective grass-roots organisations, while informed by science are very socially driven bodies. This is recognised in Table 6.7 but the social and behavioural science around effective community action could be highlighted more in the text.	Thank you for this comment. Further detail is provided on this topic in the section 6.4 of the second order draft
White, Michael	No	6	29	795	29	805	New Zealand very good, both for community and government departments; 'report a pest' hot-lines	Thank you, in the second order draft, we have decided to include another example of collaborative governance in New Zealand
Niemiec, Rebecca	No	6	29	803	29	805	It might be worth mentioning the different types of collective action covered in Graham et al. (2019): externally led, community led, co-managed, and organizational coalition	Thank you. This has been considered in the section 6.4 of the second order draft
Government of Germany	Yes	6	29	807	30	811	Please check: Table 6.7 lists five principles while in the previous para it talks about four.	Thanks for picking this up. We have made the correction in the second order draft

O'Brien, Karen	No	6	29	807	29	807	A missing principle that may not be included in IAS management initiatives is prioritized values, which is reflected in the shared goal, but could be specified in order to capture how values drive collective management and how they may conflict with values prioritized at other scales of governance.	Thank you, this table has been removed but we agree with your comment (please refer to Chapters 1 and 5 for more information).
Mariño, Juana	No	6	30	815	30	823	Mention to national - local interface in terms of policies and regulations could be added.	Thank you. This has been considered in the second order, in particular in section 6.3.
White, Michael	No	6	30	834	30	839	Covid means virtual conferencing and working remotely is now easy and acceptable; and low CO2	Thank you for making this point. It does not seem to require changes to the text.
Government of Ethiopia	Yes	6	30	843	31	873	Devlin and Grafton (1998:137) also indicated that "any policy that is implemented in an "unsuitable" milieu is doomed to failure. To be successful, a policy must be implemented in an environment in which rules and codes of behavior conducive to that policy exist."	Thank you. This has been considered in the second order draft, in particular in section 6.3.
Government of Germany	Yes	6	30	846	30	850	Bioeconomy development, at national, regional and international levels, could appear as a major lever for limiting the negative impacts of IAS.	Thank you for this comment - economic incentives are covered in further detail in the second order draft (6.5).
Rüegg, Simon	No	6	31	892	31	892	To navigate the realms of complexity it may be useful to refer to the Cynefin framework: https://en.wikipedia.org/wiki/Cynefin	Thank you for your suggestion, but we have chosen not to include this would add too much complexity and would be out of the scope of this assessment.
Guillao, Jo Ann	No	6	31				Add: Diverse customs, traditions and laws of IPLCs are crucial in holistic and collaborative approach in managing IAS.	Thank you for your comment. The experts have conducted a literature review on IPLC and ILK and governance and management across the assessment, and especially in chapters 5 and 6, which also incorporate all of the results from the ILK dialogue workshops
White, Michael	No	6	32	893	32	902	Figure 6.8: is good. Greed and ignorance are two major drivers of policy failure	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Government of Germany	Yes	6	32	903	32	904	Some text seem to be missing here. Or is the text in line L904 a sub-headline in a section 'Building governance capability'? Where is the next sub-headline?	Thank you. This has been dealt with in the second order draft
Lieurance, Deah	No	6	33	912	33	912	I'm not sure what this figure contributes (is it finished)	Thanks for this suggested change. We have considered this while editing the second order
Rüegg, Simon	No	6	33	912	33	912	Table 6.8: a capacity which seems to be missing is inclusiveness/ participation. In one health it has also been framed as knowledge integration capacity: https://www.who.int/bulletin/volumes/96/3/17-202705.pdf	Thank you. This has been considered in the second order draft, and further in section 6.4.
Government of Germany	Yes	6	34	918	35	949	Please consider adding "Mainstreaming IAS management into bioeconomy development strategies".	Thank you for this comment - economic incentives are covered in further detail in the second order draft (6.5).
Day, Roger	No	6	34	919	35	948	These are good points but there seems to be a particular emphasis on national level considerations. There is some implication of regional/international issues, but perhaps they need to be more explicit.	Thank you for this suggestion, we have included it in the second order draft.
Schaffner, Urs	No	6	34	924	34	924	NISSAP instead of NISAP	Thanks for this suggested change. We have corrected it in the second order draft.
O'Brien, Karen	No	6	34	927	34	928	Intergenerational sustainability is implicit in sustainability, but the notion of intergenerational engagement with IAS policies and practices is important and the chapter could highlight the voice of youth and importance of education and supporting leadership capacities among younger people.	Thank you. This has been considered in the second order draft.
Government of Ethiopia	Yes	6	34	934	34	935	Stakeholder analysis' may be mentioned as a method.	Thank you. This has been considered in the second order draft
White, Michael	No	6	34	936	34	939	Essential. Governments often fail to do EIAs for their own projects	Thank you for your comment.
Guillao, Jo Ann	No	6	34				Add: The actions of IPLCs, building on their traditional knowledge, can complement scientific solutions and strengthen holistic, ecosystem-based approaches to the identification, assessment, monitoring, and control or eradication of IAS (Source: Local Biodiversity Outlook 2, 2020)	Thank you very much. A literature review on IPLC and ILK and governance and management across the assessment, and especially in chapters 5 and 6, answers this issue
Rüegg, Simon	No	6	35	946			It may be worth explicitly referring to non-equilibrium social sciences and policy, which seems pertinent to revise previous governance approaches in the light of recent advances in behavioural economics: https://lnk.springer.com/book/10.1007%2F978-3-319-42424-8	Thank you for your suggestion, but we have chosen not to include this would add too much complexity and would be out of the scope of this assessment.
Mariño, Juana	No	6	35	958	35	958	This sentence needs some editing.	Thank you. The questions section has been deleted in the second order draft
Shimura, Junko	No	6	36	956	63	2050	Legal and regulatory mechanism to address unintentional introductions are not sufficiently covered in this section. It is critical for border measures to identify living organisms that are either commodity or contaminants to be intercepted.	Thank you for your comment. We have developed the sectoral sub-section to include mechanisms aimed at addressing unintentional introductions.
Takehara, Mari (Government of Japan)	Yes	6	36	956	66	2143	We believe that reviews of key legislations, lists and management systems (administrative agencies) would be useful.	Thank you. Table 6.9 provides a rough overview of these at an international level. We also cite documents that have done such an exercise.
Thompson, Ian	No	6	36	956	36	1163	This section could highlight more the potential, perhaps with an example, of regulatory instruments creating economic or commercial incentives for better practice. It is recognised at Line 970 but not expanded on. Commercial measures may be relatively cost effective.	Thank you. We see the value of highlighting such measurements and have done so in the second order draft (6.2.7. Sectoral legal and regulatory options). We do in this section an in-depth evaluation of different current/possible instruments.
Mariño, Juana	No	6	36	957	36	965	Despite being related to questions 2 and 3, it would be convenient to include a question explicitly relating to the "effectiveness" of the currently available policy options. Likewise, a question regarding the link between governance and regulatory options could be in place here.	Thank you. The questions section has been deleted in the second order draft
Government of Germany	Yes	6	36	958	36	958	Please delete 'of invasive'.	Thank you. The questions section has been deleted in the second order draft
Brooks, Thomas	No	6	36	967	37	1029	This section would be much strengthened with addition of specific elements of legal frameworks, eg adoption of lists of regulated species. Also, emphasise that many countries and regions have established and widely implemented obligations to control or eradicate priority invasive species. EU Regulation 1143/2014 could be mentioned as a specific example.	Thank you, agreed
Genovesi, Piero	No	6	36	967	37	1029	I would underline that several countries and region such as the European Union, Japan, South Africa, have introduced obligations to control/eradicate priority invasive species, in some cases with positive outcomes.	Thank you. This is added as suggested in the second order draft
Genovesi, Piero	No	6	36	967	37	1029	The para is very general, and does not summarise concrete elements of a legal framework. I would suggest to provide clear indications on the most effective concrete measures, for example mentioning the adoption and enforcement of lists of regulated species (black lists) or of frameworks that impose the screening of any proposed import of alien species (white list, as in the case of New Zealand, Australia, Iceland, Norway).	Thank you for your comment. We have added concrete elements of legal frameworks with a specific focus (i.e., the adoption and enforcement of lists or import screening) in subsequent sections (6.3.2 and 6.3.2). In this paragraph, we focused on the overall problems faced by current legislation and regulations. The effectiveness of the proposed prevention approaches is
White, Michael	No	6	36	967	36	987	These are rarely available in indigenous languages	Thank you. This has been added in the second order draft
Day, Roger	No	6	36	975	38	1058	There are several very broad generalisations here. I suggest either they are made more specific or examples of the broad generalisations are given. Of course there are cases where all these occur, but there are also cases where the problems have been surmounted. So a list of rather generalised problems doesn't	Thank you for your comment. The section was removed as part of the chapter edits to reduce length so no change required.
Government of Ethiopia	Yes	6	36	979	36	980	There is a notion of 'policy coordination' that may help to coordinate policy instruments. Policy instruments are part of or are elements of a policy and unless the policy is coordinated, they cannot be coordinated also.	Thank you very much. We clarify our idea of coordination in the second order draft. Here we talk about coordination in the context of alignment of policies focused on the same problem but in different contexts (i.e., transport, agriculture, Biotechnology).
Government of Germany	Yes	6	36	989	36	989	For better understanding, please replace "Form" with 'From'.	Thank you. This is changed in the second order draft as suggested
White, Michael	No	6	36	989	36	995	Enforcement may barely exist	Thank you. This is edited to accommodate the content in the second order draft
Karayannis, Theofanis	No	6	36	991	36	993	This text is very out-of-date with regard to IMO's ballast water management requirements and this needs to be rectified. The text references the voluntary guidelines that existed in the 1990s but this has been superseded by the BWM Convention, which is of course a global legally binding treaty. Therefore the reference needs to be changed from the guidelines to the convention and obviously moved into the examples of binding treaties. At the same time, what could be included in the non-binding portion of the text is the Biofouling Guidelines (also global, but voluntary).	Thank you very much. In the second order draft, the text was changed based on the suggestions, replacing the IMO Guidelines for the Control and Management of Ships Ballast Water by the International Convention for the Control and Management of Ships' Ballast Water and Sediments. Also, the BWM Convention was placed as a binding treaty. Last, as suggested, the Biofouling Guidelines were included as a voluntary global instrument.
Takehara, Mari (Government of Japan)	Yes	6	36	991	36	993	The draft report refers the IMO Guidelines for the Control and Management of Ships Ballast Water, adopted in 1997 as the non-legally binding instrument, but in 2004, the International Convention for the Control and Management of Ships' Ballast Water and Sediments was adopted and entered into force in 2017 (http://www.imo.org/en/OurWork/Environment/BallastWaterManagement/Pages/Default.aspx). In order to update the information appropriately in this report, we request to delete 'IMO Guidelines for the Control and Management of Ships Ballast Water' in the line No. 992 and insert 'International Convention for the Control and Management of Ships' Ballast Water and Sediments' after 'Convention on Biological Diversity' in the line No. 991.	Thank you for your comment. The text was changed in the second order draft based on the suggestions, replacing the IMO Guidelines for the Control and Management of Ships Ballast Water by the International Convention for the Control and Management of Ships' Ballast Water and Sediments. Also, the BWM Convention was placed as a binding treaty.
Genovesi, Piero	No	6	36	993	36	994	I would add the EU Regulation 1143/2014 among the regional tools.	Thank you. This is added as suggested in the second order draft
Jewell, Susan	No	6	37	998		1001	My comment is about this sentence: "Fourth, most national level instruments are focused on either preventing, eradicating, or controlling IAS (rather than an integrated approach across invasion stages), with most of these focusing on the prevention of unwanted introductions from other countries." My comment is that the sentence is under a subject of limitations, and it implies that focusing only on "preventing," rather than an integrated approach, is a limitation. I think focusing on prevention in particular and in a coordinated, intense fashion is extremely effective and could preclude the need for invasion control (except where species have already invaded). Obviously, most, if not all, countries likely have invasive species that should be controlled, and control is needed.	Thank you for your comment. Edits have been made to the sentence to accommodate the points of the reviewer. Now we highlight prevention as the best first step and the need to consider all stages of invasions to deal with IAS, currently a problem with a political unit.
White, Michael	No	6	37	1001	37	1003	Example is IAS introduced through economic trade causing loss of Organic eco-labelling certification	Thank you. We have added an example to show the point made in the second order draft.
Government of Ethiopia	Yes	6	37	1005	37	1005	From an implementation perspective, before talking about parts of the problem, it can be generally concluded that there are total deficiency of implementation of IAS policies and strategies, due to lack of commitment and determination, in addition to lack of coordination.	Thank you for your comment. We have highlighted that the issue referred to in the comment does not rank high in jurisdictional priorities relevant for the prevention of IAS introductions in the second order draft.
Rüegg, Simon	No	6	37	1005			It may be worth mentioning that most governance measures take wrong assumptions as to human behaviour. A prevailing principle is the belief that more information leads to better decisions, which has repeatedly been disproven. Consequently, policy options should focus on the development of heuristics and narratives based on sound science and inclusive consultation.	Thank you. This is an excellent point we deal with in both sections 6.6 on knowledge and 6.7 transformative change
White, Michael	No	6	37	1005	37	1012	Correct. Even though CBD in place since 1992	Thanks for the comment
Government of Ethiopia	Yes	6	37	1010	37	1012	Should include 'less attention and priority'	Thank you. This is edited to accommodate the suggestion in the second order draft
O'Brien, Karen	No	6	37	1010	37	1010	This sentence seems to be critical in that it identifies the piecemeal, fragmented, and partial responses resulting from low visibility as leading to ineffective strategies. The final section on transformative change could pick up on this and consider the factors that would contribute to an integrative and coherent	Thank you for this suggestion. As pointed out, this is a dimension highlighted in section 6.8 on transformative change.
White, Michael	No	6	37	1019	37	1021	Exactly! No coherent holistic approach across all stakeholders	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Mariño, Juana	No	6	37	1035	38	1058	This sentence needs some editing.	Thank you. The text in the Box has been edited in the second order draft.
Jewell, Susan	No	6	37	1042		1043	One notable exception is from the United States and focuses on prevention (see "A century of injurious wildlife listing under the Lacey Act: a history" https://www.reabic.net/journals/mbi/2020/3/MBI_2020_Jewell.pdf)	Thank you very much. In the second order draft, we rephrased the section to "With notable exceptions, most international and national instruments focus on preventing introductions rather than eradication or mitigation of existing IAS". This accommodates the points made in

Kamigawara, Kenji	No	6	38	1042	38	1043	This sentence contradicts the early literature which pointed out that "legal and institutional frameworks tend to be stronger on preventing introduction than on mitigating their impacts. There is often no basis for taking legal measures to tackle accumulated problems linked to past, untreated invasions" (Shine et al., 2000). Shine et al. reiterated that "national frameworks tend to be much stronger on preventing introduction than on mitigating their impacts. Very few countries have a comprehensive basis for taking legal measures to tackle accumulated problems linked to past, untreated invasions" (Shine et al., 2005). Kamigawara et al. confirmed this tendency at least in Japan and France (Kamigawara et al. What kind of legislation can contribute to on-site management?: Comparative case studies on legislative developments in managing aquatic invasive alien plants in France, England, and Japan, Journal of International Wildlife	Thank you. In the second order draft, we rephrased the section to "With notable exceptions, most international and national instruments focus on preventing introductions rather than eradication or mitigation of existing IAS". This accommodates the points made in the comment.
Jewell, Susan	No	6	38	1049		1049	Same as above -- "Focus only on a single stage of the invasion process." Why is preventing an invasion a limitation?	Thank you. We rephrase the statement to reflect that the deficiency relates to a lack of consideration of possible implementation failures.
Shimura, Junko	No	6	38	1051	38	1059	Add a lack of instrument, such as alerting mechanism, on the risk of biological invasions associated with broad spectrum of living organisms as environmentally hazardous articles (moving through trade, transport, tourism, development aid, military activities etc). Those transports of living organisms via various pathways are not recognized dangerous under the current regulatory framework related to IAS. Ref: https://www.unecce.org/fileadmin/DAM/trans/doc/2019/dgacl10c3/UN_SCETDG-55-1NF46e.pdf	Thank you, we proposed instruments is now being evaluated in the second order draft
Thompson, Ian	No	6	38	1054	38	1056	These problems of low visibility of IAS could be a platform to highlight the need for more research on impact of IAS on biodiversity and ecosystem function. One of the visibility problems is the frequent long lag time between introduction and impact.	Thank you. This is an excellent point now highlighted in the text by adding "due to a limited knowledge of the impact of IAS on biodiversity and GQL" in the second order draft
White, Michael	No	6	38	1057	38	1058	E.g. payments for IAS removal (bounties)	Thank you very much. Here the focus is not management-eradication but prevention of introduction. However, the point is also added in the second order draft.
Government of Ethiopia	Yes	6	38	1064	38	1064	Should include 'early detection'.	Thank you very much. This is added as suggested in the second order draft.
Day, Roger	No	6	38	1067	38	1067	See my earlier comments on international agreements	Thank you, we have reviewed this sentence in line with this comment in the second order draft
White, Michael	No	6	38	1071	38	1077	The media charade on the world stage vs the cost and labour of really doing it	Thank you. In the second order draft, we added text to highlight the point made by the reviewer "highlighting the legal and economic difficulties of the implementation of such provisions"
Government of Ethiopia	Yes	6	38	1075	38	1077	It is also due to lack of support from CBD.	Thank you. In the second order draft, we added text to highlight the point made by the reviewer "highlighting the legal and economic difficulties of the implementation of such provisions"
Thompson, Ian	No	6	38	1075	38	1077	Could add a reference to the limited reporting on implementation too or shared and relatively comprehensive reports on status of IAS introductions and spread	Thank you. As suggested we now state in the second order draft that "Another reason [for the IAS knowledge limitations] is the lack of reporting standards on implementation status and success, or status of IAS introductions and spread"
White, Michael	No	6	39	1085	39	1088	I noticed with real-time SDG reporting (SDG dashboard) some partners still don't bother	Yes, this is a point of importance, but hard to determine how this affects policy/regulation development or implementation.
Government of Germany	Yes	6	39	1089	39	1090	Please replace "address" with 'addressing' and add '(... relating to IAS) which (are characteristic ...)' . The sentence would read "... when addressing the limitations of current policy instruments is the broadness and generality of the provisions relating to IAS which are characteristic ..."	Thank you. In the second order draft, the section was restructured, so the changes do not reflect the context of the ideas presented now.
Karayannis, Theofanis	No	6	39	1094	39	1096	The binding nature of IPPC is also the case for the BWM Convention: as with all IMO conventions, it is legally binding for all its Parties, which have an obligation to implement and enforce it.	Thank you. We added the BWM as an example of a treaty with clear directions on how we should implement the instrument provisions.
Thompson, Ian	No	6	39	1094	39	1098	The 'narrow biodiversity focus of the IPPC' is not clear. It is not clear what this means - plant pests and plants as pests?	Thank you. We added text to clarify the focus of the IPPC and BWM in the second order draft
Government of Germany	Yes	6	39	1095	39	1095	It is proposed to explain the core concept of IPPC in a footnote or in an additional box.	Thank you. We added text to clarify the focus of the IPPC and BWM in the second order draft
Schaffner, Urs	No	6	39	1100	39	1101	This should be toned down, there are clear cases where impact is experienced beyond the local scale, e.g. water shortage at watershed level, allergies due to long-distance pollen transport	Thank you, the section was removed as part of the chapter edits to reduce length so no change required.
White, Michael	No	6	39	1100	39	1103	Often without permission of IPLCs	Thank you. The involvement of IPLC in governance decisions is covered in Section 6.4
O'Brien, Karen	No	6	39	1112	39	1112	The prevalence of reactive responses could be highlighted in the section on transformative change, drawing attention to the importance of systems thinking, adaptive leadership, single, double and triple-loop learning, and approaches that contribute to anticipatory rather than reactive responses.	Thank you. This is an excellent point we deal with in section 6.7 on transformative change
White, Michael	No	6	39	1112	39	1113	Absolutely. Prioritising for political re-election is paramount. Nature vs economic well-being	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Brooks, Thomas	No	6	39	1115	40	1124	This paragraph can be updated by the new work of ISSG documented and available at http://www.issg.org/pdf/Report_Invasive-Species-Integration-of-IUCN-data_Policies.pdf and https://www.bipindicators.net/indicators/adoption-of-national-legislation-relevant-to-the-prevention-or-control-of-invasive-alien-species .	Thank you. In the second order draft, the text in the paragraph has been updated based on the work by IUCN ISSG, as suggested. We have also added a figure based on the mentioned report highlighting the degree of national adoption of IAS relevant issues.
Genovesi, Piero	No	6	39	1115	39	1124	IUCN ISSG is compiling information on legal instruments at the global scale, with data at the national level. Important to stress that data will be available soon. See also comment on indicators, below.	Thank you. In the second order draft, we have also added a figure based on the mentioned report highlighting the degree of national adoption of IAS relevant issues.
Kanneh, Ambrose Bockarie	No	6	40	113	41	1147	One major challenge with regards to the effectiveness of sectoral legal and regulatory options for the control of IAS is the lack of coordination between and among sectors at the national level. Individual sectors seeks mostly their own interest with regards legal regulatory options and fails to look at the impacts of	Thank you for this suggestion. We have chosen to include it in section 6.3 where we specifically deal with the need to integrate and coordinate legal and regulatory instruments.
Lieurance, Deah	No	6	40	1131	40	1132	I like this figure - clearly illustrates the content	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Shackleton, Ross	No	6	40	1132	40	1132	This figure is a little confusing. I think there might be something wrong with the caption. Is the thin blue line the number of agreements? The caption suggests this line is actually the number of countries, but there are only roughly 180 countries globally.	Thank you, we have now removed this figure so the comment does not longer apply
Mariño, Juana	No	6	40	1133	57	1796	Limiting the analysis to the policy options related to specific "sectors" and conservation leaves out cross cutting "territorial" policies and regulation that, without being explicitly oriented to IAS or to a specific "sector", have an influence on the control of progress and mitigation of effects, namely policies related to land use change, including urban development and sprawl. Land use planning and urban development have also a huge impact on protected areas as well as on	Thank you very much. We agree with the point made and consider this a factor that deserves its section (Intersection with Climate change and land degradation mitigation and adaptation strategies). However, we discuss the perverse incentives of different policies in the section.
Government of Germany	Yes	6	40	1138	42	1187	There are efforts around the world to deal with this - notably in the EU. The "Farming for Biodiversity - Results based agri-environmental payment schemes" (www.rhans.eu) example could also be used as a transferable example how to gear farming towards IAS management targets.	Thank you. We add this and an example in the production sector section of the second order draft.
Government of Germany	Yes	6	40	1144	40	1144	Please consider replacing "livestock breeding" by "animal husbandry" or "livestock husbandry" because the latter involve a broader range of relevant human activities.	Thank you very much. The phrase was changed to "livestock husbandry", in the second order draft as suggested.
Mandivenyi, Wadzanayi; Araya Quesada, Mariana; McLoughlin, Austin	No	6	40	1144	40	1145	The term "living modified organisms" is defined in the Cartagena Protocol on Biosafety. This term only appears here without context. It may be beneficial to include a footnote referencing the definition from the protocol if not previously discussed.	Thank you, this is now addressed in the second order draft
Guillao, Jo Ann	No	6	41	1160	41	1163	Comment: Climate change has been recorded to have impact on the spread or presence of IAS. Hence, it would be good to include the Framework as discussed in previous chapters. On page 41, there is a table showing international legal and institutional framework by sector. It is possible to add few sentences on how decisions in other processes like those relating to climate change (UNFCCC) and sustainable development (SDGs) can be linked to other mentioned "framework" in table 6.9 in order to address coherence or at least attempt to address cross-sectional impacts of IAS?	Thank you. The UNFCCC has been added to the list of frameworks in the second order draft
Karayannis, Theofanis	No	6	41	1161	41	1163	The arrow on the right side of Table 6.9 is confusing, as it seems to imply a decreasing level of enforcement or binding nature of the items listed to its left, which is not the case (for example IMO conventions are fully binding and enforceable but IMO is seen next to the middle of the arrow)	Thank you. In the second order draft the figure has been redrawn to reflect the point made.
Day, Roger	No	6	41	1162	41	1163	Table 6.9. This table is not really comparing like with like. Some entries are specific conventions or agreements directly concerning Invasives (eg SPS, IPPC); others are organisations for whom Invasives may only be a small part of their work.	Thank you for your comment. The goal is not to compare but to list existing frameworks within each sector.
Lieurance, Deah	No	6	41	1162	41	1163	What does "Find next" mean in this table	Thank you. This was a typo when extracting the figure from the source. The figure has been redrawn to remove this error.
Day, Roger	No	6	41	1167	41	1169	I don't think this is correct, at least for plant health. ISPM11 (pest risk analysis) explicitly includes a section on non-commercial and environmental consequences (section 2.3.2.4) and an annex on the scope of the IPPC in regard to environmental risks.	Thank you for your comment. The section was removed as part of the chapter edits to reduce length so no change required.
Rüegg, Simon	No	6	42	1174			I am not sure, if the authors intentionally focus on conservation as the point of reference. From a complex systems perspective it may be beneficial to also show inconsistencies between bipoles, e.g. agriculture-public health, military - public health, diplomacy/strategic - agriculture, etc. potentially it would deserve a network map of the sectorial linkages to generate awareness of the multiple takes influencing IAS governance. A very blunt example is the "America first" policy versus global solidarity in the fight against COVID.	Thank you. We have used conservation as the point of reference due to the focus on biodiversity as the sector. The addition of Bipoles, while interesting, will diverge the focus on the section. Nonetheless, we have added some of these contrasts in specific sections dealing with agriculture, Trade, extraction systems, and public health in the second order draft.
Day, Roger	No	6	42	1181	43	1222	I'm not sure all these examples are really perverse incentives. In some cases a trade-off may have been made intentionally. And any policy or regulation is likely to have some positive and some negative impacts.	Thank you for your comment. They are following the definition of the CBD
White, Michael	No	6	42	1193	42	1196	Also Rachel Carson's book 'Silent Spring' mentioned above (line 1185)	Thank you. Reference added to the second order draft
Setsaas, Trine Hay	No	6	42	1197	42	1204	Is transport (land and sea) covered by this section? How about industry?	Thank you very much. Transport and industry are dealt with in the following sections of the second order draft
Takehara, Mari (Government of Japan)	Yes	6	42	1526	42	1528	We request to delete the sentence 'Discharge of ballast water ... of aquatic IAS (section 3.3.1.6)', because the International Convention for the Control and Management of Ship's Ballast Water and Sediments was adopted, entered into force in 2017, and appropriately implemented, it is not appropriate to state ballast water as present principal driver.	Thank you, this sentence has been deleted from the second order draft
Government of Germany	Yes	6	43	1212	43	1215	There are also other forces at play at the moment which are arguing for more ecologically based solutions (see High Level Panel of Experts 2019 on Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition).	Thank you very much. Although the point highlighted in the comment is correct, our focus here is how regulations focused on protecting biodiversity or sustainable agriculture can be perceived as a perverse incentive in another sector. However, this is a point we highlight in the
Thompson, Ian	No	6	43	1212	43	1215	This could also cover the use of potentially invasive species in conservation agriculture - acacias, eucalypts or cover crops to stabilise soil and land (sterile hybrids and others). Its an area of contention too.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Lieurance, Deah	No	6	43	1224	43	1224	General Comment: I think at some in this section I think it should be mentioned that the US has inadequate biosecurity measures and regulation.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations and as such the point raised may be consider a policy recommendation for a specific country.
White, Michael	No	6	43	1233	43	1236	Online shopping must play some role - who checks the deliveries?	This is an excellent point we deal with it in the trade section below.

Government of Germany	Yes	6	43	1235	43	1236	For better understanding, please correct: '(...primarily causes) (environmental impacts), it (is coordinated ...). It is assumed that the sentence should read: "While the management and control of IAS primarily causing environmental impacts are almost exclusively coordinated by national level institutions."'?	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
White, Michael	No	6	43	1246	43	1248	USA is notorious for threatening other countries over perceived loss of future profits. Sanctions.	Thank you for making this point. It does not seem to require changes to the text.
Genovesi, Piero	No	6	43	1250	45	1320	I suggest to consider the guidelines included in: Genovesi P. & Monaco A. (2013) Guidelines for Addressing Invasive Species in Protected Areas. Plant Invasions in Protected Areas (ed. by L.C. Foxcroft, P. Pyšek, D.M. Richardson, and P. Genovesi), pp. 487–506. Springer Netherlands, Dordrecht. These include the following guidelines: (i) Raise Awareness on Biological Invasions at all Levels (ii) Integrate Invasive Species and Protected Area Management (iii) Implement Site-Based Prevention Actions as a Priority (iv) Develop Staff Capacities for all Aspects of Invasive Species Management (v) Set up Rapid Detection and Prompt Response Framework (vi) Manage Invasive Species Beyond the Protected Area Boundaries (vii) Implement Surveillance, Monitoring and Information Exchange Networks Rationale Limited awareness and concern of the public is a major constraint to prevention and mitigation of impact of IAS, and PAs should thus give priority to informing on this issue. In some cases also PA employees are not fully aware of the issue Addressing IAS requires strategic approaches, based on coordinated prevention as well as management measures. Dynamic nature of invasions calls for more proactive rather than reactive approaches to the issue, and to adaptive management. Prevention should be the first line of defence from invasions. Protected areas can do much in this respect, encouraging responsible behaviours by privates as well as enterprises, identifying most relevant vectors and pathways of invasion, or IAS expected to arrive to their territories, and developing focused measures to reduce risks. Prevention should also be linked to early warning and rapid response Capacity and awareness of PA officials and staff are crucial for applying most of the guidelines. Trained staff are key to effective management, and can contribute to communicate to the visitors as well as to the general public Early warning and rapid response is a key element of any strategic approach to invasions, as it is much more effective and cost effective than controlling invaders once they have established. It requires a coordinated framework for surveillance and monitoring activities, identification of invading species, assessment of risks, sharing of information, development of alarm lists and selection and enforcement of appropriate responses. Support by the public, and contingency action and funding are also very important The invasion of PAs often originates from the surrounding areas and this calls for a landscape perspective to planning. Establishment of buffer zones should be explored. To enhance prevention, PAs should cooperate with surroundings landowners and institutions, and lobby with competent authorities for implementing regulatory or voluntary measures to address	Thank you for your comment, this reference has been included in the second order draft
Government of Germany	Yes	6	44	1259	44	1262	This sentence states that there is no evidence that invasive species do not pose a threat to protected areas. However then, the box 6.4 only talks about marine invasives (which of course differ from terrestrial, the source Usher et al 1988 is rather old, and the source Enders et al. 2020 is missing in the list of references. It would be really good to add an explanation specifically on the importance of invasions for terrestrial PAs, and to add more recent literature sources (maybe Liu et al. 2020 - "animal invaders threaten protected areas worldwide" would contain relevant information). Because many stakeholders still believe that biological invasions are and will not really be a problem for terrestrial protected areas.	Thank you for your comment. We have rephrased the statement highlighting that invasive species do not threaten both marine and terrestrial protected species. We have also replaced the missing reference and older reference with more recent ones and added Liu et al. 2020 Nat Comm.
Hughes, Kevin	No	6	44	1264	44	1267	With regard to invasive species, protected areas and Antarctica, the authors may like to consider the paper: Hughes, K.A., and Convey, P. (2010). The protection of Antarctic terrestrial ecosystems from inter- and intra-continental transfer of non-indigenous species by human activities: a review of current systems and practices. Global Environmental Change 20: 96-112.	Thank you for this suggestion, we have included it in the second order draft.
White, Michael	No	6	44	1264	44	1271	Red List of Threatened Ecosystems is another useful tool; complements Threatened Species RL	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be
Day, Roger	No	6	44	1294	43	1296	If I've understood this correctly I don't think it's true for plant health. The IPPC requires contracting parties to conduct surveillance and report new invasives or changes in pest status.	Thank you for your comment. Yes, but here we are focusing many on biodiversity-related instruments, and so far, none of these focuses on monitoring.
Thompson, Ian	No	6	44	1294	44	1300	These remarks about biodiversity reporting are accurate but there are other arrangements where reporting on surveillance of biodiversity because of its production significance is quite good - fisheries status arrangements, OIE on animal diseases an IPPC on plant pests. These examples indicate that its not a technical barrier that prevents surveillance or may provide models.	Thank you very much. The point is correct. We have rephrased the section to highlight that the "technical barriers" appear to be specific for "biodiversity" focused international instruments.
Day, Roger	No	6	45	1302	45	1320	This list has some good points but I wouldn't say they are all directly related to legal and regulatory issues.	Thank you for your comment. We have streamlined these to only legal and regulatory issues.
Kanneh, Ambrose Bockarie	No	6	45	1302	45	1320	Another solution is the setting up of a legal and regulatory body at national level to look into the various challenges among sectors (Agriculture, health and conservation) for the control and prevention of IAS that will have positive impact on one or more other sectors.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested as phrased. However, the idea of coordination is one that the
Schaffner, Urs	No	6	45	1302	45	1320	The title refers to the Biodiversity sector, while all five points refer to protected areas only; this needs to be revised, since in numerous countries, e.g. Kenya, efforts are underway to integrated biodiversity conservation with sustainable land management (e.g. livestock management).	Thank you, these are now part of our solution to protected areas
Government of Ethiopia	Yes	6	45	1303	45	1304	Solutions for problems created by IAS related to the Biodiversity sector should not focus on PAs only. Instead it is appropriate to embrace other land use types as well, because IAS affects biodiversity in all areas of land uses and other natural ecosystems.	Thank you. We have removed the PA focus of the statement to a more general biodiversity-centred perspective.
White, Michael	No	6	45	1312	45	1314	Especially if IAS introduction was via economic trade – money vs nature	Thank you. The clarification was added to the second order draft
Government of Germany	Yes	6	45	1328	45	1328	Please delete "Caribbean reefs established" (it is mentioned twice).	Thank you for the comment. "Caribbean reefs" has been deleted from the second order draft.
White, Michael	No	6	46	1137	46	1138	Emma Hickerson also worked at Flower Garden Banks	Thanks fo pointing this.
Mc Kav, Fernando	No	6	46	1212	46	1253	Line 1214-1215, Barratt, 1214 Moran et al. 2018 citation is missing from the references list	Thank you for your comment. The references and citations have been corrected in the second
Mc Kav, Fernando	No	6	46	1212	46	1253	Line 1215, Van Driesche, Nowierski et al. 2020 citation missing from the references list	Thank you for your comment. The references and citations have been corrected in the second
Government of Germany	Yes	6	46	1342	46	1342	For better understanding, please explain "NIS fish"	Thank you for the comment. "NIS fish" is spelled out in the second order draft (non-
White, Michael	No	6	46	1347	46	1347	Caulerpa racemosa also spreading across the Mediterranean	Thank you for the comment. Unfortunately, it is hard to see on how it fits to the current context (of MPAs). Therefore, we have respectfully declined to incorporate your suggestion.
Government of Germany	Yes	6	46	1348	46	1350	Please complete the sentence (verb etc. is missing).	Thank you, this has been addressed in the second order draft
Acosta-Michlik, Lilibeth	No	6	46	1352	50	1542	Boxes are powerful instruments to provide evidence for the analysis. However, they should be used wisely by providing only relevant information that provide strong evidence on the argument provided in the main text. Box 6.5 is very long and does not justify the use for such boxes. I suggest that boxes should not be more than one page. If possible maximum of half a page, but then use more consistently across different sections, particularly for the different options being suggested in the chapter, highlighting evidence of best practices for these options using case studies.	Thank you for this suggestion. We have chosen to keep this and reduce the text so we focus only on how we can use cross-national coordination to deal with IAS introductions in a susceptible area of the world.
Day, Roger	No	6	46	1352	50	1542	The Antarctic Treaty is clearly important, but I'm not sure it deserves this much space when various other treaties and conventions get little or no specific	Thank you for your email. The case study has been reduced to a shorter box
Hughes, Kevin	No	6	46	1352	46	1352	Given the general lack of IAS within the Antarctic Treaty Area, and the terms commonly used by the Committee for Environmental Protection in guidelines and manual, the author may like to consider changing the title to 'Current Non-native Species Policy Arrangements for the Antarctic Treaty Area'	Thank you for this suggestion. We have chosen to include this sections as it provides an example of how we can use cross-national coordination to deal with IAS introductions in a susceptible
Mariño, Juana	No	6	46	1352	50	1542	The example on Antarctica is interesting, but it would be important to include case studies related to ecosystems / situations that are more widely applicable.	Thank you very much. We have rephrased the title as "The Committee for Environmental Protection as a coordinating body for Antarctic alien species problems"
Hughes, Kevin	No	6	46	1357	46	1357	Perhaps '...responsible for the islands IN THE SOUTHERN OCEAN north of 60°S?'	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Hughes, Kevin	No	6	46	1364	46	1365	Article 4 (6) prohibits all live animals being imported for food (not just birds): "Nothing in this Article shall apply to the importation of food into the Antarctic Treaty area provided that no live animals are imported for this purpose and all plants and animal parts and products are kept under carefully controlled conditions and disposed of in accordance with Annex III to the Protocol"	Thank you for this comment. In the restructuring of the box, we have removed the sentence from the second order draft
Hughes, Kevin	No	6	46	1369	46	1369	It would be helpful to make clear who would be issuing the permits (i.e. Treaty Party national governmental authorities)	Thank you. As suggested the name of the issuing organization was added to the second order
Government of Germany	Yes	6	47	1378	47	1378	Please check: The convention's abbreviation is CCAMLR	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Hughes, Kevin	No	6	47	1378	47	1379	At joint meetings of CCAMLR and the CEP, it was agreed that the issue of non-native species would be considered the responsibility of the CEP. As far as I am aware, in general, CCAMLR has not consider NNS issues to any great extent.	Thank you for making this point. It does not seem to require changes to the text.
Hughes, Kevin	No	6	47	1383	47	1384	It seems odd to mention ASPAs in a section describing the work of CCAMLR. While a small number of ASPAs protect marine environment, most protected values within ice-free ground. Also the ASPAs are managed by the CEP, not CCAMLR, so it may be useful to move this section.	Thank you for your comment. The section was removed as part of re-structuring/re-writing of the section to meet the length requirements.
Hughes, Kevin	No	6	47	1384	47	1386	Perhaps this text on ballast water should be moved elsewhere. While the resolution was agreed by CCAMLR in 2008, it was first agreed by the Antarctic Treaty Consultative Parties in 2006, and then the IMO's MEPC in 2007. See: https://www.atsq/devAS/MeetingsMeasure/365 and https://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Marine-Environment-Protection-Committee-(MEPC)/Documents/MEPC163(56).pdf	Thank you very much. We moved the text to the main text of the second order draft
Hughes, Kevin	No	6	47	1394	47	1396	Again, perhaps reconsider the use of the term 'IAS' in title and in line 1396	Thank you, we have removed all acronyms from the text of the second order draft
Hughes, Kevin	No	6	47	1400	47	1400	The only text I know of is where the Protocol does talk about taking practical steps to prevent accidental introduction of soil. See line 1365-1367.	Thanks for point out this. In the second order draft, we have rephrased the text to highlight the fact made in the comment.
Hughes, Kevin	No	6	47	1405	47	1407	While the rate of uptake by the ATS has been rapid compared with nation states (which often contain millions of people and complex societies and infrastructure) the relative simplicity of Antarctic operations (30 nations, each typically with one national organisation coordinating and delivering activities within Antarctic) should allow a very much more rapid delivery of good biosecurity practices. However, we currently lack evidence to demonstrate/quantify the implementation of different biosecurity measures across more than a handful of national programmes.	Thank you for making this point. We add the point on "a lack evidence to quantify the implementation of different biosecurity measures across more than a handful of national programs" to the paragraph of the second order draft
Government of Germany	Yes	6	47	1406			For better understanding, please explain the abbreviation "ATS".	Thank you very much. ATS is changed to "Antarctic Treaty System" in the second order draft

Hughes, Kevin	No	6	47	1417	47	1418	The numbers of tourists for the 2019/20 season was 74,401. See: IAATO. 2020. IAATO Antarctic visitor figures 2019–2020. Available at https://iaato.org/wp-content/uploads/2020/07/IAATO-on-Antarctic-visitor-figures-2019-20-FINAL.pdf	Thank you for making this point. We have added the new number to the text of the second
Hughes, Kevin	No	6	48	1425	48	1426	Comprehensive Environmental Evaluation (CEE)	Thank you, this has been removed from the second order draft.
Hughes, Kevin	No	6	48	1430	48	1434	Consider referencing here: AH McCarthy, LS Peck, KA Hughes, DC Aldridge. 2019. Antarctica: The final frontier for marine biological invasions. <i>Global Change Biology</i> 25 (7), 2221–2241	Thanks for this suggested reference. We have included it in the second order draft.
Hughes, Kevin	No	6	48	1434	48	1435	The current edition of the CEP Non-native species manual (2019) does reference the SCAR's code of conduct for the exploration and research of subglacial aquatic environments, which was endorsed by the ATCM through Resolution 2 (2017).	Thank you, we have removed this sentence from the second order draft
Hughes, Kevin	No	6	48	1435	48	1436	Before being presented to the CEP, the flow chart was published originally in Hughes and Pertierra, 2016: Hughes, Kevin A., Pertierra, Luis R.. (2016) Evaluation of non-native species policy development and implementation within the Antarctic Treaty area. <i>Biological Conservation</i> , 200, 149–159.	Thanks for this suggested change. We have included it in the second order draft.
Hughes, Kevin	No	6	48	1443	48	1444	It is not clear which islands are being referred to by 'maritime Antarctic islands under national control' that are north of 60°S. The South Sandwich Island are often considered to be within the maritime Antarctic biogeographic zone, but I am not sure if this is what is meant here. Same point applies to line 1447.	Thank you, this has been clarified in the second order draft
Hughes, Kevin	No	6	49	1460	49	1469	The text here very clearly articulates the difference in implementation of biosecurity practices across sub-Antarctic islands. This text (rightly) contradicts the examples given in the 'Box' within Chapter 5, page 43 line 1477. (see comments 51 to 54 given in this document)	Thank you. We have coordinated the points regarding biosecurity practices across sub-Antarctic islands between chapters 5 and 6 of the second order draft
Hughes, Kevin	No	6	49	1487	49	1496	I agree with the authors that progress has been made in the development of tools to help Parties consider and address non-native species issues; however, I wonder how well these are implemented into the practices of the Parties and their respective national operators. Some progress has been made with eradication of plants and invertebrates within stations, but biosecurity practices are often poor and monitoring is generally undertaken sporadically if at all. The text here could be interpreted in a rather positive way, but I wonder if the true situation is not considerably less positive in terms of delivery of practical action by the Parties in general to reduce NNS threats to Antarctic biodiversity. The point is made to some degree in lines 1492–1496, but I wonder if it could be made more	Thank you for your comment. In the second order draft, we have reduced this box but reflected this point elsewhere in the box.
Hughes, Kevin	No	6	50	1513	50	1514	The following paper also provides a good example that is relevant here: Hughes, Kevin A., Pescott, Oliver L., Peyton, Jodey, Adriaens, Tim, Cottier-Cook, Elizabeth J., Key, Gillian, Rabitsch, Wolfgang, Tricarico, Elena, Barnes, David K.A., Baxter, Naomi, Belchier, Mark, Blake, Denise, Convey, Peter, Dawson, Wayne, Fröhlich, Danielle, Gardiner, Lauren M., González-Moreno, Pablo, James, Ross, Malumphy, Christopher, Martin, Stephanie, Martinou, Angeliki F., Minchin, Dan, Monaco, Andrea, Moore, Niall, Morley, Simon A., Ross, Katherine, Shanklin, Jonathan, Turvey, Katharine, Vaughan, David, Vaux, Alexander G.C., Wrenkraut, Victoria, Winfield, Ian J., Roy, Helen E. (2020) Invasive non-native species likely to threaten biodiversity and ecosystems in the Antarctic Peninsula region. <i>Global Change Biology</i> , 26, 2702–2716. 10.1111/gcb.14938	Thanks for this suggested reference, but we had to reduce the length of this box due to word restriction and have decided not to include more examples
Hughes, Kevin	No	6	50	1526	50	1529	The text here refers well to the point made in comment no. 73 (above). Perhaps there could be a 'nod' in the earlier text to the points made here.	Thank you for making this point. It does not seem to require changes to the text.
Hughes, Kevin	No	6	50	1539	50	1540	The lack of funding available to the CEP to pursue conservation research is a major conclusion in: Hughes, Kevin A., Constable, A., Frenot, Y., Lopez-Martinez, J., McIvor, E., Njstad, B., Terauds, A., 4345 Liggett, D., Roldan, G., Wilmotte, A., & Xavier, J. C. (2018). Antarctic environmental protection: 4346 Strengthening the links between science and governance. <i>Environmental Science and Policy</i> , 83, 86–95. 4347 https://doi.org/10.1016/j.envsci.2018.02.006 4348. The abstract concludes: 'Improvements to science-policy communication mechanisms, combined with purposeful consideration of funding opportunities for policy-relevant science, would greatly enhance international policy development and protection of the Antarctic environment.'	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Shackleton, Ross	No	6	51	1543		1543	Could the text on this figure be made a little larger?	Thank you, this figure has been removed from the second order draft.
Thompson, Ian	No	6	51	1572	52	1575	These statements are correct but both IPPC and to an extent and OIE are moving. As they are standard setting bodies under the SPS, encouraging these moves are important as they may provide a way to progress the WTO/CBD tensions mentioned at Line 12146 on age 43. Examples of relevant work for IPPC includes, ISPM 11 Pest Risk Assessment for Quarantine Pests, ISPM 15 Regulation of Wood Packaging in International Trade, CPM Recommendation on Threats to biodiversity posed by alien species: actions within the framework of the IPPC 24 August 2017 and the Sea Containers Task Force are relevant. For OIE, encouraging the reporting of wildlife diseases such as White Nose Syndrome (a fungus) in bats.	Thank you very much. We cannot add additional text to the chapter due to word length restrictions. As these are other examples to support the point made, and not crucial to our critical evaluation, we have chosen not to include it here. Thank you for your comment.
Government of Bulgaria	Yes	6	52	1588	52	1596	Examples of best practices in collaboration between the agencies or for improved ability to evaluate shipments for potential risks by the customs and border agencies should be added.	Thank you very much. We cannot add additional text to the chapter due to word length restrictions. As these are specific recommendations these are at the end of the section.
White, Michael	No	6	52	1593	52	1596	Genetics, DNA sampling	Thanks for this suggested reference. We have included it in the second order draft.
Government of Germany	Yes	6	52	1596	52	1596	At the end of the sentence, it is suggested to add: 'DNA-based tools (cf. Auliya M et al 2020, https://doi.org/10.3897/matureconservation.38.49478). The sentence would read: "... artificial sniffers, and other audio and visual aids as well as DNI-based tools (cf. (cf. Auliya M et al 2020, https://doi.org/10.3897/matureconservation.38.49478)."	Thanks for this suggested reference. We have included it in the second order draft but do not include the reference as we do not find it to support the general argument made in the statement.
Franzoi, Marco	No	6	52	1598	53	1610	Practical examples of tools/instruments used in past FTAs might be helpful (visual aid in the following 1638–1639 placeholder). Are there specific SPS/Non-tariff measures that are effective?	Thank you very much. We cannot add additional text to the chapter due to word length restrictions. As these are specific recommendations these are at the end of the section.
Day, Roger	No	6	53	1612	53	1644	Seems to be confusion here between invasive alien species and other alien species. Many crops are alien or exotic, but not invasive.	Thank you, this is a point clarified in Chapter 1. The chapter and report focus only on Alien
Day, Roger	No	6	53	1612	53	1634	Some of this discussion seemed to be not particularly to do with legal and regulatory options	Thank you for your comment. As these are types of self-regulations/standards that fall within the scope of the section, we do consider these to be under the legal/regulatory instrument
Thompson, Ian	No	6	53	1612	53	1634	It's implicit in these references to online trade and mail and courier pathways, but perhaps it should be explicit that governments and agents will need access to cost effective technology such sensors, x rays, or dogs or such if pests are to be found and there is to be a real incentive to do the right thing	Thank you. We have added the suggested point on "access to surveillance technologies" to the second order draft.
Mariño, Juana	No	6	53	1636	53	1636	In general, "solution/s" is a concept that is normally avoided in relation to problems as complex as those raised in this assessment, insofar as it is rarely possible to reach a "solution". Hence, there is more talk of "measures" in, "responses", "options", "strategic management", "transformative change", "innovation" to deal with rather than to solve the problems.	Thank you. The section was removed as part of the chapter edits to reduce length of the second order draft.
Schaffner, Urs	No	6	53	1642	54	1650	Misunderstanding of the term IAS: the whole paragraph should be deleted or completely rewritten.	Thank you, the section was removed as part of the chapter edits to reduce length so no
Day, Roger	No	6	53	1645	54	1646	This statement is a sweeping generalisation and should either be substantiated with facts or removed!	Thank you for your comment. The section was removed as part of the chapter edits to reduce length so no change required.
Dool, Serena	No	6	53	1645	54	1646	It is not clear how this sentence relating to GMOs is relevant here.	Thank you. The section was removed as part of the chapter edits to reduce length of the second
Government of Germany	Yes	6	53	1645	54	1646	Please consider verifying this statement. Rationale: It might hold true for corn and soya production in the Americas. But most human food globally is still produced in small scale farming systems that are not likely to have adopted GMO due to economic reasons and/or policies.	Thank you. The section was removed as part of the chapter edits to reduce length of the second order draft.
White, Michael	No	6	53	1645	54	1648	GMOs are not popular with consumers. USAID GMO food deliveries were shunned by countries	Thank you. The section was removed as part of the chapter edits to reduce length of the second
Genovesi, Piero	No	6	54	169	54	1610	I would suggest to also mention the Global Register of Introduced and Invasive Species GRIIS, and the Global Invasive Species Database GISD.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided a clear argumentation as to why this reference needs to be added.
Schaffner, Urs	No	6	54	1645	54	1646	I do not think that this sentence has any relevance for this assessment and should therefore be removed.	Thanks for this suggested change. We have corrected it in the second order draft.
Guillao, Jo Ann	No	6	54	1670	54	1670	Comment: Can we also say something about readiness to address issues and problems arising from the attempts to harmonize efforts ?	Thank you. This has been added as art of our explanation of solutions to the IAS problem in the second order draft
Genovesi, Piero	No	6	54	1671	55	1721	I suggest to quote: Heywood V.H. & Brunel S. (2011) Code of conduct on horticulture and invasive alien plants. Council of Europe, Strasbourg, France.	Thank you. We have included the reference in the section as an example of a code of conducts in the second order draft
Lieurance, Deah	No	6	54	1683	54	1683	"cultigens" I am not familiar with this term, should be defined or a more widely understood synonym should be used	Thank you, we have added a definition
Lemaître, Charles-Frédéric	No	6	55	1724	55	1725	considering quarry industries as a part of the "non living material extraction system"(cf 3.3.2.3) Considering the quarry industries in France, prevention and management of IAS have to take into account three main considerations: 1. IAS seeds can be already present in the top soils before extraction (e.g. <i>Ambrosia artemisiifolia</i>). Stripping, moving, and re-using top soils for restoration after quarrying can foster the growing of IAS; 2. Some IAS have been encouraged and used for quarry restoration, as for road embankments (e.g. <i>Robinia pseudoacacia</i>) before being classified as IAS; 3. External soils used for backfilling can contain IAS seeds. the extractive sector activities encompass IAS issue in different ways: 1. through regulation: Environmental Impact Assessments have to take into account risk linked to IAE; obligations are set down in the quarrying license; 2. through action: through awareness, monitoring and action in quarry. Technical aspects are developed in guidance, technical guides for IAS recognition and actions (written by professional associations or directly by the companies); 3. through prevention: when external top soils are needed for restoration or backfilling, by visual control, monitoring and geographical localization of the top soil used in the quarry. Means already used to minimize risks with IAS in the extractive sector 1. planting and seeding the removed top soils before being reemployed 2. taking strictly into account the seasons calendar in restoration operations 3. Staff training on IAS 4. Visual monitoring 5. coordination between extraction and restoration, to minimize disturbed areas; the type of restoration and the species used for that purpose are listed in the Environmental Impact Assessment; local species are employed for restoration after being validated during the instruction of the license request. Limitations 1. Sterilizing external soils is not relevant and not possible 2. IAS seed banks are sometimes already presents in removed top soils 3. Wind spreading of IAS seeds from the surrounding areas of the quarry.	Thank you, Chapter 6 does not cover the topic of quarries but your comment has been shared with Chapter 3 (drivers) and Chapter 5 (management)
Jewell, Susan	No	6	56	1726		1780	While the subject of the case study box on salmonids is about their harm to the ecosystems where they were introduced, there is another aspect of introducing salmonids that may be worth noting. Salmonids can be hosts of pathogens that can be lethal to other salmonids and other fish species. The United States has prohibited the importation of all members of the family Salmonidae since 1968, unless they are accompanied by a health certificate saying they are free of certain pathogens if alive, or if dead but not eviscerated; dead eviscerated individuals are not considered a threat for disease and are not prohibited from importation (https://www.ecfr.gov/cgi-bin/text-idx?SID=23cd07432c36aa1ae6a5459b50367a4&mc=true&node=se50.1.16_113&rgn=div8). Perhaps some of the harm caused in other countries by the introduced salmonids was due to them being carriers of fish pathogens.	Thank you, this topic is covered in Chapter 4 (impacts)
Shimura, Junko	No	6	57	1782	57	1797	Need to highlight the IAS associated risks to be a reservoir and a vector for zoonotic diseases that infect humans in this section.	Thank you for your comment. This is a point clarified in Chapter 1. The chapter and report focus only on Alien Invasives and the point is removed for the health section.
Day, Roger	No	6	57	1783	57	1786	Differing definitions is indeed an issue, though I'm not sure it applies particularly to the public health sector. The examples given are not really accurate. See http://www.fao.org/3/y5968e/y5968e05.htm for a comparison between IPPC and CBD terminology.	Thank you for your comment. This is a point clarified in Chapter 1. The chapter and report focus only on Alien Invasives and the point is removed for the health section.
Government of Ethiopia	Yes	6	57	1783	57	1789	Standardised definition for terminologies related to IAS should be given to avoid ambiguity in understanding IAS.	Thank you very much. The section was removed as part of the chapter edits to reduce length of the second order draft

Jewell, Susan	No	6	57	1788		1789	The United States uses "injurious" as a Federal designation for wildlife species that are prohibited from importation (https://www.fws.gov/injuriouswildlife/pdf_files/InjuriousWildlifeFactSheet2017.pdf).	Thank you very much. The section was removed as part of the chapter edits to reduce length of the second order draft.
Mandivenyi, Wadzanayi; Araya Quesada, Mariana; McLoughlin, Austein	No	6	57	1795	57	1796	We would be interested in having an additional opportunity to review the case study on <i>Aedes aegypti</i> if the self-limiting mosquitoes were used. We would like to suggest that the case study is written objectively.	Thank you for your comment. There will be an external review of the second order draft (tentatively planned late 2021)
Mariño, Juana	No	6	57	1800	57	1800	Undoubtedly, IAS can have indirect cross-border effects, especially in border areas, but their direct effects are mainly local, as previously noted. Therefore, a distinction between direct and indirect impacts could be in place.	Thank you very much. Although the comment is accurate, it does not reflect the point of the statement. We rephrased the statement to clarify that we are talking about "IAS impacts not
Mariño, Juana	No	6	57	1805	60	1909	Consistent with the previous comment, I believe that both the identification of the main problems and the general ways to address them should differentiate not only the scales of the legislative provisions but the objective of the provisions, whether it is to control the distribution of species or to control / mitigate its effects. With this distinction, it would probably be that the propagation mitigation provisions would be located mainly at the international and regional levels while those for impact mitigation would refer mainly to the local level. The national level, which, as noted, is key to comprehensive management, clearly constitutes the level of transition and articulation between the international and the local and between the control of dispersion and mitigation of impacts.	Thanks for this suggested point. We have included it in the second order draft.
Government of Germany	Yes	6	58	1813	58	1813	Please check the sentence. It is not clear, what is meant by "the capacity".	Thank you very much. This paragraph has been rewritten in the second order draft, and what is meant by capacity has been clarified (capacity to respond to IAS)
Government of Germany	Yes	6	58	1819	58	1819	Please check the sentence. It is not clear, what is meant by "... is only as strong weakest area"?	Thank you very much. The section was removed as part of the chapter edits to reduce length of the second order draft. So no change is required
Lequette, Benoît	No	6	58	1834	58	1835	This is extremely important for Outermost Regions where legal and regulatory instruments need to take into account their insular situation and extremely high sensitivity to IAS compared to continental Europe.	Thank you for your comments. We agree with your point and have developed this point throughout the chapter of the second order draft
Government of Germany	Yes	6	59	1856	59	1856	Please check the sentence. It is not clear, what is meant by "an introduced are or little or no concern"?	Thank you very much. The section was removed as part of the chapter edits to reduce length of the second order draft. So no change is required
Government of Germany	Yes	6	59	1867	59	1867	It would be interesting to not only look at Europe and South America, but also to provide a (brief) overview of the current state of legislation on IAS for the other continents as well.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. This is an interesting exercise, but we consider it will not add more to the two examples made here to illustrate the point of aligning national policy with "trading block"
Genovesi, Piero	No	6	59	1874	59	1875	Legal tools for addressing pathways of introductions are not discussed elsewhere, but only mentioned here. I would suggest to report (perhaps in 6.3.4) that the European Regulation 1143/2014 introduced an obligation to address key pathways, adopting and enforcing action plans on priority pathways, and also other countries and regions have introduced obligations on pathways management.	Thank you very much. We have expanded on this in the second order draft.
Lequette, Benoît	No	6	59	1878	59	1880	End point 3. "Legal and regulatory instruments also has to be different from national ones where the local situation need it. " Two examples : (1) the introduction of new species should be prohibited on Outermost Régions (Islands) unless they have been shown to be safe. (2) Feral cats should not be considered as "domestic animals" in French Outermost territory as it makes local eradication actions almost impossible. (feral cats must be brought back alive from high mountains and cliffs where they kill endemic petrel species.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Kanneh, Ambrose Bockarie	No	6	60	906	60	909	Capacity building or training of the local community about what is Invasive species and all knowledge around it will help to effectively implement legal actions adopted at the international and national level for the control, prevention and eradication of IAS.	Thank you very much. The issues of knowledge options and indigenous peoples and local communities are explored in Section 6.6 of the second order draft
Abdul Wahid Arimiyaw	No	6	60	1901	60	1905	There can also be a Creation of departments or agencies specifically dedicated to the governance and implementation of IAS legislations.	Thanks for this suggested addition. We have included it in the second order draft.
Abdul Wahid Arimiyaw	No	6	60	1906	60	1909	I suggest that there should be the incorporation of the contributions of Indigenous Local People in the decision making process or in the formalation of the	Thank you, this is now addressed in the second order draft
O'Brien, Karen	No	6	60	1906	60	1909	There is untapped potential at the local level to connect with national, regional, and international strategies, which may be unleashed by involving locals in the regulatory and legal processes at all levels, and by mobilizing narrative networks (see Leiano et al. 2013, The power of narrative in environmental networks,	Thanks for this suggested addition. We have included it in the second order draft.
White, Michael	No	6	60	1909	60	1909	Covid-19 being a good example	Thank you for this suggestion. We have chosen not to include it in this paragraph, as you have not provided any supporting evidence for this specific approach and it does seem to be
Mariño, Juana	No	6	61	1981	61	1982	Check in Chapter 2 if the fourth stage, "spread", includes "use", and if there is a graph that links each stage with measures required to face the problem of IAS. This scheme could constitute a very good basis for identifying policy options at different levels of intervention.	Thank you very much. There is not such a figure, but here we provide stages specific solutions.
Mc Kay, Fernando	No	6	62	1976	62	2015	Line 1976 Pires Teixeira and Creed 2020, Schwindt, Carlton et al. 2020 citations are missing from the references list.	Thank you for your comment. The references and citations have been corrected in the second
Day, Roger	No	6	62	1981	63	2049	Section 6.3.4. This section needs to focus more clearly on the legal and regulatory options rather than the methods. For example, inspection is a method for managing risk, but here the discussion should focus on the laws and regulations around inspection.	Thank you for your comment. We have restructured the section comments to focus on legal and regulatory instruments.
Kamigawara, Kenji	No	6	62	1981	63	2049	This section refers only little to legal provisions to manage established IAS populations. Legislations often do not clearly define who is responsible to manage invasive alien plants. "Prohibition of sale and release into the wild is not enough to stop dispersal of alien invasive aquatic species, although it is a basic element of legislation for their management. "Landowner responsibility" is an important but often overlooked element. Governments could consider moving from a voluntary approach to a responsibility approach with collaboration among stakeholders. For example, in 2019, the Swiss Federal Government has proposed a legal framework, which includes the provision of "landowner responsibility": Owners of buildings, facilities or objects that are or may be infested with invasive alien organisms should monitor, isolate, treat or destroy these organisms in collaboration with the competent authorities, or tolerate these measures." (Kamigawara et al. What kind of legislation can contribute to on-site management?: Comparative case studies on legislative developments in managing aquatic invasive alien plants in France, England, and Japan, Journal of International Wildlife Law & Policy, 23 (2), 83-108, (2020))	Thank you, we have added this point and reference to the second order draft, as suggested.
Day, Roger	No	6	62	1984	62	1985	Many different taxa are involved with both intentional and unintentional introduction	Thank you for your comment. Yes we agree with your comment. However, the groups identified are examples not to be intended extensive in coverage.
Schaffner, Urs	No	6	62	1993	62	1996	Slowing down the spread/limit the range of an IAS is a different management goal than bringing IAS populations below a certain ecological or economic threshold. The first goal is primarily a spatial goal and the second one primarily a local one, which means that different actors and different management tools may be needed. Thus, I do not think they should be merged in a discussion on legal and policy options supporting IAS management.	Thank you for your comment. This is correct, but our point is not to merge the discussion of these goals but to show that there are multiple goals in the instrument focused on the spread stage.
Government of Germany	Yes	6	62	2012	62	2012	"Epanchin-Niell 2017" is cited in the text but not listed in the literature list at the end of the chapter: Epanchin-Niell, Rebecca S. (2017): Economics of invasive species policy and management. In Biol Invasions 19 (11), pp. 3333-3354. DOI: 10.1007/s10530-017-1406-4.	Thank you for your comment. The references and citations have been corrected in the second order draft
Thompson, Ian	No	6	62	2015	63	2017	The difficulty of predicting the behavior of an exotic species in a naive ecosystem could also be mentioned	Thank you very much. We have added the point to the text of the second order draft
White, Michael	No	6	63	2019	63	2033	BREXIT will prove an interesting example for this: especially on the island of Ireland	Thank you for this suggestion. We have chosen not to include it in the assessment, as this is a future scenario, of an event with only a few months, with no supporting evidence to show the
Jewell, Susan	No	6	63	2031		2033	It is not just that the data isn't available to researchers, but it may not even be available to the agency managers. Specifically, in the United States, the customs declaration form for importing wildlife species does not require itemizing each taxa to species level if it is not a regulated species. Therefore, the agency (for example, the U.S. Fish and Wildlife Service) does not necessarily even know what species are being imported and could become invasive if not stopped.	Thank you very much. We fully agree with the point, and it is a situation we discuss in section 6.6
Schaffner, Urs	No	6	63	2036	63	2042	I don't think this is really a new scientific finding. It would be good to explain which policies need to be harmonized and how. In the USA and in Canada, genes of declared noxious weeds of individual states/provinces are not allowed to be introduced, irrespective of whether the weed has already established in	Thank you for your comment. We expand our explanation of why the proposed harmonization needs to take place.
Mariño, Juana	No	6	63	2044	63	2049	In accordance with the previous comment, regarding the "use" of IAS, I think that in all stages, but particularly in the spread stage, it would be important to have a differentiation of types of invasive species, probably related to the type of impact. Impact at spread stage can be very negative for natural ecosystems but highly positive for a community or economic group; or for society in general, for which a specific IAS can be considered a supplement to its diet or a factor of economic income. Despite the quality and relevance of this subchapter, it still seems very general in terms of the identification and analysis of specific policies and regulations foreseen for specific stages, levels and, ideally, types of IAS. It could be done through case studies.	Thank you, we have developed the full sub-section on this theme in the second order draft
Schaffner, Urs	No	6	63	2044	63	2049	It is true that classical biological control (CBC) is one of the key management tools for widely established invaders, either alone or as part of an integrated management approach. However, there are certainly other tools available that can and should be integrated with CBC. An important approach to manage widely established IAS is to design spatially explicit management strategies that assign the most suitable management tools to specific areas of the target region; however, such an approach is hardly emphasized in policies. This paragraph should be significantly extended because managing widely established IAS is a huge challenge for many countries. For example, the key challenge for	Thank you for your comment. We are brief in our text on managing widely established IAS, as chapter 5 describes this at length. However, we discuss how legal and regulatory instruments can help match the best strategy for a given location.
Government of Germany	Yes	6	63	2045	63	2049	Is this point really the only legal option that needs improvement regarding legislation on the spread? Strict legislation on the use of for example herbicides would be a similar point. Furthermore, it would be good to add a sentence on why it is made more difficult to import such species; and on the risk of using biocontrol (as many of those often alien organisms used for biocontrol may not be unproblematic / pose certain risks either).	Thank you, please refer to Chapter 5 where these issues are covered
Schaffner, Urs	No	6	63	2051	65	2136	I found the section on climate change and land degradation difficult to read and suggest to revise it. Some statements, e.g. "To achieve the goal of carbon reductions and temperature reductions, a most viable strategy is prevent or limiting deforestation and forest degradation" appears to be wrong; why should a reduction in deforestation reduce temperature?. One aspect that should be more clearly discussed is the inter-relationship between IAS and climate change; e.g. some have suggested that invasion by alien trees could create carbon sinks and thus be used as carbon crediting. However, various papers show that this is far from clear; in fact, in some cases invasions by trees reduce carbon pools, particularly below-ground.	Thank you for the comment. The section was removed as part of the chapter edits to reduce the length, so no change required. We spread the content over the different subsections, particularly the section discussing "perverse incentives."
Government of Germany	Yes	6	63	2053	63	2054	This statement seems policy-prescriptive, stating which problems currently are "the most important issues" . Kindly rephrase?	Thank you, this section has been removed from the second order draft, and this comment does not longer apply
Smith, Emily	No	6	64	2059	64	2088	A further issue with the discussion of climate change is confusion between species distribution expansion due to climate change and human-mediated invasive species movement. This was apparent in the UK Environmental Audit Committee Invasive Species Inquiry in 2019 where witnesses had to explain this important distinction to the committee. Going forward to improve management it is important that this distinction is clearly understood.	Thank you, this theme is now developed in Chapter 3 (drivers) and has been removed from the second order draft
White, Michael	No	6	64	2063	64	6068	In small countries the Focal Point for conventions may not be in a position of influence	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific point.
Government of Germany	Yes	6	64	2078	64	2078	For better understanding, please replace "restore" with "restoring".	Thank you, this sentence has been removed so the comment does not longer apply
Government of Germany	Yes	6	65	2102	65	2102	For better understanding, please replace "mainly" with "mainly".	Thanks for this suggested change of wording. It is an improvement and we have adopted it in the second order draft

Government of Germany	Yes	6	65	2105	65	2106	please correct the acronym to "UNFCCC" (at 2 occurrences - please correct throughout report) and please check the literature reference "Secretariat 1992".	Thank you, we have changed that throughout the chapter of the second order draft
Takehara, Mari (Government of Japan)	Yes	6	65	2105	65	2105	The correct abbreviation is not "UNFCC" but "UNFCCC".	Thank you, we have changed that throughout the chapter of the second order draft
Takehara, Mari (Government of Japan)	Yes	6	65	2110	65	2112	Following should be deleted due to the misunderstanding of the fact. "Likewise, the 188 +EU states that have ratified COP21 have committed to achieve the 20/20/20 targets (20% reduction of carbon dioxide (CO2) emissions, 20%, increase of renewable energy's market share, and a 20% increase in energy	Thank you very much. The section was removed as part of the chapter edits to reduce length of second order draft.
Government of Germany	Yes	6	65	2114	65	2125	This paragraph does not connect to the paragraphs preceding it. It is not clear, what "stands" are being talked about. Please specify and consider rearranging the text in order to ensure a logically consistent thread for the reader.	Thank you very much. The section was removed as part of the chapter edits to reduce length of second order draft.
Government of Germany	Yes	6	65	2120	65	2121	"... the most important potential bio-perversities of them all." is not appropriate language for an intergovernmental assessment report and can be perceived as policy-prescriptive. Please rephrase.	Thank you, this sentence has been deleted from the second order draft
Government of Germany	Yes	6	65	2128	65	2130	The IPCC does not prepare guidelines for policy - it aims to be policy-relevant, but not policy-prescriptive. Please rephrase as following (references need to be checked and corrected): "There is a large body of literature focused on adaptation options as summarized in the IPCC Working Group II contributions to all five IPCC assessments (REF) and to IPCC Special Reports."	Thank you. The section was removed as part of the chapter edits to reduce length of the second order draft. Also, Here we state the IPCC reports SUMMARIZE the large body of literature focused on defined guidelines for adaptation policy.
Takehara, Mari (Government of Japan)	Yes	6	65	2133	65	2136	Following should be modified or deleted due to unclear definition of "carbon economy" and incomplete sentence. "Also, economic instruments such as carbon taxes and carbon trading markets (REDD?) are leading to the development of a carbon economy that aims at mitigating and adaptation (Galatowitsch 2009, Hamilton, Chokkalingam et al. 2010). These strategies can also result in perverse incentives as"	Thank you. The section was removed as part of the chapter edits to reduce length of the second order draft.
White, Michael	No	6	65	2133	65	2136	As with fisheries: the quota permits had greater market value than the fish themselves!	Thank you. The section was removed as part of the chapter edits to reduce length of the
Thompson, Ian	No	6	65	2136	65	2136	Not clear. I presume it means the possibility of carbon plantings being weedy?	Thank you very much. The section was removed as part of the chapter edits to reduce length.
Mariño, Juana	No	6	65	2138	65	2139	It is not clear if this PLACEHOLDER refers only to subchapter 6.3.4 or to 6.3.5 as well; it is very important in both cases.	Thank you. The placeholder was for both sections
Day, Roger	No	6	66	2141	66	2141	Section 6.3.6. The intersection between climate change etc and Invasives policy is mentioned but somewhere I would expect to see mention of the intersection between Invasives and NBSAPs. I'm not sure where it should appear in the text, but certainly there should be something on it in the key messages.	Thank you for your comment. The section was removed as part of the chapter edits to reduce the length, so no change required. We spread the content over the different subsections, particularly the section discussing "perverse incentives."
Genovesi, Piero	No	6	66	2141	66	2143	It is essential to provide clear and concrete recommendations to countries/regions, calling to strengthen their legal frameworks, considering introducing white lists or black lists of regulated species, based on a prioritisation effort, evaluating the current and potential impacts caused by the different species. Also, legal frameworks could consider introducing obligations to control/eradicate priority species, especially in the most vulnerable areas. It should also be reminded that in order to focus on prevention, it would be useful to consider obligations to address pathways of introduction of invasive species.	Thank you very much. The section was removed as part of the chapter edits to reduce length of the second order draft
Brooks, Thomas	No	6	66	2142	66	2142	As in the introduction to Section 6.3 above, it will be essential that Section 6.3.6 provide clear information on legal and regulatory frameworks for national or regional level implementation, eg on adopting lists of regulated species, obligations to control or eradicate priority IAS, obligations to address pathways, etc.	Thank you very much. The section was removed as part of the chapter edits to reduce length.
Mariño, Juana	No	6	66	2142	66	2142	Pending	Thank you for your comment.
Government of Germany	Yes	6	67	2144	84	2848	The section 6.4 is informative and interesting as well as very well written. However, the section would benefit from some(more) descriptive examples allowing the reader to better understand the scientific findings.	Thank you, in the second order draft, we have added case studies throughout the section
O'Brien, Karen	No	6	67	2165	67	2165	While it is important to be sensitive to differences in values (which is how I understand "value perceptions") and cultural differences, a consideration of future options should emphasize creating connections and resonance across diverse cultures and emphasizing the importance of highlighting shared values.	Thank you, the second order draft has been reorganized and section 6.7 brings solution for transformative change.
White, Michael	No	6	67	2172	67	2175	This time frame is 30 years too late	Thank you very much. There is no possible response to this, as it refers to the Convention on Biological Diversity's Theory of Change which applies to the Post-2020 framework. It is a rhetorical comment, to which we can respond, 'better late than never'
White, Michael	No	6	67	2177	67	2182	SDGs Agenda 2030 & Paris Accord 2015	Thank you, this section has been removed in the second order draft but are mentioned in the chapter (see 6.3), including SDGs and - indirectly the Paris Accord in Climate Action Tracker.
Shackleton, Ross	No	6	68	2191	68	2291	Please define and explain what the "One Heath Approach" is.	Thank you very much. This is done in Chapter 1 of the second order draft
Day, Roger	No	6	68	2198	68	200	I'm not sure I understand what is meant by adaptation is an option. If an IAS cannot be eradicated, then there is no option but to live with it. What that looks like will differ in different cases, but could include various forms of control effort (both planned at a policy level as well as at an individual level), as well as many possible changes to the production or other practices (again at different spatial or temporal scales). So I would say for an invasives that can't be eradicated, adaptation is Hobson's choice, and the issue is what form that adaptation takes, and what the governance, policy and regulatory options are that	Thank you, this is now clarified in the second order draft.
Schaffner, Urs	No	6	68	2198	68	2200	I suggest changing this sentence to "This section also considers whether and, if so, how..."; clearly, adaptation happens, but whether it should be considered as an 'integrated option' must be carefully assessed. People also adapt to increasing frequencies of drought events, I would not call this an integrated option if the frequency of droughts continues to increase, as adaptation will not be possible anymore at a certain tipping point.	Thanks for this suggested change. We have corrected it in the second order draft.
O'Brien, Karen	No	6	68	2201	68	2201	The term stakeholders should be clearly defined, and distinguished from actors and whole of society engagement when it comes to specific strategies (see lines 2195, 2205, 2209). If or when they are being used as synonyms, that should be specified.	Thank you, we have clarified this point in the second order draft
White, Michael	No	6	68	2208	68	2218	United Nations Declaration on Rights of Indigenous Peoples 2007	Thank you, but we think the references we have included already provide sufficient support to this point. This paragraph has been substantially revised in the second order draft
Born-Schmidt, Georgia	No	6	68	2214	68	2218	the content is repetitive	Thank you. Yes, the last phrase in the sentence has been eliminated from the second order draft
Government of Germany	Yes	6	68	2223	68	2224	It is suggested to give a brief introduction to the Malawi Principles in a box or a footnote.	Thank you, but this has been removed in the second order draft - the comment no longer
Mariño, Juana	No	6	68	2235	68	2236	"larger anthropomorphic change processes affect both natural and human-dominated ecosystems across the globe"; hence the importance of including land use planning policies and regulations in the review of options, frequently underestimated due to the pre-eminence of sectoral policies.	Thank you. This is covered in the IPBES assessment on land degradation, and we have made a reference to it in Chapter 6.
O'Brien, Karen	No	6	69	2235	69	2235	Anthropomorphic should be replaced with anthropogenic.	Yes, thank you
White, Michael	No	6	69	2247	69	2251	Or karma by others (cause & effect)	Thank you for your feedback
Mariño, Juana	No	6	69	2265	74	2450	The inclusion, at this point, of a subchapter related again to governance, broadly addressed in subchapter 2 is confusing, mainly because it does not seem to be related to the previous subchapter on policies and regulations.	Thank you, we have restructured Chapter 6 of the second order draft
Singh, Bajjinder	No	6	70	2051	72	2136	In this section on "Intersection with Climate change and land degradation mitigation and adaptation 2052 strategies", it might be worthwhile including some of the recent attempts at "Pleistocene Arctic rewilding as a form of megafaunal ecological engineering (MEE)", as described in the paper "Pleistocene Arctic megafaunal ecological engineering as a natural climate solution?": https://doi.org/10.1098/rstb.2019.0122 . Although bison and horses are the likely essential megafaunal engineers for the present, there are serious attempts, by renowned genetic engineer George Church, among others, to clone mammoths & use such cloned animals to re-engineer the Arctic tundra (https://reviverestore.org/projects/woolly-mammoth/progress/). Japanese scientists recently made a remarkable breakthrough in cell regeneration technology as they were able to successfully implant cell nuclei, from cells recovered from the left hind leg of a juvenile mammoth, into mouse cells (https://www.dw.com/en/japanese-scientists-make-breakthrough-in-cloning-a-woolly-mammoth/a-48063060).	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Government of Ethiopia	Yes	6	70	2273	70	2292	The literature review should include Ostrom (2007, 2009), McGinnis and Ostrom (2014) Socioecological System framework (SESF) for analysis and characterization of sustainability of a socioecological system including the governance of SES.	This is indeed relevant literature, but the section addresses only integrated approaches used in relation to invasive alien species.
Maclean, Kirsten	No	6	70	2282	70	2282	There is another very useful reference to add here - Maclean, K., Farbotko, C., Mankad, A., Robinson, C. J., Curnock, M., Collins, K., & McAllister, R. R. J. (2018). Building social resilience to biological invasions. A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>GeoForum</i> , 97, 95-105. doi: https://doi.org/10.1016/j.geoforum.2018.10.018 . This paper provides a review of the SES literature with a focus on Social Resilience, and draws on six attributes of SR to consider how the management of any biosecurity event can be managed to also build the SR of those most affected.	Thank you very much. It has been included here and under 'adaptation'. Thank you.
Maclean, Kirsten	No	6	70	2290	70	2290	There is no other paper by McAllister et al that can be included here McAllister, R. R. J., Robinson, C. J., Brown, A., Maclean, K., Perry, S., & Liu, S. (2017). Balancing collaboration with coordination: Contesting eradication in the Australian plant pest and disease biosecurity system. <i>International Journal of the Commons</i> , 11(1), 330-354. doi: http://doi.org/10.18352/ijc.701 this paper also recognises that contestation is a good thing and part of the collaboration process.	Thank you. We unfortunately have too many examples from Australia, and have decided to include examples from other regions for better regional balance
Bliss, Cebuan	No	6	70	2293	70	2308	Suggest adding Integrative Governance literature reference - Vissere-Hamakers, 2018	Thank you for this suggestion, it is added in the second order draft
Shackleton, Ross	No	6	70	2293	70	2293	This should be past tense. The sentence is also a little confusing	Thank you. The tense is okay - it refers to the future - 'it will be reviewed'
Shackleton, Ross	No	6	70	2299	70	2299	Change to "The literature included encompasses the following categories"	Thank you, this has been deleted from the second order draft and the comment no longer
Shackleton, Ross	No	6	70	2302	70	2302	Add "The" before literature	Thank you, this has been addressed in the second order draft (paragraph removed)
Singh, Bajjinder	No	6	71	2076	71	2082	A number of references listed in these lines appear to have been inadvertently omitted from the References section. These include "Corlett 2016" (line 2078); "Nogués-Bravo, Simberloff et al.2016" (line 2079); "D'Antonio and Meyerson 2002" (line 2081); Hobbs, Higgs et al. 2009" (line 2081); Ren, Lu et al. 2009" (line 2082); "Bertness and Coverdale 2013"(line 2082).	Thank you for your comment. The references and citations have been corrected in the second order draft
O'Brien, Karen	No	6	71	2333	71	2333	This question could address both barriers and possibilities for implementation.	Thank you, this has been taken into account when conducting the literature review - but this specific paragraph (methodology) has been removed from the second order draft
Born-Schmidt, Georgia	No	6	71	2345	71	2346	The following is a positive example for stakeholder engagement which could be used as a show case for this section: M. Latofski-Robles 1, F. Méndez-Sánchez1, A. Aguirre-Muñoz1, C. Juárez-García1, P. Koleff-Osorio2, A. I. González-Martínez2, G. Born-Schmidt2, J. Bernal-Stoopen3 and E. Rendón-Hernández. Mexico's island biosecurity programme: collaborative formulation and implementation https://www.islas.org.mx/articulos_files/Latofski-Robles%202019.pdf	Thank you, but we think the examples we have included already provide sufficient support to this point. This paragraph has been substantially revised in the second order draft
Shackleton, Ross	No	6	72	2356	72	2356	Remove James?. There seems to be a few inconsistencies in in-text referencing throughout the document.	Thank you for your comment. The reference and citation style have been harmonized in the second order draft
Pan, Xubin	No	6	73	2399	73	2404	Same as the P73L2416-P73L2420.	Thank you, the repetition has been removed in the second order draft
Guillao, Jo Ann	No	6	73	2405	73	2405	Add: Conflict-resolution mechanisms.	Thank you, conflict resolution is included in the second order draft, but this table has been
O'Brien, Karen	No	6	73	2423	73	2423	Emphasis on the quality of stakeholder engagement is important and can be picked up in the final section on transformative change.	Thank you, we have now developed the final section and include this theme in the second
Shackleton, Ross	No	6	74	2437	74	2450	Maybe add something on co-design of research questions or management initiatives, linking to this maybe also something on co-implementation and	Thank you very much. Yes, this theme is included in this section
White, Michael	No	6	75	2468	75	2471	The heart of the matter	Thank you for your feedback

Mariño, Juana	No	6	75	2473	75	2490	If IPLC stands for Indigenous People and local Communities, the statements included in this paragraph are true in regard to indigenous peoples, but not necessarily in relation to local communities. "Local communities" is a very broad concept that includes a great diversity of communities, including rural and urban communities, whose relationship with nature can be significantly different from that of indigenous communities. Having been included in a single acronym - IPLC - with a strong bias towards indigenous peoples, these communities have been made invisible despite the fact that, in practice, they constitute	Thank you very much. Please refer to the IPBES definition of indigenous peoples and local communities (Chapter 1)
Mariño, Juana	No	6	75	2492	75	2500	As previously mentioned, this last paragraph no longer refers to local communities, only to indigenous peoples.	Thank you very much. All references to Indigenous Peoples also refer to local communities as indicated in the IPBES definition (see response to comment above)
Schaffner, Urs	No	6	75	2498	75	2498	I suggest removing catchwords such as 'Western Science'.	Thanks for this suggested change. We have corrected it in the second order draft.
Schaffner, Urs	No	6	76	2515	76	2515	Adaptation to IAS is indeed common, as is adaptation to many other forms of environmental/global change; however, as mentioned above, this should not be interpreted as an indication that IPLC can adapt to the environmental change, including that caused by IAS, in the long-term. A thorough analysis is needed to assess what kind of adaptation by IPLC increases the resilience of social-ecological systems to environmental/global change and to what extent.	Thank you for your comment. This is very true, but 'a thorough analysis' depends on the availability of literature. There is very little literature that addresses long-term resilience of IPLC, much less in relation to IAS. The literature review has captured multiple drivers of environmental change that are affecting IPLC ability to adapt, as well as the effects of this adaptation, but even medium-term implications are speculative (see Table 4 in Howard 2019)
Takahashi, Yasuo	No	6	76	2527	76	2533	Referencing other papers that describe IPLC's responses to IAS could further substantiate the paragraph. These include: Miranda-Chumacero et al. 2012. Distribution of arapaima (<i>Arapaima gigas</i>) (Pisces: Arapaimatidae) in Bolivia: implications in the control and management of a non-native population. <i>BioInvasions Rec.</i> 1, 129–138. https://doi.org/10.3391/bir.2012.1.2.09 ; Ens et al. 2016. Creating multi-functional landscapes: Using exclusion fences to frame ferret ungulate management preferences in remote Aboriginal-owned northern Australia. <i>Biol. Conserv.</i> 197, 235–246.	Thank you very much. We have included this paper in the IPLC review of the second order draft.
Thompson, Ian	No	6	76	2527	76	2518	It may not come through in the literature but the question of Indigenous values may also arise. There is likely to be a substantial overlap between Indigenous values in the environment and western values associated with species and genetic diversity, status and ecosystem function. However, in prioritising action and response Indigenous cultural values around totemic species or significant landscapes may require consideration. This is a complex area and will raise the issues	Thank you very much. The literature on IPLC and 'cultural keystone' species or landscapes in reference to IAS is being reviewed across the assessment. Questions of WTO and trade will be beyond the scope of this assessment in relation to intellectual property/genetic diversity.
Government of Germany	Yes	6	76	2540	76	2540	Please clarify what "ceremonies" could refer to in the given context. Moreover, please consider adding 'controlled' as a further precision of the term "grazing".	Thank you very much. This is from a secondary source that does not specify the types of ceremonies, other than: "Thirty-nine percent of respondents use ceremonies to honor Indigenous plant and animal population, and 21 percent of respondents said their Indigenous nation has used ceremonies specifically to help native species impacted by introduced species" (p. 211). Grazing is a relatively common form of cultural control of some invasive species.
White, Michael	No	6	76	2542	76	2547	Widespread approach across the Pacific Islands: many people are related	Thank you. It is unclear what this refers to
White, Michael	No	6	77	2552	77	2553	Yes they do	Thank you very much. Presume that this confirms that IAS are managed in ways that recognise multiple values of nature for people - this indeed has strong evidence
White, Michael	No	6	77	2560	77	2561	Rarely seen as legitimate and just	Thank you very much. Presume that this means that governance is rarely seen as legitimate and just by IPLC as it largely fails to recognise that harms and benefits are unequally distributed. The literature review provides evidence.
Schaffner, Urs	No	6	77	2563	77	2564	This question should be rephrased as a no management also causes non-target effects, particularly in cases where IAS have documented negative impacts on biodiversity, NCP and GQL. I suggest to write 'Is there recognition that not only 'business-as-usual', but also management can cause non-target (e.g. negative) effects and, if so, how are these managed?'	Thank you for your comment. The term 'non-target effects' is not generally associated with the absence of management - such effects are characterised in different ways e.g. by economists, as externalities, or 'impacts' of IAS.
Day, Roger	No	6	77	2567	77	2568	The issue of the definition of IPLC is mentioned but no definition is given here or in the glossary. So, for example would grain farmers in southern UK count as IPLC? Lines 2503-2504 draw a distinction between indigenous governance and Western governance systems, so maybe UK farmers don't count as IPLC. So if IPLC are only where there is no formal political governance system, perhaps there aren't that many? But local communities could include areas where there is formal political governance which includes some form of local governance, so the discussion is relevant. It may be that "indigenous" community issues are much more important in addressing invasives in natural habitats rather than in agroecosystems, where local community issues are important but perhaps different from those around indigenous communities in natural/less managed ecosystems. Clarification around all of this would be helpful.	Thank you, this is provided in Chapter 1, which outlines all concepts used in this assessment
Maclean, Kirsten	No	6	77	2580	77	2580	The statement that 'Dunca et al' are the only authors to examine how different environmental governance regimes influence indigenous community involvement in Australia, is incorrect. There are many other papers on this or similar topics.	Thank you. In the second order draft, this statement has been removed and the section has been updated and supported by a systematic literature review on this theme
White, Michael	No	6	77	2580	78	2630	Even the language used to describe IPLC is often derogatory (colonial-speak)	Thank you, we have harmonized this in the second order draft
Thompson, Ian	No	6	77	2610	77	2613	The following reference may be useful. Submission to the 2020 independent review of the Environment Protection and Biodiversity Conservation Act 1999. A case for Culturally Significant Species. Indigenous Reference Group of the National Environmental Science Program's Threatened Species Recovery Hub. (Australia) https://epbcaactreview.environment.gov.au/sites/default/files/2020-06/ANON-QICP-UGT1-F%20-%20Indigenous%20Working%20Group%20-%20Threatened%20Species%20Recovery%20Hub.pdf	Thank you, a cross-chapter systematic literature review on indigenous peoples and local communities and invasive alien species has been done - you can access the data management report (linked in the chapter). Because of regional balance, we were not able to add more cases from Australia
O'Brien, Karen	No	6	78	2619	78	2619	It is not clear why respectful should be put in quotes here, and if it is pointing to a particular interpretation of a concept, then it should also be used on line 2626: management systems are 'respectful.'	Thank you very much. Respectful does not need to be in quotes.
Maclean, Kirsten	No	6	79	2632			Consider looking at the two following papers (that Maclean would be happy to provide if needs be): Maclean, K., C.J., R., Beck, E., & Rist, P. (in review). Reconciling risk and responsibility on Indigenous country. Bridging the boundaries to guide knowledge sharing for cross-cultural biosecurity. <i>Journal of Cultural Geography</i> . Maclean, K., C.J., R., & Wallace, R. (2016). Engaging Indigenous People in biosecurity surveillance in northern Australia - a scoping study for Northern Australia Quarantine Strategy (NAQS). <i>Engagement and Communication Strategies to support Indigenous Rangers to respond to biosecurity risks in northern Australia</i> . Retrieved from Brisbane.	Thank you, the first paper has been included in the indigenous peoples and local communities and IAS literature review - and also included in Chapter 6 of the second order draft.
Maclean, Kirsten	No	6	79	2637			Consider looking at: There is another very useful reference to add here - Maclean, K., Farbotko, C., Mankad, A., Robinson, C. J., Curnock, M., Collins, K., & McAllister, R. R. J. (2018). Building social resilience to biological invasions. A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>GeoForum</i> , 97, 95-105. doi:https://doi.org/10.1016/j.geoforum.2018.10.018 - This paper provides a review of the SES literature with a focus on Social Resilience, and draws on six attributes of SR to consider how the management of any biosecurity event can be managed to also build the SR of those most	Thank you very much. These references are included in the cross-chapter systematic literature review on indigenous peoples and local communities and invasive alien species - you can access the data management report (linked in the chapter).
Government of Germany	Yes	6	79	2652	79	2653	Some of the involved organizations - at least OIE, WHO, FAO (Trinartite Alliance) as main actors - should be mentioned	Thank you, but this has been removed in the second order draft - the comment no longer
Government of Germany	Yes	6	79	2652	79	2663	The One Health approach should be explained in more detail respectively more comprehensively (e.g., kindly mention the involved organizations, and summarize the history and development). The relation / difference between the 'One Health approach' and the 'One World One Health' initiative isn't clear.	Thank you very much. This is addressed in Chapter 1.
Rüegg, Simon	No	6	79	2658			There is a diversity of interpretations of the OH approach. We tried to provide an overview of these narratives, and concepts: http://neoh.onehealthglobal.net/ . Fig 4 would allow identifying concepts that align with an integrative approach to IAS. Note, that OH is not restricted to infectious diseases, but aims at including questions of urbanisation, chronic diseases and food security as illustrated by Queenan et al: www.cabi.org/cabreviews/review/20173134856	Thank you, but this section has been removed from the second order draft - the comment no longer applies
Government of Germany	Yes	6	79	2665	80	2687	In the text the main focus is on the 'One Health approach' and now there is 'Ecohealth' mentioned in the last sentence. Have the principles of the "Ecohealth approach" been introduced somewhere in the chapter, before? If yes, please insert a reference to this page. If not, please either explain the principles of the Ecohealth concept or delete the reference, since it is otherwise confusing.	Thank you very much. This is addressed in Chapter 1.
Rüegg, Simon	No	6	80	2677			In the process of the COST Action "Network for Evaluation of One Health" (https://http://neoh.onehealthglobal.net/), based on the 4 year project and 8 case studies, some fundamental challenges were identified in relation to the vision of health for people, animals and ecosystems. It is in print.	Thank you, but this section has been removed from the second order draft - the comment no longer applies
Day, Roger	No	6	80	2689	80	2690	As the document states, one health was originally around the human health/animal health nexus. Some authors (see e.g. https://static-curis.ku.dk/portal/files/123783239/2013_DBL_book_One_health_with_plants_SDanielsen.pdf) have suggested including plant health within the one health concept, so it would be useful to comment on the appropriateness or not of that within the context of IAS.	Thank you, content on One health has been revised in the second order draft.
Mariño, Juana	No	6	80	2692	84	2848	Indeed, this point requires editing, it is very long and is confusing and repetitive. The relationship with the previous sub-chapters is not clear either.	Thank you, we have edited this section in the second order draft
O'Brien, Karen	No	6	80	2699	80	2711	I found this discussion of adaptation to be confusing, as it first refers to IPCC definitions, and then introduces an alternative. In the IPCC conceptualization of adaptation, autonomous adaptations "are widely interpreted as initiatives by private actors rather than by governments, usually triggered by market or welfare changes induced by actual or anticipated climate change (Leary, 1999)" vs. in the biodiversity community "The concept of autochthonous adaptation is introduced to specifically address adaptation to environmental change in local systems." It would be helpful to first identify the IPCC derived understandings of adaptation, then introduce the alternative and why it is better in the case of IAS governance and management.	Thank you very much. This is a good point - 'autonomous' adaptation has been used by many authors to refer to private actor adaptation. However, this literature does not set out alternative definitions and there is no review to date of the use of 'autonomous' adaptation - which is why a new definition was considered to be necessary. This is now shortened and clarified in the second order draft
Day, Roger	No	6	81	2713	81	2715	See comment on row 30. I wouldn't see adaptation as something that happens when control has failed or is not possible. For any invasive that cannot be eradicated, adaptation is necessary, which could involve various activities including control efforts (even if only partially successful) as well as other changes to practices. So I would not see control effort and adaptation as mutually exclusive as I understand to be implied here.	Thank you, this section has been revised in the second order draft, taking this comment into account
Day, Roger	No	6	81	2746	81	2747	This may be true in general, but it doesn't mean there aren't very good examples of where successful control has been achieved over a wide area. Some control methods are more suitable to this than others, such as classical biological control. See https://journals.co.za/doi/abs/10.1016/j.sajsci.2010.11.001 - 2/sajsci.v100.n1.a24.pdf?expires=1603275617&id=id&accname=guest&checksum=B0752B7C66639D64A22075C7D94D14E for some specific examples.	Thank you for your comment, we agree and this is further explored in Chapter 5
Faulkner, Katelyn	No	6	81	3098	81	3098	Should 'South Africa' not be 'South America'?	Thank you for the correction, we have changed it in the second order draft
Born-Schmidt, Georgia	No	6	83	2805	83	2819	The content is repetitive	Thank you, we have revised this section in the second order draft.
Government of Germany	Yes	6	83	2833	83	2833	There seem to be a mismatch: Please replace "HAIS" with "IAS".	Thank you very much. All acronyms have been removed in the second order draft
Day, Roger	No	6	85	2849	86	2905	This will be an interesting section. It would be good if it could be linked to the legal and regulatory section too, with which there may be quite complex interaction. For example, a pesticide regulatory regime that does not distinguish between broad-spectrum pesticides and lower risk products for which there might be a smaller market is effectively encouraging the broader spectrum, more dangerous and damaging products. The external costs of such products are almost never built into the product cost, so such regulatory systems are effectively subsidising management methods which have negative societal impacts.	Thank you, the feedback is greatly appreciated. We have ensured cross-section linkages.

Government of Germany	Yes	6	85	2849	85	2849	The subchapter on "economic and financial options" for IAS management has not been completed yet which means that it is not possible to comment on it at this point in time. In order to assist the compilation process, please see the list of relevant articles below which so far have not been mentioned in the Assessment Report yet (following comments): 1. Market-based instruments: comparison of pigouvian taxes with tradable permits for invasive species control in US agriculture: Richards, Timothy J.; Ellsworth, Peter; Tronstad, Russell; Naranjo, Steve (2010): Market-Based Instruments for the Optimal Control of Invasive Insect Species: B. Tabaci in Arizona. In Journal of Agricultural and Resource Economics 35 (3), pp. 349–367. Available online at http://www.jstor.org/stable/23243060 . 2. More on permit schemes: Feng, Hong Li; Hennessy, David A. (2008): Least-cost tradeable risk permit scheme for controlling risk of introducing invasive alien species by shipping. In Ecological Economics 68 (1), pp. 532–535. DOI: 10.1016/j.ecolecon.2008.05.014. 3. The role of tariffs as border taxes for trade and invasive species: Lichtenberg, Erik; Olson, Lars J. (2020): Tariffs and the risk of invasive pest introductions in commodity imports: Theory and empirical evidence. In Journal of Environmental Economics and Management 101, p. 102321. DOI: 10.1016/j.jeem.2020.102321. 4. More on taxes: Jones, Kristin Roti; Corona, Joel P. (2008): An ambient tax approach to invasive species. In Ecological Economics 64 (3), pp. 534–541. DOI: 10.1016/j.ecolecon.2008.05.014.	Thank you. We have included one of these papers (4) but found more recent or more relevant papers through our systematic literature searches so we have decided not to include the other references (1, 2, 3).
Mariño, Juana	No	6	85	2849	86	2905	Pending	Thank you for your comment.
Sarat, Emmanuelle	No	6	85	2849	86	2905	We look forward to seeing the next draft of Section 6.5 on options of funding mechanisms for IAS prevention and management. Case studies of countries with successful policies could be inspiring, such as New Zealand, Australia, South Africa, Canada...	Thank you for your comment.
Schaffner, Urs	No	6	85	2849	85	2849	It is unfortunate that this section has not yet been drafted, as it is one of the key challenges with regard to the implementation of sustainable IAS management, particularly in low- and middle-income countries.	Thank you for your comment.
Born-Schmidt, Georgia	No	6	85	2865	85	2869	I recommend to consider in this section the option to cover massive IAS impacts cost in national disaster funds	Thank you very much. There is no indicator to assess when IAS become national disaster (equivalent to other major events such as tsunamis which impacts) and can be addressed
Born-Schmidt, Georgia	No	6	85	2872	85	2876	I recommend to consider in this section also the option of insurances for producer of IAS, during the GEF Project for IAS in Mexico a study regarding insurances for ornamental fish producers was developed. In case this idea seems viable to you in the following I cite the study and the link: PNUD México (Programa de las Naciones Unidas para el Desarrollo). 2019. Actualización de la propuesta de un seguro de responsabilidad ambiental para las unidades de producción de peces de ornato, indicando los existentes en la literatura internacional y la propuesta de establecimiento del seguro en México, incluyendo la descripción de esfuerzo y viabilidad para su implementación. Producto No1 al Proyecto 00089333 "Aumentar las Capacidades Nacionales para el Manejo de Especies Exóticas Invasoras (EEI) a través de la implementación de la Estrategia Nacional de EEI. Revollo-Fernández, D.A. Consultor Independiente, Ciudad de México, México. 60 pp. https://www.biodiversidad.gob.mx/especies/Invasoras/proyecto/resultados-componente-1	Thank you, we have included this option in the second order draft. We have however limited space for examples and have chosen not to illustrate this particular point.
Shackleton, Ross	No	6	85	2872		2972	Maybe also discuss "Payment for Ecosystem Services"?	Thank you, we agree with your comment but assessing the value of ecosystem services goes beyond the scope of this assessment. In Chapter 6 we focus on responsibility and available instruments to provide the economic incentives for governments, industries, and individuals to invest in invasive alien species preparedness, prevention, containment, mitigation or eradication
Takehara, Mari (Government of Japan)	Yes	6	85	2875	85	2876	We request to delete the sentence ' For example, this would include a tariff on international shipping used to fund inspections of ballast water on the same ships'. The tariff scheme shown in the sentence is very strange and uncommon in the maritime sector. Any ships, engaging in international voyage, have to comply with the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 can be inspected by the duly authorized officers of the Party of the convention, when the ships call at the port of the Party.	Thank you, this has been deleted from the second order draft.
Yiu, Evonne	No	6	86	2895	86	2899	Private sector role in mitigating IAS should not be limited to only reducing IAS spread of individual companies, but also innovations for the whole sector and also raising consumer awareness. For instance, the proper disposal of waste (especially plastic waste) can reduce IAS transported by marine plastic waste.	Thank you, this is addressed in 6.4 and 6.5 of the second order draft.
Mariño, Juana	No	6	86	2906	116	4057	The need for policies aimed at promoting the generation of information and relevant knowledge for decision-making is clear. However, subchapter 6.6 seems too long and detailed to be in the chapter on policy options.	Thank you for your comment. We are revising the section and will be reducing its length, while also concentrating it more on the policy options in the second order draft
Day, Roger	No	6	86	2916	86	2917	One person's knowledge is not necessarily fact - good point. See https://www.sciencedirect.com/science/article/pii/S0301479718304274 for a proposed framework of people's perceptions of invasives.	Thank you for the suggestion. We have included the references, though in a slightly different part of the text.
Day, Roger	No	6	87	2906	114	4013	The issue of knowledge is important, and I realise there is still much work to be done. However this section doesn't really seem to be addressing the questions laid out at the start, and to fit comfortably within this chapter it needs to be more focused.	Thank you, we have revised it in the second order draft and also refined the scope of each section
Shackleton, Ross	No	6	87	2913		2913	There is an extra bullet point "6"	Thank you for pointing it out, we have removed it from the second order draft.
Government of Germany	Yes	6	87	2939	88	2954	The process of knowledge acquisition explained in this para seems very science/technical-centred. While these experts play a decisive role previous sections in this and other chapters have stressed the importance of other stakeholders such as IPLC in generating knowledge.	Thank you for your comment. This section is just intended to contextualize the section and raise some of the specific issues of IAS and knowledge. We will build on this in later sections, particularly as it relates to IPLC.
Shackleton, Ross	No	6	87		87		Knowledge is well contextualised here :). More so than other key terms and concepts in sections above. Better contextualisation of other key concepts is needed, which links to some of my comments above. For this section it might be good to cite some key references for the concept of knowledge that has been theorised in the social sciences. There is a whole field (Science and technology studies) in the social sciences dedicated to studying the production of knowledge	Thank you for your suggestion. We have tried to improve the contextualisation across the chapter of the second order draft
White, Michael	No	6	88	2950	88	2951	New Zealand is very good with using peer review for government decisions	Thank you for your comment. We have taken a look at the situation in New Zealand, but may not include more examples due to length restrictions and regional balance
Lequette, Benoît	No	6	88	2976	88	2978	Another need of knowledge is the perception of IAS by part of local population and politics. Part of them (might be a high%) do not realize the magnitude of the problem and are therefore frequently opposed to new legal and regulatory instruments allowing to fight against IAS. Local governance would be improved by better understanding their perception and by monitoring their change over time.	Thank you for your comments. We agree with your point and have developed this point throughout the chapter. Please also refer to Chapter 1 for more information
Shackleton, Ross	No	6	89	3041	89	3041	Creighton and Bennett 2019 is not in the ref list.	Thank you for your comment. The references and citations have been corrected in the second order draft
Bliss, Cebuan	No	6	90	3033	90	3034	knowledge which is needed - animal welfare and rights perspectives with regards to IAS (fauna)	Thank you for your comment, this theme is now included in the second order draft
Dudgeon, David	No	6	91	3093	91	3093	I'd imagine most of the rest were crustaceans, such as crayfishes	Thank you for your comment. Yes, I expect you're right. We have revised the text in this sub-section of the second order draft
Born-Schmidt, Georgia	No	6	91	3111			In this section Mexico is not mentioned even so there are publications but they are in Spanish and rather in national papers https://scielo.conicyt.cl/scielo.php?pid=S0718-19572011000300006&script=sci_arttext&lng=en or in books https://agua.org.mx/wp-content/uploads/2016/01/Especies-acidicas-invasoras-en-Mexico.pdf for example SECCIÓN IV. ESTADO ACTUAL DE LAS INVASIONES DE ALGAS Y PLANTAS ACUÁTICAS. 12. Algas marinas no nativas en la Costa del PACÍFICO Mexicano 211	Thank you for the additional references. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Rius Viladomiu, Marc	No	6	92	3150	92	3150	There should be a separate paragraph on this section on how intraspecific hybridization (or genetic admixture) affect species invasions: Keller, S.R. and Taylor, D.R. (2010) Genomic admixture increases fitness during a biological invasion. J. Evol. Biol. 23, 1720–1731; Rius, M., & Darling, J. A. (2014). How important is intraspecific genetic admixture to the success of colonising populations? Trends in Ecology & Evolution, 29, 233–242	Thank you for your comment. This is an important subject and one that deserve attention. Though we actually need to reduce the length of this section, particularly as some of the aspects may be covered within other chapters, such as under impacts.
Rius Viladomiu, Marc	No	6	93	3159	93	3164	There should be more explicit examples of genetic / genomic studies that use analytical techniques that allow unraveling invasion routes, e.g.: Estoup A, Guillemaud T (2010) Reconstructing routes of invasion using genetic data: why, how and so what? Molecular Ecology 19: 4113–4130; Lombaert E, Guillemaud T, Cornuet J-M, Malusa T, Facon B, et al. (2010) Bridgehead effect in the worldwide invasion of the biocontrol harlequin ladybird. PLoS ONE 5: e9743; Rius M, Turon X, Ordóñez V, Pascual M (2011) Tracking invasion histories in the sea: facing complex scenarios using multilocus data. PLoS ONE 7: e35815; Hudson J, Johannesson K, McQuaid CD, Rius M (2020) Secondary contacts and genetic admixture shape colonization by an amphitlantic epibenthic	Thank you very much. Indeed, this theme is covered within other chapters too. Here we will just focus on the policy and research needs that relate to this.
Rius Viladomiu, Marc	No	6	93	3172	93	3177	The use of environmental DNA metabarcoding (which allows the non-targeted surveillance of molecular biodiversity landscape) to detect non-indigenous species (NIS) and can be essential for early detection of NIS should be included. Some key citations here are: Darling JA, Gall BS, Carvalho GR, Rius M, Viard F, Piraino S (2017) Recommendations for developing and applying genetic tools to assess and manage biological invasions in marine ecosystems. Marine Policy 85: 54-64 ; Holman LE, de Bruyn M, Creer S, Carvalho GR, Robidart J, Rius M (2019) Detection of introduced and resident marine species using environmental DNA metabarcoding of sediment and water. Scientific Reports 9:11559	Thank you for those additional references, they are included in the second order draft
Pourkazemi, Mohammad	No	6	93	3189	93	3189	The YY male: work in close aquaculture system for tilapia, but not apply when tilapia introduced in natural water bodies. Maybe via introducing a local predator species to minimize algal species. It worth to mention establishment a regional framework to control and combat against invasive species, not only focus at	Thank you for your comments. This subject has been developed in depth in the chapter on management in the second order draft
Faulkner, Katelyn	No	6	94	3221	97	3346	There is a very lengthy and detailed discussion in this section on research and trends in South America. Perhaps information from other regions could be	Thank you for the comment. We have revised this section accordingly in the second order draft
Schaffner, Urs	No	6	94	3221	94	3221	I agree that there is a geographic bias in research, including conceptual frameworks for and implementation of IAS management. However, I feel that the coverage of the literature in this chapter makes the bias even bigger than it actually is. E.g., work done in Africa is hardly mentioned. Even the lessons learned from the Working for Water program (see e.g. the recent book by van Wilgen et al 2020), are not really integrated. I may be biased, but one should also not underestimate the work done in Eastern Africa, including the failures and the lessons learned.	Thank you for your comment. The section on geographic bias has been reduced and there are good examples from all over the world. We will try to balance the geographic bias in our examples, though this will not be entirely possible. Though we try to balance examples across the whole assessment.
Day, Roger	No	6	97	3334	97	3335	This must be true not only for aquatic systems?	Thank you for your suggestion. We agree and have slightly modified the sentence to reflect
Schaffner, Urs	No	6	97	3338	97	3346	The story about Parthenium is not accurate, as the cited paper does not adequately cover the published literature. In fact, publications of early records of P. hysterophorus e.g. in Southern Africa and on the Arabic Peninsula (e.g. Oman, Yemen) actually tell a different story, i.e. the establishment of Parthenium was reported in several of these countries at an early stage, but no EDRR was implemented.	Thank you for pointing this out. As we need to reduce this section we will have removed this example all together.
Day, Roger	No	6	97	3344	97	3346	I'm not sure the issue is lack of research per se. Early detection depends on effective monitoring and reporting systems, rather than research.	Thank you for your comment. We agree and have tried to incorporate this.
Faulkner, Katelyn	No	6	97	3365	97	3378	This paragraph should probably be in Chapter 1. Seems out of place here	Thank you for the comment. We see what you mean, because it appears as if we are redefining the definition. We have reworded it in the second order draft, because it is in fact about the way that the definition is interpreted.
Smith, Emily	No	6	98	3380	98	3397	Along with this recognising the spatial and temporal variability in the importance of pathways. Expected that e-commerce is going to increase overtime, but as trade routes change, and preferences in travel substantial uncertainty in determining which pathways will be more important in the future. The intrinsic human element in pathways of movement, will mean this will always be hard to predict.	Thank you, we agree and have referred to Chapter 3 where this issue is covered

Dudgeon, David	No	6	99	3437	99	3437	Did they really publish on Uruguayan symposia???	Thank you for your comment. We have corrected this in the second order draft
Shackleton, Ross	No	6	100	3483	101		I would suggest to rather say promote interdisciplinary or transdisciplinary research. Social-ecological system approaches is one paradigm that allows for integration of disciplines but there are many other approaches too (e.g. Political Ecology ...). Framing it in an interdisciplinary manner also could call for other collaborations e.g. we should also promote engineers to work with biologists for example to develop new technologies which would be interdisciplinary, but would fit in the "social-ecological" approach, the same with work with computer scientists on big data etc. Maybe social-ecological approaches can be one aspect that should be core to the discussion but others should also be highlighted, framing it as interdisciplinary	Thank you for your comment. Promoting interdisciplinary or transdisciplinary research is indeed an important policy goal and we will have built on this in the second order draft.
Day, Roger	No	6	101	3506	101	3514	Whether having a large proportion of biological invasion studies that don't include socially relevant research is a problem depends on the objective of the research. If the objective is to understand the biological processes then maybe social science isn't so necessary. The problem comes when biological research is undertaken with the supposed objective of informing policy and management decisions. Policy and management is as much or even more about social research	Thank you for your comment. agreed. We have removed the first sentence of the section to clarify this point.
Shackleton, Ross	No	6	101			102	I miss a little how this think and applies to invasions. There are examples in the literature where local communities "adopt" new species and create products, identities and customs around them (e.g. prickly pear in South Africa) local communities cal also "discover" new uses for species or ways to manage them (e.g. Australian acacias are used as medicinal plants in South Africa).	Thank you, this theme is addressed through Chapters 4 and 6 in the second order draft
White, Michael	No	6	102	3547	102	3556	Good. Sometimes an entire generation is skipped when passing down knowledge. Dreaming is well known	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Day, Roger	No	6	103	3581	105	3654	Surely an important point for this section is that IT developments open up massive opportunities for citizen science that were not previously available.	Thank you for your comment. Yes, we certainly agree and have improved this section to make
Thompson, Ian	No	6	103	3581	104	3654	It could be useful if this somewhere a reference was made to what could make citizen science and community engagement better. It is a growing resource. Expanding general surveillance of invasive species by integrating citizens as both observers and identifiers. S. M. Pawson, - J. J. Sullivan, - A. Grant. Journal of Pest Science. 17 June 2020. https://doi.org/10.1007/s10340-020-01259-x Many eyes on the ground: citizen science is an effective early detection tool for biosecurity. Thomas, Melissa & Gunawardene, Nihara & Horton, Kristin & Williams, Angus & O'Connor, Simon & McKirdy, Simon & Merwe, Johann. (2017). Biological Invasions. 10.1007/s10530-017-1481-6.	Thank you for your comment, we have developed the citizen science policy aspect and agree with your perspective.
White, Michael	No	6	103	3592	103	3592	I contribute to eBird, CoralWatch & Project NOAH	Thank you for making this point. It does not seem to require changes to the text.
Johnson, Brian	No	6	104	3619	104	3621	Please note that this finding was strictly for citizen science initiatives having a web/mobile app interface for data collection (not all citizen science projects in general). There have been other IAS studies in Asia which have used citizen science data collected in other ways, e.g. https://www.sciencedirect.com/science/article/pii/S0048969718315961 . There are probably also cases where published papers were in other languages besides English, which would have been missed in Johnson et al., 2020, and could partially explain the imbalance between the different regions.	Thank you, that is an important point and we have incorporated it in the second order draft.
Johnson, Brian	No	6	104	3629	104	3631	This reference is outdated (from 2000), so I suggest to find a more recent one.	Thank you for your comment. There are indeed more recent references, we have revised it accordingly in the second order draft.
Källström, Björn	No	6	107	3734	7	3735	As the last sentence in Box 6.10 include the following: "Another important step is to implement validations of citizen science IAS data by experts (e.g. taxonomists) or through automated machine learning approaches (e.g. computer vision) or even by Artificial Intelligence (AI)."	Thank you for this suggestion. We have chosen to include it in the section
Born-Schmidt, Georgia	No	6	107	3737			Another example for integrating IAS monitoring into a national monitoring system is the Mexican National Biodiversity Monitoring system "Sistema Nacional de Monitoreo de la Biodiversidad (SNMB, https://www.biodiversidad.gob.mx/monitoreo/monitoreo-biodiversidad/)" which includes remote monitoring through the use of camera traps and recorders for bioacoustic monitoring. In addition, the system has protocols for collecting data on vegetation.	Thank you for pointing out this. We will be trying to balance the examples geographically across the assessment and currently we need to reduce the length of chapter 6. Nevertheless, we may be able to include a citation to the system in the second order draft.
Sharma, Gyan	No	6	107	3756	107	3756	Reference of Mungi et al 2020 - missing from reference list	Thank you for your comment. The references and citations have been corrected in the second
Sharma, Gyan	No	6	107	3759	107	3759	Please add- "A case study from India by Goyal et al (2020) suggest how various stakeholders can work in tandem to formulate and execute management programs for IAS and they can be termed as- Biological Invasion Managers-which should include: policymakers, implementing bodies, and research institutes etc". Reference: Goyal, N., Krishna, S., Shah, K. et al. Integrating the biological invasion paradigm in the policy framework in India. <i>Tropical Ecology</i> (2020). https://doi.org/10.1007/s42965-020-00117-2	Thank you for your suggestion. Unfortunately, we are not able to add more case studies because of length restrictions.
Shackleton, Ross	No	6	107			108	I think the monitoring section should be more than just a case study box. There are very different ways of monitoring at different scales with different outcomes etc. There are challenges and opportunities to be discussed as well. A discussion of indicators might also be good. Some good sources to add to this section are: Wilson JRU, Faulkner KT, Rahloa SJ, Richardson DM, Zengeya TA, van Wilgen BW (2018) Indicators for monitoring biological invasions at a national level. <i>J Appl Ecol</i> 55:2612–2620 McGeoch MA, Butchart SH, Spear D, Marais E, Kleyhans E, Symes A, Chanson J, Hoffmann M (2010) Global indicators of biological invasion: species, numbers, biodiversity impact and policy responses. <i>Divers Distrib</i> 16:95–108 McGeoch MA, Spear D, Kleyhans EJ, Marais E (2012) Uncertainty in invasive alien species listing. <i>Ecol Appl</i> 22:959–971 Latombe G et al (2017) A vision for global monitoring of biological invasions. <i>Biol Conserv</i> 213:295–308 Shackleton et al. 2020 <i>Biological Invasions in World Heritage Sites: current status and a proposed monitoring and reporting framework</i>	Thank you for your comment. Monitoring of different kinds is extensively covered in the other chapters, include those on management, pathways and impacts.
Thompson, Ian	No	6	108	3778	108	3778	Because of the criticality of the information to better management of IAS a plain language explanation of need and value could be very useful. While data management is a very technical issue, use of the product is for everyone.	Thank you for your comment. The feedback is greatly appreciated by the chapter authors.
Shackleton, Ross	No	6	108			109	I miss links and examples relating to invasion science	Thank you for your comment, in the second order draft, we have revised this section to make its relevance more apparent.
Day, Roger	No	6	109	3821	110	3845	In the plant health area, countries (contracting parties to the IPPC) are obligated to report new pests/invasives. However, very few countries, rich or otherwise, meet their obligations. This issue needs to be addressed in this document; why does it happen, what is the impact, and how can this situation be improved? Maybe it appears in another chapter that I've not looked at?	Thank you for making this point, it is very relevant and we have tried to provide answers in the second order draft
Jewell, Susan	No	6	110	3847		3869	Suggested addition for U.S. national scope: USGS's Nonindigenous Aquatic Species website https://nas.er.usgs.gov/	Thank you for your comment. We have added the database to the list, but we may remove the whole list the final draft.
Born-Schmidt, Georgia	No	6	112	3920	112	3930	Research gate should be mentioned as it is an important source to gain access legally to publications for free	Thank you for this suggestion. EICAT is indeed an important methodological standard and it is covered quite extensively in the chapter on impacts. Here we are referring to data standards, though we will have to make that clear
Brooks, Thomas	No	6	112	3939	112	3939	Add a paragraph around here on EICAT and SEICAT as standards for documenting impacts of IAS on nature and on NCP/GOL respectively. See Ch 4, p147-148. Key citations are Blackburn et al. (2014); https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001850 & IUCN (2020); https://portals.iucn.org/library/node/49101 for EICAT; Baehar et al. *2018: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12844	Thank you for your comment. Please refer to chapter 4 for these standard methods.
Shackleton, Ross	No	6	112			113	I think this section is missing the discussion of key "standards". e.g. EICAT https://www.iucn.org/theme/species/our-work/invasive-species/eicat . Also maybe draw on the "frameworks" and indicated two comments above. For example the Wilson reference relates to a established standard for South Africa and the first ever coordinated status report on biological invasion in a country (see https://blogs.sun.ac.za/cib/report-on-status-of-biological-invasions-in-south-africa-a)	Thank you for your comment. We agree but in revisions of this section we refer to chapter 3 where they discuss the drivers of invasions.
Faulkner, Katelyn	No	6	113	3951	113	3951	The reference should be Hulme 2008	Thanks for this suggested change. We have included it in the second order draft.
Genovesi, Piero	No	6	113	3989	114	3997	I agree that reporting is essential, but this should also be based on agreed indicators, in order to track progress on the enforcement of policy measures over time. I suggest to take into account the work done within the Biodiversity Indicator Partnership (https://www.bipindicators.net/) calling to identify trends in terms of introduction events, impacts of invasive alien species, trends in policy tools (see the indicator developed for the UN Sustainable Development Goals) and trends in invasive alien species vertebrate eradication.	Thank you for pointing this out, we have incorporated this in the second order draft.
Brooks, Thomas	No	6	114	3998	114	3998	Add a section here on the importance of IAS indicators in tracking IAS themselves, their impacts, and responses to these over time, focusing on the four key indicators: 1) Trends in the numbers of invasive alien species introduction events (see https://www.bipindicators.net/indicators/trends-in-numbers-of-invasive-alien-species-introduction-events ; discussed in Ch 2, Section 2.2); 2) Red List Index (impacts of invasive alien species) see https://www.bipindicators.net/indicators/red-list-index-impacts-of-invasive-alien-species - key references are Butchart (2008 <i>Bird Conserv Int</i> ; https://www.cambridge.org/core/journals/bird-conservation-international/article/red-list-indices-to-measure-the-sustainability-of-species-use-and-impacts-of-invasive-alien-species/BFA17D64284A8508582CC77CA6156B6D) & Rodrigues et al. (2014 <i>PLoS ONE</i> ; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0113934); 3) Policy responses (see https://www.bipindicators.net/indicators/adoption-of-national-legislation-relevant-to-the-prevention-or-control-of-invasive-alien-species) as discussed on P22 above (this is the official Sustainable Development Goal indicator 15.8.1, see https://unstats.un.org/sdgs/metadata/files/Metadata-15-08-01.pdf); and 4) Trends in invasive alien species vertebrate	Thank you very much. Indeed, we have worked towards better integration between chapter 6 and the previous chapters and in this chapter we cover the policy related issues you have raised.
Brooks, Thomas	No	6	115	4025	115	4032	Add mention of IUCN Red List of Threatened Species (https://www.iucnredlist.org/), which includes spatial documentation of Introduced vs Native range, and documentation of IAS as threats in assessments of >120,000 species	Thank you for this suggestion. We have included it in the section in the second order draft
Brooks, Thomas	No	6	115	4038	115	4038	Suggest instead highlighting GISD (http://www.iucngisd.org/gisd/) here as the central existing platform for integration of IAS data.	Thank you for your comment. The GISD has been highlighted in several places, but here we are specifically referring to the Species Populations Essential Biodiversity Variables (EBVs) and so the GISD is not directly relevant.
Ruegg, Simon	No	6	116	4059			Somewhere in this chapter it should be mentioned that for successful transfer from knowledge to action, information needs to be translated into heuristics and narratives that guide peoples everyday behaviour. Unless the information finds a resonance in daily activity patterns, it will remain non-considered by everyday decisions. For details refer to: https://link.springer.com/book/10.1007%2F978-3-319-42424-8	Thank you for your interesting comment. We have included this point throughout 6.4 and 6.6 of the second order draft
Alaux, Christine	No	6	117	4059	117	4076	Subheading 6.7.1 must be removed as it has the same statement as 6.7, and there is no 6.7.2.	Thank you for pointing this out. We have reviewed all the section numbering in the second
Government of Germany	Yes	6	117	4059	117	4078	In the context of transformative change the IPBES global assessment (2019) identifies key leverage points, where efforts yield exceptionally large effects. Maybe this is something the chapter's authors may wish to consider whilst further developing this section.	Thank you for this comment - it is addressed in the second order draft
Mariño, Juana	No	6	117	4059	117	4077	Mostly pending	Thank you for this comment - it is addressed in the second order draft

Bates, Peter (ILK TSU, from the ILK dialogue workshop for the IAS assessment, 29 Sept - 1 October 2020)	No	6	117	4060	117	4061	In addition to a focus on national and international governance, it is important to include discussions of the key role of customary protocols, governance and institutions, emphasizing IPLC self-determination and rights to manage lands and resources (especially in Figure 6.15). Working with and enhancing support for traditional governance systems could be a key goal of efforts to manage IAS, including through policy, regulations, tools, methods and approaches. More information in IPBES (2020) Andreu, J.L., Batzin Chojoi, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. Report of the ILK dialogue workshop on the first order drafts of the IPBES assessment of invasive alien species. Online, 29 September to 1 October.	Thank you very much. This point has been reported as part of a systematic literature review on indigenous peoples and local communities and invasive alien species (and governance)
O'Brien, Karen	No	6	117	4060	117	4077	This chapter presents a rich and substantial amount of content that is relevant to future options for the prevention and management of IAS, and the final section on transformative change offers an opportunity to pull together the many strands in a coherent way. A key here will be to identify transformation involving a shift from what to what (e.g., reactive to proactive; coping to adaptive, partial and fragmented to integrated and aligned, etc.), and then focus on the "how" of transformation. Rather than identifying new or additional things to do, it seems important here to consider how to do the same things differently, e.g., building trust, connecting with the values of diverse actors, raising awareness and influencing social norms, identifying and being transparent about the values that are prioritized in IPBES and IAS-related initiatives. From reading the chapter, it seems clear that traditional ways of doing things are unlikely to benefit from a "more of" approach. The current approach seems to be addressing IAS as what Heifetz et al. (2009, Adaptive Leadership) refer to as a technical problem, or one that can be addressed with more knowledge, know-how, expertise, resources, management, etc., when in fact it is an adaptive challenge that draws attention to mindsets, beliefs, values, worldviews, and paradigms, as well as emotions and identities (see O'Brien and Selboe, ch. 1 in The Adaptive Challenge of Climate Change). Addressing these issues may benefit from attention to the practical, political, and personal dimensions of transformation, all of	Thank you, we agree with your views and have taken them into account in the second order draft
Schaffner, Urs	No	6	117	4061	117	4061	I suggest to revise Fig 6.15 as it may be seriously misunderstood: for example, why should eradication be possible at high population densities where mitigation is not possible anymore, and why should mitigation be restricted to spread? Also, placing spread and impacts along an increasing population size is questionable; what is the area under consideration, is it the entire habitat suitable for a particular IAS in a particular continent or region? Moreover, while promoting the use of an IAS may make sense from an economic point of view, there are numerous examples where utilisation has not helped managing IAS, which may, if applied in isolation, to a further destabilization of social-ecological systems (see box underneath). Clearly, there are mitigation strategies that can reduce also high population densities of IAS, e.g. biological control, and these measures may help to sustainably manage IAS.	Thank you - the figure has been deleted in the second order draft
Jeschke, Jonathan	No	6	118	4079	131	4741	The reference section is currently incomplete. I didn't check all publications cited in the chapter, but at least the following ones that are cited in the text are currently missing in the list of references: Bellard & Jeschke (2016), Dana et al. (2014), Jeschke et al. (2012, 2019).	Thank you for your comment. The references and citations have been updated and harmonized in the second order draft
Guillao, Jo Ann	No	6	65-75				In addition to above, comprehensive and effective management of IAS requires IPLCs engagement and clear understanding on how they have been impacted by IAS. It is also important to devise practical tools such as risk assessment, situation analysis and problem-solving approaches to facilitate management of IAS.	Thank you, we have added more information on this theme in the second order draft
Guillao, Jo Ann	No	6	65-75				Please see Local Biodiversity Outlook-2 for insights and contributions of IPLCs. Relevant messages of IPLCs in regard to their contributions are also mentioned. Below is a key message mentioned specific to IAS. "Invasive Alien Species (IAS) pose serious threats to IPLCs' cultural, environmental and food systems, and many IPLCs are contributing to, and in some cases initiating, programmes to address this growing problem. The actions of IPLCs, building on their traditional knowledge, can complement scientific solutions and strengthen holistic, ecosystem-based approaches to the identification, assessment, monitoring, and control or eradication of IAS." The document can be accessed from: https://localbiodiversityoutlooks.net/wp-content/uploads/2020/09/Local-Biodiversity-Outlooks-2.pdf	Thank you, a literature review on IPLC and IAS has been conducted and answers this concern (see also Chapter 4 and Chapter 1)
Ieurance, Deah	No	6		956		1136	Legal and regulatory options...this section was very well written and the	Thank you for your comment.
Rüegg, Simon	No	6		1549			It should be noted that the WTO framework is primarily utilized to leverage economic benefits and not to promote any health or welfare issue+G43s. A good example is the trade stop with milk products from the Netherlands to Russia due to Qfever outbreak. When it emerged that the Russian federation did not have enough capacity to cover the needs with milk products, imports were allowed again. This may have historic reasons, but also the lack of experts at the WTO and in the corresponding national delegations that are capable of articulating threats to well-being and resilience in terms of that framework. Furthermore, the requirement of evidence disables the precautionary principle eminently important for the maintenance of complex adaptive systems.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided what needs to be addressed in the statement.
Rüegg, Simon	No	6		2261			In the process of the COST Action "Network for Evaluation of One Health" (https://http://neoh.onehealthglobal.net/), based on the 4 year project and 8 case studies, some fundamental challenges were identified in relation to the vision of health for people, animals and ecosystems. It is in print:	Thank you very much. This is indeed relevant literature, but the section addresses only integrated approaches used in relation to invasive alien species.
Rüegg, Simon	No	6		2849			An expert potentially interesting for this section would be Marc Chesney: http://www.bf.uzh.ch/de/persons/chesney-marc	Thank you, we will certainly value his comments during the external review of the second order draft - we will make sure to contact him.
Jewell, Susan	No	6					General comment: I would like to bring to your attention a recent publication on the history of injurious wildlife listing under the Lacey Act, which has prohibited the importation of certain invasive species into the United States since 1900: "A century of injurious wildlife listing under the Lacey Act: a history" https://www.reabic.net/journals/mbi/2020/3/MBI_2020_Jewell.pdf . It might give some insight into the strengths and weaknesses of the U.S.'s federal statute on invasive species.	Thank you. We have decided not to include this example, as it doesn't add more information to the points already made in the chapter. In the second order draft, we also chose to include examples from other regions for better regional balance
Rüegg, Simon	No	6					An economic approach that I am missing in chapter 6.5 are regulatory mechanisms for trade and economy, e.g. steering the investment and divestment flow.	Thank you, this is addressed in 6.3 of the second order draft
Lerambert, Adeline	No	5 & 6	0	0	0	0	Chapters 5 and 6 deal with the management of IAS and potential plans for management into the future. We strongly recommend a preventative and humane approach to invasive species management. The consideration of animal welfare science is a key component of good conservation practice, and it will lead to a reduction in harm to individual wild animals, a greater appreciation of their intrinsic value, and ultimately, improved conservation outcomes. Rather than considering the concerns of society (public and organisations) about welfare as an obstacle to getting the job done, the assessment should instead include welfare as one of the guiding principles of IAS identification and management. The consideration of welfare into any planning would not only be more ethical and appease those who care, but might also contribute to a fuller, more robust analysis of the situation and what needs to/can be done. The International Consensus Principles for Ethical Wildlife Control (Dubois et al. 2017) is a set of principles that was formulated with the goal of encouraging the ethical management of human-wildlife conflict. These principles can be easily used as entry points to include animal welfare considerations in the scope and implementation of programmes aimed at effectively managing wildlife, including of invasive alien species, as well as addressing associated sustainability challenges. As well as using the International Consensus Principles for Ethical Wildlife Control as a key set of criteria, there should also be a focus on the One Health/One	Thank you, ethical considerations of management actions have been further developed in Chapters 1, 5 and 6 in response to this comment.
Akhtar-Schuster, Mariam	No	General	0	0	0	0	All of the chapter have some very old (20 years old) references. Perhaps a cut-off date for references needs to be introduced.	Thank you for your comment. We see no need for a cut-off date since such references are non-avoidable, but will encourage experts to get as up to date as possible in the second order draft.
Bliss, Cebuan	No	General	0	0	0	0	In general, there is a lack of discussion of the welfare implications of IAS management. Also, an animal rights perspective which takes into account IAS is lacking or at least is only seen as negative - i.e. animal rights views got in the way of IAS management, but there may also be positive implications from taking into account the rights of IAS (see Litin, 2010; Donaldson and Kymlicka, 2011; Sagoff, 2011; Büscher, 2019; Cowan et al., 2011)	Thank you for your comment. We have extended the text on ethical perspectives in the second order draft.
Catford, Jane	No	General	0	0	0	0	Congratulations and thanks to all authors for this tremendous first draft. The work that you have all done is incredible: comprehensive, thoughtful and well integrated. A very impressive effort and clearly a huge amount to work. My comments on each of the chapters are rather brief (sadly big time constraints), but I would be very happy to expand upon or clarify any of my comments, if needed.	Thank you very much for your positive feedback, it is much appreciated by the chapter authors.
Copp, Gordon	No	General	0	0	0	0	The definition of an invasive species, besides impacts, appears to require 'establishment' and dispersal. Some definitions now no longer require establishment, but simply persistence and impacts. Was that issue discussed in setting the definition.	Thank you very much for your comment. The definition was provided by scoping document and approved by IPBES member states. It may not be changed. However, we have improved clarity through design of a figure explaining all terms and linking to other definitions in the
Fumey, Christian (Government of Ghana)	Yes	General	0	0	0	0	Non vascular plants should also be assessed.	Thank you for your comment. Non-vascular plants are included in the second order draft.
Government of Germany	Yes	General	0	0	0	0	By IPBES decision IPBES-4/1 this assessment should respond directly to Aichi Biodiversity Target 9 (Annex III to decision IPBES-4/1), which states: "By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment." We therefore recommend the analyses of the recently launched CBD GBO-5 report (2020, https://www.cbd.int/gbo/) that provides an in depth analyses of what progress has been achieved so far regarding Target 9. For the sake of continuity, we also strongly recommend that the authors analyse IAS-related aspects in the ongoing CBD processes that should lead to further goals/targets under the planned 'post-2020 global biodiversity framework'. Therefore, please consider analysing working documents that will be released in preparation of CBD COP-15, and decisions taken at COP-15 in 2021.	Thank you for your comment. We have addressed this aspect of ongoing policy development, including the SPM in the second order draft
Government of Germany	Yes	General	0	0	0	0	Considerable efforts were undertaken to include IPLCs different views on IAS and recognize traditional knowledge as valuable contribution to managing IAS.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter
Government of Germany	Yes	General	0	0	0	0	Executive Summaries are crucial parts of a chapter. They should include self-explanatory information. It is therefore suggested to avoid using abbreviations in the summaries.	Thank you for your comment, we no longer use abbreviations/acronyms in the second order draft
Government of Germany	Yes	General	0	0	0	0	Including a list of guiding questions at the beginning of each section of a chapter could be useful to highlight a section's rational and direction. It is suggested to consider this for all chapters.	Thank you very much for the suggested change. Authors have discussed including additional introductory material in each chapter in the second order draft.
Government of Germany	Yes	General	0	0	0	0	It is suggested to develop an index for the entire assessment that lists all IAS mentioned with latin names with reference to the pages where it is mentioned.	Thank you for your comment, we may develop an index for the final version of this assessment (after the Plenary approval)
Government of Germany	Yes	General	0	0	0	0	Language, grammar and punctuation marks have limited the understanding of several parts of the text. We hope that these aspects will be given full attention (see specific comments below). Kindly also ensure that page numbering throughout the chapters of the SOD is consistent.	Thank you for your comments. Grammatical and editorial errors have been corrected in the second order draft (as much as possible).

Government of Germany	Yes	General	0	0	0	0	Only references in English are used and cited - intention or omission?	Thank you for your comment. Please note that in other chapters, there are references in other languages. Literature searches were in a wide selection of languages (e.g. Impact datasets) in
Government of Germany	Yes	General	0	0	0	0	Please ensure that figures and tables are depicted in high quality resolution in order to guarantee readability in the SOD. At this stage it was sometimes difficult to assess the relevance of some tables because of their poor readability.	Thank you for your comment, we have included high resolution pictures and figures in the second order draft of the assessment
Government of Germany	Yes	General	0	0	0	0	Please spell out an acronym when used for the first time.	Thank you for your comment, we no longer use acronyms in the second order draft
Government of Germany	Yes	General	0	0	0	0	Several of our specific comments show that the discussions in the chapters about 'drivers' aren't clear at the moment. The complexity of the issue of drivers in the context of IAS is also reflected in ch 3 (L27-28), where the authors themselves state that "The standard dichotomy of indirect and direct drivers widely adopted by IPBES breaks down when examining IAS since many traditional indirect drivers affecting biodiversity are direct drivers of IAS." We believe that the issue of drivers is crucial for the narrative of the report. We therefore hope that our numerous comments on this issue will support the development of an explanatory note and/or a graph which insert fairly early in the assessment report providing the required clarification on direct and indirect drivers of IAS.	Thank you very much for your comment. We have improved the links amongst chapters and including on drivers in the second order draft
Government of Germany	Yes	General	0	0	0	0	We acknowledge that by decision IPBES-4/1 the definition of IAS was provided for the purpose of developing this assessment. However, this definition is not clear on several aspects (see the specific comments listed in this template regarding the definition). The general scope of the definition may allow the inclusion of explanations on more specific aspects without conflicting with the definition. For example, it would be very important to define the term "impact" used in the definition. The approved scoping for this assessment states the "... assessment will focus on species fitting to this definition, especially those with a demonstrable impact on or risk for biodiversity and through their effects on ecosystem services, and human well-being." We strongly recommend that "impact" should by definition refer to detrimental impacts on biodiversity as for example in the definition used by the CBD and in the definition of invasive alien species in the EU regulation on IAS. Rationale: The definition of IAS used in this assessment is not in line with the usual definition of IAS in the CBD and other relevant international and supranational contexts. The CBD's definition of IAS is tied to the threat on biodiversity, while the definition in this assessment only refers to "impacts". We therefore recommend discussing the IAS definition in relation to those definitions and explaining the differences and reasons for deviating from established definitions in the introductory chapter. As every naturalized alien species has some impacts, it is not clear in this definition when a species would be an invasive alien species, and when it would only be an alien species. Moreover, we noted that in some sections different IAS definitions are apparently being used. The definition of IAS is also not clear about whether species dislocated due to climate change are counted as IAS or not.	Thanks for this suggested change. We have included it in the second order draft. Climate-induced invasions are certainly included; human activities are indirect drivers in this case (assuming anthropogenic responsibility for climate change). However, we have clarified the terminology within a new figure on the definition in the second order draft.
Government of Germany	Yes	General	0	0	0	0	We commend the tremendous efforts undertaken by the authors for the development of the FOD. The quality of the IAS FOD is impressive. It is striking that the theme IAS has been covered in its complexity. In general, the first order draft is very comprehensive and thoroughly researched, especially highlighting lessons learned and developing future options for IAS governance and management which are highly appreciated. The assessment is written in a well structured and comprehensible way. This provided a good basis for reviewing in-depth from multiple perspectives. We have however raised some issues that the authors hopefully will find useful for the further development of this assessment. Our comments generally target the definition used, drivers, literature used, incorrect or inconsistent statements. For some statements, we also request more concrete evidences, and we also provide suggestions, e.g. for restructuring the content or developing supplementary sections (annexes) to make the chapters punchier and more to the point. There are some general aspects concerning all chapters, which we have highlighted below. We encourage the co-chairs of this assessment to ensure that these	Thank you very much for your feedback
Government of Germany	Yes	General	0	0	0	0	We encourage the authors to increase cross-referencing between chapters wherever possible. This will enhance the narrative of the assessment, and may also help reducing redundant information.	Thank you for your comment. We have improved the links amongst chapters in the second order draft
Government of Germany	Yes	General	0	0	0	0	We encourage the CLAs to analyse text sections, figures and tables under each chapter, which could be moved to annexes as supplementary material to shorten the length of chapters.	Thank you for your comment. Authors have shortened the chapters and included more supplementary materials in the second order draft.
Government of Germany	Yes	General	0	0	0	0	We realized that in many cases, quite old publications have been cited (see our specific comments on this matter). We strongly recommend the use of more recent and up date publications to ensure that the conclusions emerging from the chapters will support the development of response options to address IAS which consider the current state of knowledge.	Thank you for your comment. Chapter authors cite most recent publications when relevant in the second order draft
Government of UK	Yes	General	0	0	0	0	In relation to National Invasive Species Action Plans, we believe the GB Invasive Non-native Species Strategy (http://www.nonnativespecies.org/index.cfm?sectionid=55) is a good and broadly successful example. We would be happy to provide more detail to include in the report. The UK can also provide an example of a move towards greater integration between animal, plant health and invasive species biosecurity regimes with the introduction of monthly biosecurity meetings at which risks from all disciplines are reviewed together. We are happy to provide further details. Please	Thank you for your kind offer of support. Olaf Booy has been contacted and involved as a contributing author in the second order draft
Government of UK	Yes	General	0	0	0	0	Specifically in relation to chapter 6, there is a large amount of background and academic detail. However, it is not clear that it achieves the objectives of setting out future options for the prevention and management of invasive alien species. It would be useful to cut back on the more general text and provide a clearer synthesis, supported by evidence, of what options could be considered. It would be particularly useful to more fully consider the ways in which IAS might be able to learn from plant and animal health and potentially consider following in their path in relation to international and national approaches. This is touched	Thank you for your comment. The chapter 6 has been revised to be more solution-oriented in the second order draft.
Government of UK	Yes	General	0	0	0	0	The numerous authors and approaches means the report is somewhat inconsistent – some topics are covered in fine detail, others are much more summarised, and there is some repetition. It would be useful for the final report to be more consistent in style and balanced in coverage.	Thank you very much for your comment. Internal and external reviews contribute to reducing overlaps and inconsistencies in the second order draft.
Government of UK	Yes	General	0	0	0	0	The report is an excellent exploration of much of the science and research into invasive non-native species – and appears comprehensive in terms of the more academic aspects of invasion as well as being well representative of different geographic regions and people. However, there are some potential gaps: a. It does not do so well in assimilating and using experience from the disciplines of plant and animal health (and similar biosecurity regimes). These are of course referenced and discussed in many places but more thorough consideration would be useful, particularly in relation to the future of invasive non-native species management and how we could learn from these areas. While the range of taxa, pathways and impacts may be somewhat different, there are many similarities in the types of tools, processes, legislation, policy and responses needed. As these regimes have long track records and are largely successful in their approach – it is essential to learn lessons from them. It would be good for the report to engage further with experts with experience in these regimes. b. In general the policy oriented sections of the report are weaker than other sections. The impression is that the policy sections have been developed from an academic perspective, more than that of practical policy delivery (both are useful). The assessment would benefit from engaging further with those involved in designing / delivering policy at different levels, though as commented above, the current draft report is too unwieldy to support effective engagement with policy and implementation experts.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. Authors have considered the points made in terms of animal and plant health and the SPM provides a succinct version of the overall assessment in the second order draft.
Government of UK	Yes	General	0	0	0	0	Undertaking an international review of invasive non-native species is undoubtedly complex and diverse. Even so, the report is overly long and could be substantially condensed. This is needed to help communicate the key points the authors are trying to get across, which are largely lost in the volume of material. It is recommended that unnecessary text is removed and relevant text condensed where possible.	Thank you for your comment. Authors have shortened the chapters and included more supplementary materials in the second order draft.
Khosravifard, Sam	No	General	0	0	0	0	Raccoon (Procyon lotor) is an IAS in Iran. It is missing in entire assessment. Please consult Farashi et al. 2017, Khosravifard et al. (in press) and Khosravifard S. and Niamir, A. (2015) (DOI:10.13140/RG.2.1.1782.8326)	Thank you very much for your suggested comment. Many IAS will not be found in the final report, but that does not say anything about their importance in the second order draft.
Kudjawa, Jewel (Government of Ghana)	Yes	General	0	0	0	0	Most of the references were not captured well, this should be addressed.	Thank you for your comment. Authors have revised the text and refined their analysis in the second order draft of this assessment.
Kudjawa, Jewel (Government of Ghana)	Yes	General	0	0	0	0	Most tables were not referenced, this should be addressed.	Thank you for your comment, the text has been revised (including references to tables) in the second order draft of this assessment.
Kudjawa, Jewel (Government of Ghana)	Yes	General	0	0	0	0	There is no reference to floating sargassum which is impacting the West Coast of Africa.	Thank you very much. Many IAS will not be found in the final report, but that does not say anything about their importance.
Kudjawa, Jewel (Government of Ghana)	Yes	General	0	0	0	0	There is no section on algae (Sargassum), which is now a major problem along the coast of West Africa.	Thank you - algae have been included in the second order draft.
Government of Ghana	Yes	General	0	0	0	0	The tables should be referenced in the narrative.	Thank you for your comment, the text has been revised in the second order draft of this assessment, including references to tables.
Larson, Brendon	No	General	0	0	0	0	My main comment on the "first order draft of the chapters of the IPBES assessment of invasive alien species" will not help much with revision, though I do want to register it here. Invasion biology is well known to be not only a contentious field underlain by divergent values (e.g., Young and Larson 2011), but one dominated by a small network of alpha individuals (see Pys'ek et al. 2006) who are well represented in this assessment. This network has recently sought to further exclude critical voices (e.g., by smearing critics as 'denialists,' see Cuthbert et al. 2020), despite recognition – even within the field, let alone for science more generally – that greater diversity and social-ecological interdisciplinarity are highly beneficial (Vaz et al. 2017). It is unfortunate that IPBES did not sufficiently accommodate this context within the design of these working groups because the inclusion of diverse voices could have been harnessed to wrestle in a more productive way with the challenge of these species rather than producing what is in my view mostly more-of-the-same groupthink.	Thank you for your comment. The team of authors working on this assessment are diverse. Authors are working collaboratively to draft the thematic assessment.
Larson, Brendon	No	General	0	0	0	0	Please consider: Cuthbert RN, Bacher S, Blackburn TM, Briski E, Diagne C, Dick JTA, Essl F, Genovesi P, Haubrock PJ, Latombe G, Lenzer B, Meinard Y, Pauchard A, Pys'ek P, Ricciardi A, Richardson DM, Russell JC, Simberloff D and Courchamp F. 2020. Invasion costs, impacts, and human agency: Response to Sagoff 2020. Conservation Biology.	Thank you for this suggestion. This reference is a response to another paper and we already include much of the content throughout chapter 1 in the second order draft.

Larson, Brendon	No	General	0	0	0	0	Please consider: Pys'ek P, Richardson DM and Jarosik V. 2006. Who cites who in the invasion zoo: Insights from an analysis of the most highly cited papers in invasion ecology. <i>Preslia</i> 78: 437-468.	Thank you for your suggestion. This paper is useful in highlighting biases which are covered throughout the assessment, but the authors have used more recent sources and the results of this assessment's findings to describe these biases in the second order draft.
Larson, Brendon	No	General	0	0	0	0	Please consider: Yaz AS, Kueffer C, Kull CA, Richardson DM, Schindler S, Muñoz-Pajares AJ, Vicente JR, Martins J, Hui C, Kühn I and Honrado JP. 2017. The progress of interdisciplinarity in invasion science. <i>Ambio</i> 46: 428-442.	Thank you - we have included this reference in Chapter 1 of the second order draft
Larson, Brendon	No	General	0	0	0	0	Please consider: Young AM and Larson BMH. 2011. Clarifying debates in invasion biology: A survey of invasion biologists. <i>Environmental Research</i> 111:	Thanks for this suggested change. We have included it in the second order draft.
Lynn, William	No	General	0	0	0	0	Hello, Thank you for the opportunity to review this first order draft of the IPBES thematic assessment of invasive alien species and their control (hereafter, "draft"). I appreciate and honour the tremendous amount of work, knowledge and insight that informs this draft. There is already a great deal to praise in terms of the wealth of knowledge, clarity of writing, and scientific/policy insights it offers. The report does an admirable job of discussing various scientific issues along with tightly related policy and management matters. Like most reports of its kind, it relies primarily on quantitative and objectivist natural and behaviorist science, with a smattering of qualitative research primarily from a psychological perspective. What is lacking from this report, however, is a discussion of the ethical issues, and how these impacts our interpretation of the science, policy, and interventions around alien species, especially those deemed invasive alien species (IAS). This ethical discussion is requisite. Without it the report will neither be complete or legitimate. This is not because of any bad faith or lack of rigour on the part of this section's authors. Rather it is because a major element informing our understanding of IAS is missing. Climate change and the loss of biodiversity are twin crises of global proportions. Because of this, the work of the IPBES and this draft entails unavoidable ethical concerns that deserve and require consideration. With this in mind I have avoided a line-by-line critique as it is the absence of a substantive ethical discussion that is my primary concern. This may be rectified by adding to the various sections of the chapter, or including a new section. In either case it will entail substantially new work that complements but is not contained in the current draft. To start, allow me to begin with an analogy to bioethics. The term bioethics has a range of meanings. Narrowly it references the ethics of biomedical research and health care in human and animal subjects. More broadly, it speaks to an ethics of towards the living world (Kuhse and Singer 1998; Fox 2001). The study of bioethics was slowly formalized after World War II. This was based on a growing recognition that international norms of what we now call human rights and justice were being violated (Jonsen 1998). It also arose from concerns over the toll that human technology and social processes were taking upon nature and society (Potter 1988). In order to address these dysfunctions, a movement to complement science with ethics was set afoot that resulted in the field of bioethics. As of today, bioethics is the principle example of how ethics can complement science. When viewed together, ethics and science are twin points of reference that help us triangulate on the creation of public policies and interventions that establish or protect animal welfare, ecological integrity, social justice,	Thank you for this comment - Authors have addressed ethics more thoroughly in the second order draft.
Mangi, Jawed Ahmed	No	General	0	0	0	0	1- Role of Media Awareness to be given to general public through media, press and mass communication e.g Television programs ,advertisements regarding :- i- Food related to the species- animals-(Meat Market, Fish,) ii- Pets iii-Plants	Thank you for your comment, the role of media is addressed in Chapter 6 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	2- Trade Control strategy Trade monitoring through Road, Railway ,ships and planes Passengers carrying animals and plants through travelling should also be monitored and checked	Thank you for your comment, trade control strategy is addressed in Chapter 6 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	3- Disaster Management Strategy i-The database , the species could be affected during calamities, disasters ii-Strategies to meet such disastrous changes or disturbances	Thank you for your comment, disaster management strategy is addressed in Chapter 6 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	4-Policy and strategy for extinction, killing the harmful and infectious species ,which pose a high survival risk to other healthy members of ecology	Thank you for your comment - authors have developed the theme on this topic in Chapter 1 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	5-Periodic Precautions Strategy i- Periodic precautionary measures for reduction of Viral infectious diseases ii- Controls and SOPs for the Fish markets, meat markets, Petmarkets iii-Identification for the Causes of Viral Infections-Responsibility of Health Sector	Thank you very much for your comment. These topics are detailed in Chapter 5 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	6-The Chemicals used for the spray and Hygienic measures need be identified ,either they are useful for the environment and ecology or rather harmful.	Thank you for your comment, this topic is addressed in Chapter 5 of the second order draft
Mangi, Jawed Ahmed	No	General	0	0	0	0	7-Research on Introduction of Anti Viral species-e.g Plants which have the potential and ability to act as antiviral substances-By the plantation of those plants who could be useful to grow as useful for in such situations suchas Pandemics, COVID-19 are others God forbid viral diseases.	Thank you for your comment, this topic is addressed in Chapter 5 of the second order draft
Marchante, Elizabete	No	General	0	0	0	0	The different chapters could benefit from some "reduction" in its extension. One suggestion would be to turn parts of the text into tables, for example, when describing different types of tools, mechanisms, etc. - this can shorten the text and, in addition, facilitate comparison between different categories. Some "refinement" of the text can also help, but I think it will be done at a later stage.	Thank you very much for your comment - authors have reviewed the text to ensure reasonable word limits in the second order draft
Franzoi, Marco	No	General	0	0	0	0	In terms of trade and IAS, is there currently evidence/research on the positive impact of Non-tariff measures (such as sanitary and phytosanitary measures and barriers to trade) to stop and control IAS?	Thank you very much for your comment. We have included it in the second order draft.
Marterer, Beloni Terezinha Pauli	No	General	0	0	0	0	The content of the chapters presented here will undoubtedly be an excellent source of study, consultation and guidance for professionals working with invasive alien species and biodiversity conservation. The organization of the chapters makes the contents available in a logical way and allows quick access to technical information and reported experiences. Indications from the technical literature, government programs, and work by non-governmental institutions, also constitute a relevant contribution for professionals who make decisions or execute EEI control programs. I also would like to say that I really enjoyed what I read and that my professional tasks in public management would have been made easier if I had had access to a similar compilation of information on invasive alien species.The content of the chapters presented here will undoubtedly be an excellent source of study, consultation and guidance for professionals working with invasive alien species and biodiversity conservation.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Mill, Aileen	No	General	0	0	0	0	Is there a process for keeping the document current given it will be 2.5year to submission, is there another review period?	Thank you for your comment. There also is an external review planned for the second order draft of the chapters and first order draft of the summary for policymakers
Booy, Olaf	No	General	0	0	0	0	Do you know if the drafting team has had much engagement with animal or plant health teams - do you think this would be useful?	Thank you for your comment. We have integrated One Health into this assessment in unprecedented fashion already in the second order draft.
Pan, Xubin	No	General	0	0	0	0	It is better to have a Key Terms and Definition for all chapters.	Thank you very much, we have included a box on key terms and concepts for each chapter. Definitions can be found in the IAS glossary in the second order draft.
Pan, Xubin	No	General	0	0	0	0	It is better to have a Synthesis Team, which member must read the whole text then keep the consistant of all contents.	Thank you for your comment. The draft undergoes several internal reviews, allowing the experts to spot inconsistencies and gaps.
Pan, Xubin	No	General	0	0	0	0	We should have more experts from China, Central Asia and other countries.	Thank you for your comment, the experts selection is now completed. Experts are collaborating with contributing authors from these regions.
Pan, Xubin	No	General	0	0	0	0	We should have more experts who are familiar with quarantine and IPPC/OIE.	Thank you for your comment, the experts selection is now completed.
Papadopoulou, Paraskevi	No	General	0	0	0	0	Overall, all the teams have done a great job so far and they have managed to address all dimensions of the problem of invasive species. Best of luck with the project and the solutions it offers. So while the knowledge basis is well established the key options for strengthening the generation and flow of policy and management-relevant IAS knowledge is also well presented.	Thank you very much for your feedback. It is appreciated by chapter authors.
Walton, Paul	No	General	0	0	0	0	Are the terms management and prevention considered synonymous here? If not the emphasis seems on management currently, which seems odd with respect to CBD? What is an indirect introduction? In the recent UK Parl. inquiry, initially the idea of species moving as a result of anthropogenic climate change was initially included in scope, which was problematic with respect to IAS as usually understood.	Thank you for your comment. We have addressed these points in the second order draft.
Soubeyran, Yohann	No	General	0	0	0	0	This is an exhaustive state-of-the-art with a lot of up-to-date scientific information, supported with examples and figures. The amount of information compiled and the analyses are noteworthy.	Thank you very much for your feedback
Takehara, Mari (Government of Japan)	Yes	General	0	0	0	0	The below disclaimer on maps should be clearly stated in the full report of the Thematic assessment of invasive alien species and their control. Disclaimer: The designations employed and the presentation of material on the maps used in the present report do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.	Thank you for your comment, a disclaimer has been included in the second order draft

Renals, Trevor	No	General	0	0	0	0	Do you feel there is a risk that by including microorganisms, Covid19 might highjack the resultant policy discussion	Thank you very much for your comment. Balance should be achieved on this topic, but all chapters have taken this into account in the second order draft
Zisenis, Marcus	No	General	0	0	0	0	The 934 pages in total need to be very much reduced, particularly the descriptive parts, to make the report readable for a wider audience.	Thank you for your comment - we have reviewed the text to ensure reasonable word limits in the second order draft.
Dudgeon, David	No	Glossary	0	0	0	0	I have avoided commenting on many of the grammatical errors - although I have mentioend a few - but there is much in all of these documents that needs attention. I realise this is a first draft, but I hope there will be a round of careful and consistent editing. The is also inconsistency in the use of capital letter in tables (both column and row headings) and in the use of common names.	Thank you, we have revised the chapters and the glossary, with this comment in mind.
Dudgeon, David	No	Glossary	0	0	0	0	It is a bit frustrating to see a common name given with an associated scientific name on multiple occasions throughout the documents. If Nile perch (or whatever) is mentioned, the scientific name should be given the first time but does not need to be repeated on every or almost every other time Nile perch is mentioned. To avoid this it might be worth having a list of common names (as there are many cases where it is easier to use them) along with the corresponding scientific name -- this list could be in a separate section that accompanies the Glossary.	Thanks for this suggested change. We have corrected it in the second order draft.
Saavedra Susana	No	Glossary	0	0	0	0	Elimination: It is achieved when the target species environmental presence does not longer exist (in the wild) meaning that all targeted IAS species organisms or individuals have been removed, BUT the organism is still present in legal trade, black-market or private homes. Elimination must be accompanied with trained Quick Rapid Teams (QRT), able to fiercely remove any future sights after the elimination is achieved. If QRT not available, the action will be classified as long term control programm, or control b). Refs Basu Partha, Hutubessy Raymond, Broutet Nathalie. Cervical cancer: WHO called for elimination, not eradication BMJ 2019; 366 :5668 Pradeep Kumar Dalal, Mandeeep Rathee and Jaywant Kumar Singh. 2017. Area Wide Pest Management: Concept and Approaches.Int.J.Curr.Microbiol.App.Sci. 6(11): 1476-1495. doi: https://doi.org/10.20546/ijemas.2017.611.176 S. Saavedra Cruz and S.J. Reynolds, 2019. Eradication and control programmes for invasive mynas (Acridotheres spp.) and bulbuls (Pycnonotus spp.): defining best practice in managing invasive bird populations on oceanic islands. Available from: https://www.researchgate.net/publication/333246616_Eradication_and_control_programmes_for_invasive_mynas_Acridotheres_spp_and_bulbuls_Pycnonotus_spp_Defining_best_practice_in_managing_invasive_bird_populations_on_oceanic_islands [accessed Oct 18 2020].	Thank you, but this term is not used across the assessment.
Verbrugge, Laura	No	Glossary	1	3	1	6	I am not familiar with the term Trade GQL in the definition of biosecurity. An alternative to using Wikipedia and a commercial website as a source is the Biosecurity chapter by Steve Hinchliffe in book Companion the Environmental Studies (Routledge, 2018, ISBN 9781138192195) or references herein (e.g. Dobson et al (Eds) Biosecurity: the socio-politics of invasive species and infectious diseases).	Thank you, we have replaced the definition of biosecurity by one from FAO
Saavedra Susana	No	Glossary	1	8	1	11	(Recent IAS Arrivals) Containment: After preventions failure, containment is a set of activities or measures in and around an infested area, to prevent further extension and broader infestation. It includes the term "Area of wide pest management" (AWPM). Refs Basu Partha, Hutubessy Raymond, Broutet Nathalie. Cervical cancer: WHO called for elimination, not eradication BMJ 2019; 366 :5668 Pradeep Kumar Dalal, Mandeeep Rathee and Jaywant Kumar Singh. 2017. Area Wide Pest Management: Concept and Approaches.Int.J.Curr.Microbiol.App.Sci. 6(11): 1476-1495. doi: https://doi.org/10.20546/ijemas.2017.611.176 S. Saavedra Cruz and S.J. Reynolds, 2019. Eradication and control programmes for invasive mynas (Acridotheres spp.) and bulbuls (Pycnonotus spp.): defining best practice in managing invasive bird populations on oceanic islands. Available from: https://www.researchgate.net/publication/333246616_Eradication_and_control_programmes_for_invasive_mynas_Acridotheres_spp_and_bulbuls_Pycnonotus_spp_Defining_best_practice_in_managing_invasive_bird_populations_on_oceanic_islands [accessed Oct 18 2020].	Thank you, in response to other comments, we have chosen another reference for the definition of containment
Saavedra Susana	No	Glossary	1	8	1	11	Elimination: It is achieved when the target species environmental presence does not longer exist (in the wild) meaning that all targeted IAS species organisms or individuals have been removed, BUT the organism is still present in legal trade, black-market or private homes. Elimination must be accompanied with trained Quick Rapid Teams (QRT), able to fiercely remove any future sights after the elimination is achieved. If QRT not available, the action will be classified as long term control programm, or control b).	Thank you, but this term is not used across the assessment.
Saavedra Susana	No	Glossary	1	13	1	14	(Already on naturalized or established IAS) Control: a) Simply cull down effort, with or without further strategy. b) Annual cyclical strategy actions to minimise threats by random cull down of the targeted species. c) Focused on minimising the targeted IAS into a very low individual density, as switch to turn point into elimination and/or eradication.	Thank you, in response to other comments, we have chosen to retain the definition as is.
Saavedra Susana	No	Glossary	1	13	1	14	(Already on naturalized or established IAS) Control: a) Simply cull down effort, with or without further strategy. b) Annual cyclical strategy actions to minimise threats by random cull down of the targeted species. c) Focused on minimising the targeted IAS into a very low individual density, as switch to turn point into elimination and/or eradication. Refs Basu Partha, Hutubessy Raymond, Broutet Nathalie. Cervical cancer: WHO called for elimination, not eradication BMJ 2019; 366 :5668 Pradeep Kumar Dalal, Mandeeep Rathee and Jaywant Kumar Singh. 2017. Area Wide Pest Management: Concept and Approaches.Int.J.Curr.Microbiol.App.Sci. 6(11): 1476-1495. doi: https://doi.org/10.20546/ijemas.2017.611.176 S. Saavedra Cruz and S.J. Reynolds, 2019. Eradication and control programmes for invasive mynas (Acridotheres spp.) and bulbuls (Pycnonotus spp.): defining best practice in managing invasive bird populations on oceanic islands. Available from: https://www.researchgate.net/publication/333246616_Eradication_and_control_programmes_for_invasive_mynas_Acridotheres_spp_and_bulbuls_Pycnonotus_spp_Defining_best_practice_in_managing_invasive_bird_populations_on_oceanic_islands [accessed Oct 18 2020].	Thank you, in response to other comments, we have chosen to retain the definition as is.
Saavedra Susana	No	Glossary	1	21	1	22	Eradication: Stage of IAS management where all living organisms of one or several targeted species, are not longer present, by means of an unlimited time in the environment, the human trade and in captivity. The lane between containment, control, elimination and eradication classifications is directly related to both, pathway management of the targeted IAS and surveillance/quarantine actions after the species becomes extinct at all levels. What I can't agreed by myself alone, is about the area definition (pathways closing included) that will be suitable for the eradication term definition, further away from certain islands and for certain species... Refs Basu Partha, Hutubessy Raymond, Broutet Nathalie. Cervical cancer: WHO called for elimination, not eradication BMJ 2019; 366 :5668 Pradeep Kumar Dalal, Mandeeep Rathee and Jaywant Kumar Singh. 2017. Area Wide Pest Management: Concept and Approaches.Int.J.Curr.Microbiol.App.Sci. 6(11): 1476-1495. doi: https://doi.org/10.20546/ijemas.2017.611.176 S. Saavedra Cruz and S.J. Reynolds, 2019. Eradication and control programmes for invasive mynas (Acridotheres spp.) and bulbuls (Pycnonotus spp.): defining best practice in managing invasive bird populations on oceanic islands. Available from: https://www.researchgate.net/publication/333246616_Eradication_and_control_programmes_for_invasive_mynas_Acridotheres_spp_and_bulbuls_Pycnonotus_spp_Defining_best_practice_in_managing_invasive_bird_populations_on_oceanic_islands [accessed Oct 18 2020].	Thank you, in response to other comments, we have chosen to retain the definition as is.
Brooks, Thomas	No	Glossary	2	45	2	45	"Invasive Alien Species" (and likewise, "Invasive" and "Alien") conspicuous by its absence from the Glossary. Please add. Strongly recommend using (and citing) the CBD definition verbatim (see https://www.cbd.int/invasive/terms.shtml). Introduction of a new definition will cause confusion and reduce policy	Thank you, these are defined in Chapter 1.

Brooks, Thomas	No	Glossary	2	52	2	52	Change "plant and animal" to "species" so as not to exclude fungi etc	Thanks for this suggested change. We have corrected it in the second order draft.
Brooks, Thomas	No	Glossary	2	56	2	56	Add "or other organisms" after "plants".	Thanks for this suggested change. We have corrected it in the second order draft.
Verbrugge, Laura	No	Glossary	6	160	6	168	I would refrain from listing Wikipedia as a reference and try to find the original source.	Thank you, this has been addressed in the second order draft