

REGIONAL ASSESSMENT REPORT ON BIODIVERSITY AND ECOSYSTEM SERVICES FOR EUROPE AND CENTRAL ASIA						
Comments external review first order draft - Chapter 5						
Reviewer Name	Chapter	From Page	From Line	To Page	To Line	Comment
Frank Wugt Larsen (EEA input)	General	General	0			General: our "light" review has focused on relevant information hosted by the European Environment Agency (EEA) for which we believe a consultation by authors could improve the ECA report. We have also provided some specific comments to issues we spotted (please note that this has not been done systematically given the length of the report). In general, we will also refer to the EEA/ETC BD document "Information note to IPBES secretariat on EEA and EU information" (http://bd.eionet.europa.eu/Reports/ETC/ETCtechnicalWorkingpapers/PDF/Information_IPBES_on_EEA_EU.pdf), which was shared with the ECA TSU in 2015. Several reports provide a good starting point to find relevant information, incl. EEA, 2015 European environment – state and outlook 2015 (SOER 2015 (http://www.eea.europa.eu/soer/)), in particular, thematic briefings (http://www.eea.europa.eu/soer-2015/europe) and SOER synthesis (http://www.eea.europa.eu/soer/synthesis-report); EEA 2016. Mapping and assessing the condition of Europe's ecosystems. Progress and challenges (http://www.eea.europa.eu/publications/mapping-europes-ecosystems); EEA, 2015, State of Nature Report 2015 (http://www.eea.europa.eu/publications/state-of-nature-in-the-eu); EEA, 2015, State of Europe's Seas (http://www.eea.europa.eu/publications/state-of-europes-seas); EEA, 2016. European forest ecosystems – state and trends (http://www.eea.europa.eu/publications/european-forest-ecosystems). In general, the EEA website (http://www.eea.europa.eu) also provides access to a wealth of relevant indicators and assessments.
Frank Wugt Larsen (EEA input)	General	General	0			General: There seems to be quite some redundancy between the chapters. Additionally different data sources seem sometimes to be used in the redundant parts which may create more confusion than clarification leading to different partly biased messages. We assume the coherence and consistency of chapters will be dealt with in the next draft and haven't provided specific comments on this.
Frank Wugt Larsen (EEA input)	General	General	0			General: In general, there is a need to systematically check references in the chapters. References are cited in text but don't appear in reference lists, and references are missing in some graphs and in text etc. Specifically, EEA reports are not referenced consistently, e.g. sometime sit is EEA 2015, other times European Environment Agency 2015.
Thomas Brooks (IUCN)	General	0	0			Congratulations to the authors for all their hard work in producing this FOD.
Thomas Brooks (IUCN)	General	0	0			If it would be useful to the authors for IUCN to disaggregate further the Red List data summarised for the ECA region and its component subregions by Brooks et al. (2016), please feel free to contact me accordingly. Examples of potentially useful disaggregation could include by marine/freshwater/terrestrial, by major systems (and sub-systems) aligned to the headings in Section 3.3.2, species groups aligned to the headings in Section 3.3.3, or drivers aligned to the headings in Section 4.3.
Thomas Brooks (IUCN)	General	0	0			IPBES follows the CBD definition of biodiversity, which encompasses diversity at genetic, species, and ecosystem levels. It is therefore redundant to say "biodiversity and ecosystems". Either replace with "genetic, species, and ecosystem diversity", or simply say "biodiversity". Same applies any other places this formulation is used throughout (eg Chapter 1 L146, L159, L164, L170, L788, L796; Chapter 2 L300, L1843-1844; Chapter 3 L461, L468, L472, L528, L635, L1018, L3305, L3307, L3317, L3323, L3340, L3738; Chapter 4 L265, L430, L1418; Chapter 5 L142-143, L144, L824, L846, L913, L1590, L1979, L1982, L1985).
Douglas Nakashima	General	0	0			GENERAL: on incorporation of ILK as an actual source of knowledge: The way incorporation of ILK is recommended in the sections so far allows to address the question of indigenous and local people as a component of socio-ecological systems where humans and nature interact, where societies use nature, perceive it, invest it culturally etc... However, incorporation of ILK as an actual source of knowledge about biodiversity and ecosystems changes has not been fully developed in the FOD yet; although it is presented as a recommendation and announced in the 1st chapter. The involvement of indigenous and local people and ILK in scientific assessments and international organizations represents a political statement, and contributes to the recognition of indigenous people especially, as legitimate actors in decision making, in the context of natural resource management for example. However, incorporation of ILK is not only a political statement, but also represents a valuable source of knowledge. It is by taking seriously the value of this knowledge that incorporation of indigenous and local people can represent more than a superficial recognition. Published scientific literature represents a source of access to ILK. In this review, examples will be given of studies where ILK related to biodiversity and environmental change has been recorded. It can be factual qualitative observations made by local populations regarding components of the environment and the changes they observe, observations of the drivers of these changes, or narratives or stories embedded in personal history and local worldview illustrating the changes that occurred in the environment along one's lifetime or across generations. These observations can be added as a complementary source of information to scientific studies. They can corroborate scientific observations, but also complement them, often operating at different time and space scales. It is to be noted that extraction of fragments of ILK to be incorporated to the different sections of such an assessment can be problematic, notably for the integrity of the knowledge which is outrooted from its context. (see comment line 8 of this table). SEE Nakashima & Roué 2002
Douglas Nakashima	General	0	0			4.6.1.1. ECA in general Parrotta & Agnoletti 2007. [p1-2] "The holders and users of traditional knowledge in many parts of the world face significant challenges - continuing encroachment and/or expropriation of their lands, degradation of their forests, and the erosion of their cultures, values, and traditional lifestyles. In many developed societies, technological development, the abandonment of marginal lands, renaturalization, and inappropriate policies are rapidly erasing cultural values and contributing to the globalization of landscape, which are being simplified into areas either managed for commercial exploitation or left to natural succession." [p2] "This trend has been supported by the historical development of forestry, particularly in Europe. Since the early 19th century, the development of modern forestry promoted industrial plantations favoring species suited for timber production, as occurred in Europe with large-scale afforestation of conifers through artificial regeneration and producing even-aged forests. These ideas were spread throughout the world during the 19th century, largely through the colonial administrations of the European imperial powers. This process changed the features of many cultural forest landscapes created by traditional preindustrial societies, both in developed and developing countries. In the 1970s, forestry passed from a phase favoring almost exclusively economic aims, to one paying greater attention to the ecological roles of forests and the value of biodiversity. Unfortunately, the assessment of biodiversity has often neglected components arising from human influence, while monitoring and conservation have focused on "natural" species. The abandonment of traditional landscapes has reduced the diversity of forest management forms, creating simplified landscapes often with reduced biodiversity of habitats linked to land uses and related forest management practices."
Germany	General		0			We believe that the regional ECA assessment generally has a comprehensive and scientifically sound structure: Status as well as trends are shown. It is however a first order draft and therefore, we hope that our comments will be useful for the further development and maturing of this regional assessment so that scientifically sound options for action can be derived. It needs to be critically highlighted in the first order draft that chapter 6 (Options for governance, institutional arrangements and private and public decision making across scales and sectors) refers to international organizations and treaties, thereby failing to discuss specific institutions and treaties, which are of relevance to Europe and Central Asia. As we are dealing with a regional assessment for Europe and Central Asia (ECA) we strongly encourage the authors of this assessment to assess regional organizations and treaties relevant to the ECA region so that useful options for actions can be derived for the potential user groups. Please also ensure that in the further development of this assessment key messages with their level of confidence/certainty are developed as outlined in the document IPBES/4/INF/9. Such key messages will be important to develop scientifically sound options for actions. We request the co-chairs of this assessment to ensure that the general comments listed here are made available to the CLAs and LAs of all 6 chapters. Reason: It is important that there is alignment in the use of terminology and structure of the document. In order to further strengthen the storyline throughout the 6 chapters we also encourage cross-referencing between the chapters so that information redundancies are avoided and the arguments are overall strengthened. We also strongly encourage the development of an appendix that lists all the acronyms and key terms (including their definitions) used in the ECA assessment and communicate these lists with the leaders of the other regional assessments to ensure that jointly, all 4 regional assessments can provide a solid basis for the global assessment (IPBES deliverable 2c) by using the same terms and definitions. We very much look forward to the second order draft of this important assessment.
Germany	General		0			Please ensure that the general comments on the ECA assessment are provided to all CLAs and LAs! Reason: It is crucial that the chapters (a) use the same terminology; (b) don't provide redundant information and (c) don't contradict each other, and (d) provide a consistent chain of arguments and discussions.
Germany	General		0			New knowledge and publications should be used, if available. Some cited publications e.g. about the EU CAP (one from 2003) seem to be outdated
Germany	General		0			Data and findings of the SoW-Report (The State of the World's Biodiversity for Food and Agriculture, http://www.fao.org/nr/cgrfa/biodiversity/sow/bifa/en/) from FAO and report from the project "Preparatory Action on EU genetic resources" from COM (for more info: http://www.geneticresources.eu/) could provide some valuable information for this chapter. Both reports will be published soon. Please check both reports as soon as they become available.
Germany	General		0			Often, statements are linked to "Europe" but actually only refer to "Western Europe" or the European Union. Please ensure to present a well-nuanced picture of the ECA-region and state very carefully which sub-regions are concerned (see definitions in Table 1.2, p. 19).
Zsolt Molnar	General		0			The Balkan is heavily underrepresented in all chapters.
Zsolt Molnar	General		0			Many-many important publications on ILK are not at all used and cited in the assessment (see the literature lists provided by the ILK Task Force, and the Proceedings volume of the ILK Dialogue workshop)
Ayman Batisha	General	1	1	105	4013	The entire report should be homogeneously arranged, logically build and fully integrated with no inconsistency, disharmony or overlapping within its chapters and sections. The titles of chapters and sections are generally too long to be professional, as a quick example "4.6 Status and recent trends in indirect drivers", the phrase "Status and recent trends in indirect drivers" could be omitted in titles 4.6.1 to 4.6.5.
Ayman Batisha	General	1	1	105	4013	There should be examples/chapter to clarify how the biogeochemical cycle (carbon, oxygen, nitrogen, phosphorus, sulfur, calcium, rock and water etc.) through both biotic (biosphere) and abiotic (atmosphere, hydrosphere, and lithosphere) compartments of Earth can cause land degradation and restoration. Special attention should be emphasized on the human-caused cycle of atrazine, which may affect certain species. Land degradation and restoration should be assessed in the light of Global Changes; Global Warming; Global Sea Level Rise, and Global Ocean. Land degradation and restoration should be assessed into two categories which operates at different time scales: the biological – physical, (Near-term) and the geological, (Long-term). Land restoration opportunities, planning, economics, implementation constraints, and limits should be defined.
						The ECA authors have been encouraged to use EEA reports as a resources, and we would like to thank the reviewer for providing the web links for these.
						Agreed. We are aware of the overlap between chapters and this has been addressed in subsequent drafts
						Agreed. The references were thoroughly checked in subsequent drafts and the author team has been encouraged to systematically use the Mendeley reference management software.
						Thank you
						Thanks and these data have been made available to subsequent drafts of the ECA assessment
						The ECA assessment is based fundamentally on the IPBES conceptual framework. The conceptual framework refers to biodiversity and ecosystems in the "Nature" box.
						Since the FOD, the author team has received the completed proceedings of the workshop with ILKP holders. Information within the proceedings has been included as much as possible within the SOD, although time constraints (the final workshop proceedings were only received 1 week before the SOD submission deadline) limited this task.
						Furthermore, the ECA assessment has established an ILP liaison group (Chaired by Zsolt Molnar) that is responsible for all aspects of ILKP within the assessment, including the SPM. We feel that this has improved the integration of ILKP within the SOD.
						Thanks you for you comments, which have been helpful for the ECA assessment. These comments have indeed been made available to all CLAs and LAs of each of the ECA assessment chapters. Ch6 deals with all relevant decisions makers including regional organisations and treaties. The standard use of terminology is being checked across chapters. The chapters will be cross-referenced and there will be a standard IPBES glossary and list of acronyms. Confidence language has been included for all key findings. However there are different traditions in using confidence language in the humanities and social sciences and this is why confidence language is not used in the key messages concerning for example options for governance. We will thereby avoid being prescriptive and instead provide a portfolio of governance option for decision-makers.
						This has been done.
						Citations have been fully checked and the latest available (up to April 2017) used in the assessment
						This source of evidence has been checked
						The use of terms to describe the sub-regions has been checked across the chapters
						We have attempted to achieve a geographic balance right across the assessment, within the constraints of availability of evidence in some locations.
						The ECA assessment ILKP liaison group has taken on responsibility for information chapter authors of relevant ILKP literature.
						Consistency across chapters has been verified. Some chapters and sections have changed their names to be more precise.
						The LDR assessment is dealing with land degradation issues and environmental pollution. ECA will take up this evidence where relevant with respect to biodiversity (in Ch3)

Ayman Batisha	General		1	1	105	4013	Research related to the Science of biodiversity and ecosystem services should be emphasized on. Assessment on biodiversity and ecosystem services generally deal with multiple meanings of fuzzy concepts, so it is strongly recommended to add chapter/section to provide General Guidance to the subject of how applying fuzzy concepts in the context of biodiversity and ecosystem services using soft computing techniques. The scope of soft computing covers the areas of Fuzzy Logic, Neural Networks, Chaos Theory, Evolutionary Computing, Rough Sets, Ant Colony, Immunological Computing, Particle Swarm, Wavelet, Probabilistic Computing, Hybrid Methods and other similar techniques to address real world complexities achieving tractability, robustness and low cost solution. The chapter may be devoted to effective approaches to Data Collection; dealing with Uncertainties; Methodological and efficient technique Choice; Time Series Consistency Identification of Key Categories, and Quality Assurance/Quality Control and Verification. The application areas of soft computing include but are not limited to Detection and Attribution of biodiversity and ecosystem services: from Global to Regional and local, biodiversity and ecosystem services Projections and Predictability (Near-term and Long-term), biodiversity and ecosystem services and its relevance for future Global and Climate Change. Detection and attribution of observed and multi-sector biodiversity and ecosystem services, emergent risks, key vulnerabilities, and opportunities should be addressed. Biodiversity and ecosystem services should be assessed in the light of statistical analysis and levels of confidence.	Literature on these topics has been assessed along with other sources of evidence in terms of how these methods contribute to understanding of biodiversity and ecosystems. Chapter 5 is concerned with the use of models supporting biodiversity and ecosystem knowledge.
Ayman Batisha	General		1	1	105	4013	Atlas of Continental, Regional and local biodiversity and ecosystem services Existing, Projections and Predictability should be annexed.	Sorry we do not understand this comment
Mark Sneath	Chapter 5	0	0	0	general		To what extent have scenarios towards a steady state economy or even degrowth been included in the analysis of possible socioeconomic pathways? For a discussion (and references) of these approaches, see Kallis, G., Kerschner, C., Martinez-Alier, J., 2012. The economics of degrowth. Ecological Economics, 84, 172–180. doi:10.1016/j.ecolecon.2012.08.017 http://www.sciencedirect.com/science/article/pii/S0921800912003333 . Further references on this topic include: Anđić, B., Domažet, M., 2015. Potential for degrowth: Attitudes and behaviours across 18 European countries. Teorija in Praksa 52, 456–475; Daly, H., Townsend, K., 1996. Valuing the Earth: Economics, Ecology, Ethics. MIT Press; Daly, H.E., 1997. Beyond Growth: The Economics of Sustainable Development. Beacon Press, Boston.; Daly, H.E. (Ed.), 1973. Toward a Steady-state Economy. Illustrated edition edition. ed. W.H.Freeman & Co Ltd, San Francisco.; Drews, S., Antal, M., 2016. Degrowth: A "missile word" that backfires? Ecological Economics 126, 182–187. doi:10.1016/j.ecolecon.2016.04.001; García-Olivares, A., Ballabrera-Poy, J., 2015. Energy and mineral peaks, and a future steady state economy. Technological Forecasting and Social Change 90, Part B, 587–598. doi:10.1016/j.techfore.2014.02.013; Jackson, T., 2011. Prosperity without Growth: Economics for a Finite Planet, Reprint edition. ed. Routledge, London.; Lavin, P., 2010. The need to move to a qualitatively-improving steady-state economy to resolve the climate change dilemma. International Journal of Green Economics 4, 393–428. doi:10.1504/IJGE.2010.037659; Mauerhofer, V., 2013. Lose less instead of win more: The failure of decoupling and perspectives for competition in a degrowth economy. Environmental Values 22, 43–57. doi:10.3197/096327113X13528328798237; Sessa, C., Ricci, A., 2014. The world in 2050 and the New Welfare Scenario. Futures, SI: Low Carbon Futures 58, 77–90. doi:10.1016/j.futures.2013.10.019; Victor, P.A., 2012. Growth, degrowth and climate change: A scenario analysis. Ecological Economics 84, 206–212. doi:10.1016/j.ecolecon.2011.04.013; Victor, P.A., 2008. Managing Without Growth: Slower by Design, Not Disaster. Edward Elgar Pub, Cheltenham, UK.; Northampton, MA.	Thank you. The degrowth debate is a very relevant and we are grateful that you have brought it up! We have included the notion of degrowth now in our chapters, although we prefer to use the term non-GDP growth to avoid the negative connotation often associated with the term degrowth. Please find more details in our pathways section 5.5
Marcus Zisenis	Chapter 5	General		0			This chapter provides scenarios, models, and suggested socioeconomic pathways from literature for improving biodiversity values, but does it also lead to strategic acting incentives to achieve a higher role of non-monetary, non-use values of biodiversity in this assessed region? What is the point to present different scenarios when the conditions of the mainly socio-economically short-time orientated monetary driven society does not allow to chose for the long-term integration of the different values of biodiversity in a balanced participatory decision-making process of the public? An as concrete as possible strategic approach to alter this related to this particular region would be necessary and make this report innovative.	Thank you very much for your comment. We are highlighting a number of key issues arising from continuing business as usual. We have also provided a number of long-term alternative pathways in the section on pathways 5.5. However, we are asked to not write in a policy prescriptive way, and tried to be very careful with stating what the evidence supports or shows
Guy Pe'er	Chapter 5	general comment		0			The chapter includes a long and non-integrated introduction. It would be useful to create a short introduction into what this chapter is doing and how it is structured (and why). An overview of concepts along which the chapter is aligned need to be at the beginning and not emerge at the end. Key reviews (mentioned later) should move to the beginning as guiding elements. Note a recent review by Biggs et al.; note the concept of resilience as well. Biggs, R., Schlüter, M., Biggs, D., Bohensky, E.L., BurnSilver, S., Cundill, G., Dakos, V., Daw, T.M., Evans, L.S., Kotschy, K. and Leitch, A.M., 2012. Toward principles for enhancing the resilience of ecosystem services. Annual Review of Environment and Resources, 37, pp.421-448.	Thank you very much. We have now considerably shortened and simplified the introduction to clearly state the aim and structure of the chapter linking to its policy
Guy Pe'er	Chapter 5	general comment		0			Chapter 5, by contrast to 3-4,takes the terminology "nature". It forms a distinction between natural systems (protected areas?) and "anthropogenic" ones. I would suggest using the term "(semi-)natural systems" across the assessment. Further clarification of terminology can utilize the Anthrome categories : Ellis E.C. & Ramankutty N. (2008) Putting people in the map: anthropogenic biomes of the world. Frontiers in Ecology and the Environment 6, 439-447	Thank you very much for your comment. We are using the language of the IPBES conceptual framework, which refers to nature to provide coherence across chapters and assessments.
Guy Pe'er	Chapter 5	general comment		0			a gap to note is on the prevalence of papers addressing climate-change adaptations as a driver or land-use changes and their consequences in terms of biodiversity and feedbacks on humans. In addition, there needs to be a short section on studies addressing entire feedback loops - humans on nature and back.	Thank you very much for your comment. We have distinguished between the effects of policy, social, economic and technological on land use and the effects of land use on biodiversity and NCP, the latter of which was rarer at the national scale considered in our review. We have also noted that studies covering all interactions and feedbacks, particularly from biodiversity and direct driver to indirect drivers are a gap in Section 5.6.3
Guy Pe'er	chapter 5	general comment		0			case studies for socio-ecological models are missing. Some examples can be the Amudarya River system: e.g. Schlüter, Maja, and Claudia Pahl-Wostl. "Mechanisms of resilience in common-pool resource management systems: an agent-based model of water use in a river basin." Ecology and Society 12.2 (2007): 4. A case study in Spain: De Aranzabal, Itziar, et al. "Modelling of landscape changes derived from the dynamics of socio-ecological systems: a case of study in a semiarid Mediterranean landscape." Ecological Indicators 8.5 (2008): 672-685. Three case studies in Europe: Garmendia, Eneko, and Sigrid Stagl. "Public participation for sustainability and social learning: Concepts and lessons from three case studies in Europe." Ecological Economics 69.8 (2010): 1712-1722.	Thank you for the reference suggestions. We have included Schlüter, M., & Rüger, N. (2007). Application of a GIS-based simulation tool to illustrate implications of uncertainties for water management in the Amudarya river delta. Environmental Modelling and Software, 22(2), 158–166. http://doi.org/10.1016/j.envsoft.2005.09.006 as this met our criteria of studies that considered more than 2 drivers and more than 2 NCP plus information on trends under scenarios that could be extracted from the paper
Guy Pe'er	Chapter 5	general comment		0			differentiation into regions and sub-regions would be highly useful in more sections of the chapter, also in consistency with Chapter 4 (sub-sections of which contain this useful division)	Thank you for pointing out this very important gap. We have made a considerable effort to include information for all regions. We have now tried as much as possible to present results specifically for the different regions in all sections of the chapter.
Guy Pe'er	chapter 5	link to Chapter 6		0			Anderies, John M., Marco A. Janssen, and Elinor Ostrom. "A framework to analyze the robustness of social-ecological systems from an institutional perspective." Ecology and society 9.1 (2004): 18. (search was made in Google Scholar under the term "Socio-ecological systems case study europe" - not a comprehensive coverage of outcomes.	Thank you for pointing out this very interesting paper. Since conceptual discussions are mostly part of chapter 1, we did not consider this paper here, also because we were asked to follow the IPBES conceptual framework.
Guy Pe'er	chapter 5	link to Chapter 6		0			An important type of models include ecological economic models as a tool for integrated assessments and feedback processes. Suggest asking Irene Ring (as CLA chapter 6) to provide an overview of relevant models and case studies.	Thank you for the suggestion. We have searched for papers for all types of integrated models, including ecological-economic models, that meet our review criteria. We have now removed much of the discussion of specific model types based on other review comments to make the chapter more results orientated and policy relevant
Anna Augustyn	Chapter 5	General		0			The overall chapter is not sufficiently specific about quality of life / wellbeing, i.e. definitions, assessment frameworks and benchmarks; references to relevant works of OECD (e.g. better life index), European Commission, Stiglitz Commission etc. could be elaborated	Thank you very much for pointing out this gap. Since conceptual discussions are mostly part of chapter 1, we did not consider discussing specificities of quality of life. However, we have started to develop linkages with chapter 2, which will be further strengthened.
Germany	Chapter 5	general		0			The role of ILK is sometimes explicitly mentioned, and sometimes it is stated that no ILK was available. Please always provide this information even if ILK is not available.	Thank you. Overall, we found rather little explicit ILK throughout the scenarios and modelling literature. However, whenever we found an exception we highlighted it, e.g. via boxes throughout the paper.
Germany	Chapter 5	general		0			Information on Central Asia is incomplete, please highlight knowledge gaps when they appear and avoid generalizations which may not (necessarily) refer to some sub-regions if the available information is missing.	Thank you for point out this very important gap. We have made a considerable effort to include information for all regions. We have now tried as much as possible to present results specifically for the different regions in all sections of the chapter. This includes a lot of effort to access literature from Central Asia and Eastern Europe where it exists
Germany	Chapter 5	general		0			Most statements are not associated with quantitative likelihood statements nor qualitative confidence levels as outlined in Chapter 1, section 1.6.1. A coherent and adequate treatment of uncertainty is essential for the credibility of the assessment and, finally, the integrity of the IPBES." We strongly encourage you to look into the use of confidence terms used by the IPBES as outlined in IPBES/4/INF/9 pages 60-65.	Thank you, we have included confidence language now.
Zsolt Molnar	Chapter 5	General		0			I agree that science-type scenarios are rare among ILK holders, but ILK-type scenario-building is common all over the world among ILK communities. I would expect some more scenario studies with/by the Sami, maybe they are not published in IF journals.	Thank you. Overall, we found rather little explicit ILK throughout the scenarios and modelling literature. However, whenever we found an exception we highlighted it, e.g. via boxes throughout the paper and particularly in sections 5.4 and 5.5.
Paul Leadley	Chapter 5		0	0	0	0	Overall comments - At this stage (FOD), I feel it is most useful to focus on the broader issues rather than making line by line comments. Excellent first draft, especially given the difficulty of the mission! The analysis is well structured, and with additional efforts, it is clear that much is likely to emerge from further analysis of the literature review. I see no major issues with the approach taken. The choice to focus on integrated assessment seems judicious for the ECA assessment, given that other chapters review "non-integrated" scenarios and models (though it needs to be ensured that this will be handled thoroughly in previous chapters). Perhaps this relationship between chapters could be explained more clearly up front. Coherence with Conceptual framework (CF) is well respected. I feel that there is good treatment of shifting between "general" titles of CF components vs. the "scientific" titles. Overall, some key definitions come a bit late in the text, so that the reader is not fully equipped until these explanations are reached. Some short sets of definitions of key terms might be useful early on in the text. Chapter is probably difficult for the non-specialist to read. Substantial efforts need to be made to explain key concepts. More frequent reference to other IPBES documents could be helpful here (e.g., Scenarios & Models Assessment, Values). Some of this was, or still is work in progress (e.g., Ecosystem services classification), but the authors should be vigilant about this for the SOD. Avoid jargon, especially in the exec. summary (e.g., bioeconomy) - there is quite a bit of jargon in this draft.	Thank you for your encouraging words. We have now shortened and rewritten the introduction and hope it is now easy to understand. We have also included a definition of key terms in the introduction and have tried to avoid jargon.

Paul Leadley	Chapter 5		0	0			The analysis remains at a very high level. Some thought should be given to how this can be translated into text that can be more easily understood by decision makers at local, national, and regional levels. Clearly, the development of case studies which appears to be planned will be helpful, but some additional means of interpretation would be helpful. This may become considerably easier once the analysis by pathway "archetype" is carried out, but authors should take care to make conclusions comprehensible for a range of readers. Tradeoffs (and synergies which could potentially be emphasised more) are a key message for this chapter. However, the evaluation of these tradeoffs is currently weak in the body of the chapter. This is likely to be improved as the literature review is more thoroughly exploited. The executive summary is lacking "meat". This is to be expected at this stage, but SOD needs to provide more specificity and include graphics and tables that have clear and powerful messages.		Thank you. We have added more analysis of trade-offs across the sections and added more regional differentiation and policy-relevance to the results. The executive summary has been completely rewritten.
PESC-3	Chapter 5		3	57	3	57	GENERAL comment: many facts and descriptions of findings appear to be quite generic/ globally relevant - these should be either: further specified for the ECA region and/or lined up with similar findings in the other RA s and the global assessments		Thank you for pointing out this very important gap. We have made a considerable effort to include information for all regions. We have now tried as much as possible to present results specifically for the different regions in all sections of the chapter.
PESC-3	Chapter 5		4	70	6	175	GENERAL on key findings: all key findings except the last one appear quite generic across the region. Differences developed between sup-regions in the main text should also be reflected in the executive summary		Thank you for pointing out this very important gap. We have made a considerable effort to include information for all regions. We have now tried as much as possible to present results specifically for the different regions in all sections of the chapter.
PESC-3	Chapter 5		5	70			GENERAL: a further focus should be on what can be handed over to chapter 6 as baseline for potential policy actions (via the pathways section, 5.5)		Thank you. The pathways section ends now with potential policy instruments, which can be considered to achieve a more sustainable future. We use the same definitions as chapter 6, which can easily relate to this section.
PESC-3	Chapter 5		5	70			GENERAL: good links already to chapter 4		Thank you.
PESC-3	Chapter 5		5	70			GENERAL: THANK you for the hard work so far - the parts available are general well written, the chapter covers its mission, though of course a lot of work remains - see our following comments		Thank you.
PESC-3	Chapter 5		5	70			proposal in GENERAL: methodological parts should be reduced, maybe put into an Annex, thus also policy makers as key audience could be clearer addressed, via a clearer focus on results		Thank you. We have made considerable effort to reduce methodological detail and add more on results and their policy relevance throughout the text. All the tables on different types of models in Section 5.3 have been deleted or moved to other chapters. Long tables in Sections 5.4 and 5.5 have been moved to the annex.
Sigrid Kusch	Chapter 5		4	71	73		The chapter is largely based on a detailed although strongly schematic literature review, which according to the provided information has resulted in a detailed review database which is consulted to compile the text. This makes the scientific foundation strong, however, currently, the information provided is often more a schematic quantification of elements identified in the studies. The schematic parts could be shortened and the actual expert assessment of the different elements should be improved in order to allow the reader to better understand the significance of the findings.		Thank you. We considerably shortened the sections to exclude unnecessary methodological descriptions. We have moved a lot of material to the annex and tried to focus the text on results, also adding expert assessment where feasible.
Guy Pe'er	Chapter 5		4	71	4	80	It is necessary to state that "the close interactions between humans and (semi-)natural systems can be tackled most effectively by considering the Socio-Ecological-Systems (SES) as an integrative structure." Ref on the scaling aspects of global-versus-local SESs: Young, Oran R., et al. "The globalization of socio-ecological systems: an agenda for scientific research." <i>Global Environmental Change</i> 16.3 (2006): 304-316.		Thank you for pointing out this very interesting paper. Since conceptual discussions are mostly part of chapter 1, we did not consider this paper here, also because we were asked to follow the IPBES conceptual framework.
Gunay Erpul	Chapter 5		4	87	4	87	what about the scenarios on landuse change related direct drivers?		Thank you very much for this question. Land Use, Land-Use Change and Forestry is present. However, overwhelmingly as a pressure rather than a driver, as per the DPSIR framework. It has been noted that this may be an artefact of the NUTS2 spatial requirement for inclusion.
Paul Leadley	Chapter 5		4	89			Before line 89 may be helpful to explain type of scenarios and refer to Scenarios & Models assessment (e.g., as in Box 5.4).		Thank you. We have made now a strong connection to the IPBES Del 3c on scenarios and models and tried to pick up the explanations used there to make the contents of our chapter more accessible.
Petr Petrik	Chapter 5		4	104	4	104	delete "show"		Thanks. Key Findings have been completely rewritten
Tom West	Chapter 5		5	120	5	122	Also fails to capture intrinsic value.		Thank you for your comment. There has been a lot of conceptual work going on in IPBES to work on the diverse conceptualizations of values. We have tried to include the topic of values now throughout the chapter in a holistic manner instead of separating it into one section.
PESC-3	Chapter 5		5	122	5	125	It will be very challenging to develop such methodological integrative frameworks on a global or ECA regional level - scaling issue should be addressed more clearly (not visible in 5.3.3) and limits should be named		Thank you. There has been a lot of conceptual work going on in IPBES to work on the diverse conceptualizations of values. We have tried to include the topic of values now throughout the chapter in a holistic manner instead of separating it into one section.
PESC-3	Chapter 5		5	122	5	125	The key finding doesn't make clear the overall results of the chapter (5.3.3) - the latter is more balanced in terms of chances and challenges of integrative approaches (see line 1468 for example)		Thank you for your comment. We have completely redone the work on values and the key findings have been rewritten
Marianne Penker	Chapter 5		5	131		146	Without constraints of time and resources, visions should be based on IKL and other more representative sources also illustrating the different geographies of values/priorities for biodiversity and ecosystem development and conservation. This paragraph could put more emphasize on the contested nature of visions and underlying value systems.		Thank you for your comment. The reduced contribution of ILK to the visions is now emphasized in the key findings and the approaches used in the construction of the visions are discussed in the visions section and in the pathways sections. We have also included the studies, which we could find including ILK to highlight the very important values.
Tom West	Chapter 5		5	131	5	146	What is meant by a 'vision' could be spelled out more for clarity. In addition, why does 5.4 only deal with 'visions for sustainable development'. Sustainable development is itself a form of vision - why is it restricted in such a way? For example, rewilding is a vision that is highly relevant, yet missed by the framing chosen.		Thank you for your comment. The sustainability framing is now introduced and justified in more detail in the visions section; Further the introduction has been revised to make the definition of visions more clear. Rewilding - as other conservation elements - are now included in the list of reviewed visions
PESC-3	Chapter 5		5	131	5	146	first sentence should not be the "definition" of visions, but rather the key finding, e.g. the last sentence (l.143-145). Definition could then come second.		Thank you for your comment. We have completely revised the key findings now, and the first sentence of the visions finding is now: "Visions of sustainable development in Europe show a narrow coverage of biodiversity dimensions, focusing on reducing the drivers and pressures impacting biodiversity - namely through a shift to sustainable production and consumption patterns (Aichi T4) and sustainable agriculture and/or forestry (Aichi T7) - but covering less consistently other dimensions present in the CBD Strategic Plan for Biodiversity (established but incomplete) (5.4.5). Sustainable Development Goals (SDGs) were better covered by the visions, with SDG bundles characterising different sectors of activity (established but incomplete) (5.4.4, 5.4.6)."
Tom West	Chapter 5		5	148	5	148	What is the 'bioeconomy'? (Also appears in line 1496 prior to definition given in lines 1701-05). Its usefulness as a term is unclear, given that it seems to simply mean 'growing, processing and selling stuff'		Thank you for your comment. Based on your and other comments, we have now revisited the material on bioeconomy and decided to shorten it to a box. Therefore we will not include it as key finding. However, we have included in the box-text definitions to make clear what bioeconomy means (see box 5.9 for further information). In this box the connection between bioeconomy and the SDGs is now critically discussed.
PESC-3	Chapter 5		5	148	5	148	While the bioeconomy term is asked for to be tackled explicitly, it should be put into the SGD/sustainability context more critically		Thank you for your comment. Based on your and other comments, we have now revisited the material on bioeconomy and decided to shorten it to a box. Therefore we will not include it as key finding. However, we have included in the box-text definitions to make clear what bioeconomy means (see box 5.9 for further information).
Tom West	Chapter 5		5	151	5	154	Could this restriction be a result of the limitation to 'visions for sustainable development'?		Thank you for your comment. Based on a number of comments, we have now revisited the material on bioeconomy and decided to shorten it to a box. Therefore we will not include it as key finding.
PESC-3	Chapter 5		5	155	5	155	the relevant chapter to be added in brackets (5.4.4, line 1700)		Thank you for your comment. Based on a number of comments, we have now revisited the material on bioeconomy and decided to shorten it to a box. Therefore we will not include it as key finding. For the other key findings, we have now included citations for the respective sections.
Rob J.J. Hendriks	Chapter 5		6	159	6	160	What is meant with 'tend to build on incremental change seen as staging future transformation'?		Thank you for your comment. We have completely rephrased this key finding now, to avoid technical language and present a more differentiated picture.
Guy Pe'er	Chapter 5		6	192	6	193	somewhere in the chapter and accordingly in the summary one needs to give an overview of case studies demonstrating the scales and geographic distribution of case studies for generating understanding and knowledge using models and scenarios. These are usually very local to sub-national at best.		Thank you for your comment. An inventory of studies analysed for sections 5.4 and 5.5. can now be found in the appendix of the chapter. This inventory reflects both, the scale and geographic distribution of the studies.
Douglas Nakashima	Chapter 5		7	193			ADD some discussion of ILK alternatives to 'western science' scenario studies and modelling, e.g. Sezdebek and Aibek 2016 (Kyrgyzstan): Developing scenarios are regarded as a scientific tool for foreseeing and modeling the future. A traditional practice of bata kuluu 'making bata' is similar to building scenarios... Basically, this ritual is about creating and broadcasting a common vision and making a wish about the well-being of the community and success in the undertaking that brought together people making bata.		Thank you very much for pointing out this paper. We have checked this very interesting paper. Finally, we did not include it, as it did not provide enough information for a full review. But we included a number of ILKP studies now throughout the paper.

PESC-3	Chapter 5	7	197				GENERAL on structure: thank you- Links between scenarios, models and visions (via archetypes) should be further developed and will be helpful to make chapter relevant	Thank you for your comment. In the introduction 5.1, we have now included a description of how the four sections in our chapter are linked using more general visualizing material from the assessment on scenarios and modelling (Del 3c). The concept of archetypes is defined and introduced at the beginning of Section 5.2.
Paul Leadley	Chapter 5	7	197				Integrated assessment - define more clearly what you mean by this. Not only what can be done with integrated assessment models (IAMs)	Thank you for your comment. We have now included a longer introduction to Section 5.3 which explains what we mean by integrated assessment, including its policy relevance
Germany	Chapter 5	7	198	7	218		Please avoid too much repetition of the framework and refer to chapter 1, 1.2.3, p. 11 l. 263- p. 13 l. 320, as much as possible	Thank you for your comment. We have considerably shortened the introductory text now and focus more on chapter specific issues not tackled in chapter 1.
Guy Pe'er	Chapter 5	7	199	7	199		"These interactions are increasingly perceived in the conceptual context of Socio-Ecological Systems (Fischer et al. 2015)": Fischer J., Gardner T.A., Bennett E.M. et al. (2015) Advancing sustainability through mainstreaming a social-ecological systems perspective. Current Opinion in Environmental Sustainability 14, 144-149. Schlüter, M., McAllister, R.R.J., Arlinghaus, R., Bunnefeld, N., Eisenack, K., Hölker, F., Milner-Gulland, E.J., Müller, B., Nicholson, E., Quaas, M., Stöven, M., (2012): New horizons for managing the environment: a review of coupled social-ecological systems modeling Nat. Resour. Model. 25 (1), 219 - 272; E.g.: Biggs, Reintette, Maja Schlüter, and Michael L. Schoon, eds. Principles for building resilience: sustaining ecosystem services in social-ecological systems. Cambridge University Press, 2015. (other papers by Biggs et al. and Schlüter et al. mentioned elsewhere in my comments)	Thank you for pointing out these very interesting papers. Since conceptual discussions are mostly part of chapter 1, we did not consider this paper here, also because we were asked to follow the IPBES conceptual framework.
Guy Pe'er	Chapter 5	7	199	7	199		additional relevant refs: Cumming G.S., Cumming D.H.M. & Redman C.L. (2006) Scale mismatches in social-ecological systems: Causes, consequences, and solutions. Ecology and Society 11.; Folke C. (2006) Resilience: The emergence of a perspective for social-ecological systems analyses. Global Environmental Change-Human and Policy Dimensions 16, 253-267.; Fischer J., Hartel T. & Kuemmerle T. (2012) Conservation policy in traditional farming landscapes. Conservation Letters 5, 167-175.	Thank you for pointing out these very interesting papers. Since conceptual discussions are mostly part of chapter 1, we did not consider this paper here, also because we were asked to follow the IPBES conceptual framework.
Guy Pe'er	Chapter 5	7	216	7	216		additional refs: Haila Y., Henle K., Apostolopoulou E. et al. (2014) Confronting and coping with uncertainty in biodiversity research and praxis. Nature Conservation 8, 45-75.; Pe'er G., Mihoub J.B., Dislich C. & Matsinos G.Y. (2014) Towards a different attitude to uncertainty. Nature Conservation 8, 95-114.	Thank you for pointing out these very interesting papers. Since conceptual discussions are mostly part of chapter 1, we did not consider this paper here, also because we were asked to follow the IPBES conceptual framework.
Guy Pe'er	Chapter 5	7	222	7	223		It is critical to define what ARE integrated assessments, and differentiate different types of these. They can be done in a participatory way, by modelling, or through inter-and multi-disciplinary cooperation projects. By introducing the types of assessments in this chapters, the rest would become clearer and reviewers can add more refs and input more easily.	Thank you for your comment. We added to box of definitions in introduction. More details on integrated assessments are included in section 5.3 in order to avoid redundancy with section 5.1. However, many comments suggested to limit the methodological discussions in our chapter to a minimum, and hence we did not deal with this topic in depth.
Guy Pe'er	Chapter 5	7	232	7	233		additional refs: Pierr A., Ungaro F., Ciancaglini A. et al. (2009) Integrated assessment of future CAP policies: land use changes, spatial patterns and targeting. Environmental Science & Policy 12, 1122-1136.	Thank you for the paper recommendation. We have considered it but finally it has not been included in the integrated review because it did not match the criteria selected (including more than one direct driver).
Guy Pe'er	Chapter 5	8	251	8	251		line 251 or 248: "Notably, however, place-based assessments tend to be small-scale in nature, thus having limitations in their applicability for knowledge-generation toward a larger-scale assessment as this one (- as elaborated in this chapter?). Thus, at this stage they can mostly offer case studies and exemplary paths for better understanding of the functioning of SESs."	Thank you for your comment. Place-based studies are no longer mentioned in the introduction (due to the shortening and simplification requested by other reviewers)
Guy Pe'er	Chapter 5	8	274	8	277		redundant sections (repeats twice?)	Thank you for your comment. The introduction has been rewritten and considerably shortened/simplified
Gunay Erpul	Chapter 5	9	283	9	283		Figure 5. 1. Instead of CH5, probably, a wider explanatory title could help.	Thank you for your comment. The figure has been redrawn. It is now Figure 5.2 with a legend stating Schematic showing the key questions addressed within Chapter 5 and how these relate to the Chapter structure
Guy Pe'er	Chapter 5	9	285	9	289		The 5 reviews need to be mentioned earlier, yet it is not clear what is included in the chapter and why. Further justification of the aim and scope of this chapter, and what it contains or not, is needed still.	Thank you for your comment. The introduction has been rewritten to introduce the aims and structure of the chapter upfront. The 5 reviews are now not mentioned at all in the introduction as we focus on clearly stating the overall aims and structure. We refrained however, from a discussion of why we included certain things, as this is part of the scoping report, in order to be short and interesting for a wider audience.
Germany	Chapter 5	10	293				we welcome the box of definitions very much	Thank you
Paul Leadley	Chapter 5	10	293				Definitions (Box 5.1) - try to be consistent with Scenarios & Models methodological assessment in terms of terminology.	Thank you for your comment. We have been consistent with the Assessment of Del 3c as much as possible.
Guy Pe'er	Chapter 5	10	299	10	299		It is not clear why the jump is made from integrated assessments to models. I assume that integrated assessments are the approach and models are one of the tools to perform them? Needs to be clarified in the intro to this chapter or here. (move section from lines 321-323?)	Thank you for your comment. Introduction has been restructured and rewritten. Section 1.2 no longer exists. We refer to Del 3c for how scenarios and models can be used.
Germany	Chapter 5	11	326	11	327		"Here we deviate from IPBES (2016) and broaden the definitions". Please explain this deviation. Does this have implications for the global assessments? Please ensure consistency across the regional assessments	Thank you for your comment. We have chosen to work with visions as a term, because it is less "tech term" and we assume therefore it is easier to understand for our key audience. It also allows to include both scientific approaches, as defined by the Assessment Del 3c as well as approaches which are not developed based on scientific scenarios methods, e.g. to include ILKP.
Allan Watt	Chapter 5	11	329	11	330		Policy-prescriptive language: re-phrase.	Thank you for your comment. The formulation was misleading and has been rephrased
Rob J.J. Hendriks	Chapter 5	11	329	11	330		"We have searched for visions defined as a desirable future (an endpoint in time) which we want to achieve" Who is the second we in this sentence?	Thank you for your comment. The formulation was misleading and has been rephrased
PESC-3	Chapter 5	12	338				we acknowledge and confirm a weakness of material of integrated scenarios and links between biodiversity, ecosystem services and human well-being in them (also relevant for models, chapter 5.3) - thus additional work should be invested (if possible,...) to identify further according work	Thank you for your comment. The formal review of the integrated assessment literature for Europe and Central Asia has been complemented with extensive searches using the IPBES expert network and additional efforts by the author team to reduce gaps in the geographic and realm coverage of the search. However, integrated studies are still fairly rare which is acknowledged in Section 5.3 and in the knowledge gaps section in 5.6.3
Guy Pe'er	Chapter 5	12	343	12	343		"as well as the feedbacks in which biodiversity and ecosystems (functions and services) reflect back on humans and their wellbeing." Example ref: Lade, Steven J., et al. "Regime shifts in a social-ecological system." Theoretical ecology 6.3 (2013): 359-372. We have	Thank you very much for this interesting citation. Unfortunately, it was not clear how this is relevant to the scenarios review. We also discuss feedbacks in Section 5.2.2 stating that "there were very few scenario studies which modelled feedbacks from direct drivers, such as climate change or land use change, to socio-economic trends, highlighting a key gap in the scientific literature covering NCP, an integral aspect of the IPBES conceptual framework"
Santosh Kumar Mishra	Chapter 5	12	353	13	391		Under section 5.2.1 Lessons from Chapter 4: drivers and their interactions (Page 12, Line 353), add following information on cropland in Europe before start of last paragraph (Page 13, Line 393, starting with sentence: Direct and indirect drivers usually concur and interact in complex ways. All indirect drivers affect all...): "Cropland" can be understood as land with regularly or recently cultivated agricultural, horticultural and domestic habitats. With agriculture covering half of the EU's land area, Europe's biodiversity is to a large part inextricably linked to agricultural practices. The mosaic of habitats resulting from traditional farm management favored a diversity of plant and animal species across Europe and it is estimated that 50 % of all species in Europe depend on agricultural habitats. Change in agricultural land use is a major cause for the decline of biodiversity in Europe. This change is characterized by widespread intensification of farming systems on better land and abandonment or afforestation of poorer land (http://biodiversity.europa.eu/topics/ecosystems-and-habitats/grasslands , accessed on June 18, 2016).	Thank you for your comment. This section no longer exists as we felt it was unnecessary to repeat what is already in Chapter 4. Hence, we now refer to Chapter 4 on this issue
Gunay Erpul	Chapter 5	13	383	13	391		In some parts of ECA, instead of general trend, as an interactive result of land use change (land intensification in agriculture) and climate change, could land degradation be a serious issue here?	Thank you very much for your comment. Unfortunately, we did not understand it fully, and therefore could not include it. We do consider land degradation in the scenario review and include a box on land degradation and restoration scenarios based on the IPBES assessment which is specifically focused on this issue
Mark Sneithlage	Chapter 5	13	395	13	396		Chapter 4 states that GDP is the main driver for IAS	Thank you for your comment. This section no longer exists as we felt it was unnecessary to repeat what is already in Chapter 4. Hence, we now refer to Chapter 4 on this issue
Germany	Chapter 5	13	412	13	412		Please explain why only from 2005 onwards (due to MA, 2005?)	Thank you for your comment. Indeed our approach was to review literature following from MA (assumed that MA reviewed literature before 2005)
Guy Pe'er	Chapter 5	14	430	14	430		a figure or map of identified studies can help directing knowledge-generation. (correct also for other chapters)	Thank you for your comment. While we have not yet worked on a joint map of studies across all sections of our chapter we have tried to capture some diversity in figure 5.8.
Guy Pe'er	Chapter 5	15	459	15	461		additional ref (review) on consumption: Alexander P., Rounsevell M.D., Dislich C., Dodson J.R., Engström K. & Moran D. (2015) Drivers for global agricultural land use change: The nexus of diet, population, yield and bioenergy. Global Environmental Change 35, 138-147.	Thank you very much for this paper, we have included it in our review now.
Germany	Chapter 5	15	463	15	465		How about ecosystem services	Thank you very much for your comment. Unfortunately, it was unclear to us.
Guy Pe'er	Chapter 5	15	465	15	465		another ref on consumption at global level is Godfray H.C.J., Beddington J.R., Crute I.R. et al. (2010) Food Security: The Challenge of Feeding 9 Billion People. Science 327, 812-818. It is noteworthy that there are more global scenarios than truly European ones.	Thank you very much for point out this excellent paper. Unfortunately, it is not a scenario study and therefore did not fit our review criteria.
Gunay Erpul	Chapter 5	17	509	17	509		For scenarios on land degradation as a result in habitat degradation (also in close link to climate change), LDRA experts embedded in ch5 could be in contribution.	Thank you very much. Indeed our LDR expert in Chapter 5 wrote this section
Guy Pe'er	Chapter 5	16	557	16	557		a gap to note is on the prevalence of papers addressing climate-change adaptations as a driver or land-use changes and their consequences in terms of biodiversity and feedbacks on humans. In addition, there needs to be a short section on studies addressing entire feedback loops - humans on nature and back.	Thank you for your comment. We discuss feedbacks in Section 5.2.2 stating that "there were very few scenario studies which modelled feedbacks from direct drivers, such as climate change or land use change, to socio-economic trends, highlighting a key gap in the scientific literature covering NCP, an integral aspect of the IPBES conceptual framework"

Gunay Erpul	Chapter 5	19	596	19	599		Thank you very much for pointing out this gap. While indeed some scenarios can be found, the majority consisting of this combination of drivers do not provide driver quantifications and rather rely on storylines or "high/low". In the case of invasive species, the vast majority of studies involve a small number of drivers (e.g., bioclimatic model) and focus on a specific invasive. The scenario recommended here (ISRIC 2000) does not provide explicit quantifications of its drivers as far as we can see.
Gunay Erpul	Chapter 5	23	628	23	689	Scenarios combining land use change, natural resource use, invasive alien species and pollution in terms of "land degradation" could be found! For example, Impact of Soil Degradation: A Global Scenario (ISRIC)	Thank you for your comment. Apart from integrating the LDR work more deeply within the chapter in general, we have added the box 5.4, to connect our chapter with this very important topic.
Guy Pe'er	Chapter 5	21	652	22	676	ELD (Economics of Land Degradation) in a bridge to the provision of ecosystem services could help, collaborated by the LDRA experts embedded.	Thank you very much for highlighting this important topic. Indeed, all of these are studies that are well-known and well-established in the literature. To some extent all take an integrated approach, certainly some specifically aimed at combining qualitative (more socio-economic) and quantitative (more environmental) aspects. Yet, most also focus primarily on other sectors. PRELUDE, VOLANTE, and ATEAM related to land use and land use change, rather than to biodiversity and ecosystem services. Note that most studies base their scenarios on the IPCC SRES, that are well represented in the studies included in the assessment. However, Hanspach et al was included in the pathways section.
Germany	Chapter 5	23	679	23	680	other relevant projects include MultiAgri, PRELUDE, ATEAM, RIKS, VOLANTE (I) and others, albeit only few of them take an integrated approach - most of them relate more to chapter 4. Note also the work of Jörn Fischer and the group involved in Romania - equally relevant case studies for interdisciplinary, integrated assessment approaches.	Thank you for your comment. Exemplary studies from EE and CA have been added to the box on local participatory scenario planning
Heino Meessen	chapter 5	21	680	23		This is very crucial information. Please ensure to add other sub-regions (Central Asia, EE) as well	Thank you very much for this very interesting and in-depth comments. We spend considerable effort to identify relevant literature for Eastern Europe and Central Asia and hope that we could broaden the scope of our chapter as we included a number of additional studies. Unfortunately, we could not identify the literature that you are citing here, and hence were not sure on how to integrate this very valuable material. We would be most grateful if you could include this comment again in the next round of reviews, including references, which we can cite. Thank you!
						Suggests to add the following as As BOX in Chap. 5.2.2.5. e.g. as BOX 5.4.or introduce as "case study" for the large euro-asian space with transition context - in Chap. 6.1. "Introduction" between Table 6.1. and figure 6.1: Specific settings on biodiversity conservation and management of Large Protected Areas (LPA) in transition countries: This analysis is introduced by a center active in development cooperation and biodiversity conservation in Eastern Europe, the Carpathians, Caucasus and in Central Asia. Our perspective and recommendation are clearly focused on the transition context of the former planning economies making use of the more than 25 experience of the Center for Development and Environment (CDE) in the context. Analysis and recommendation are not only developed by CDE but mainly within local projects in and around LPA - jointly with national researchers, NGO, LPA Administrations and regional planning experts from a long-term established partner and experts network in the regions mentioned above. Key questions and challenges: As recent key questions for biodiversity conservation in the transition context the following have been identified: What are future settings for biodiversity conservation and LPA management in the transition countries of CA and Caucasus? How could "Eastern biodiversity jewels" contribute to nature's benefits for people and for a better a quality of life, helps against poverty of local people endangered by out-migration? How could be identified nature's benefits to people (including ecosystem goods and services) and the interlinkages between these elements? Will it be possible to introduce a democratization of natural resource use towards a locally based natural resource and landscape governance? Main challenges: - Severe threats by poverty for local people in and around large protection areas "in transition"; - Privatization, change in land tenure and insufficient regulatory basis within management and zoning plans of LPA; - Poaching, trophy hunting, collecting non-timber products, wood and any other kind of bioenergy resources - insufficient regulation of water extraction - "Bottled water" and threats to aquatic biodiversity; - Eastern organizational and societal Mentality of permanent improvisation - "help yourself" (on the examples of Tajikistan, Kyrgyzstan and Kazakhstan). Main recommendation is about participation: The overall aim is to foster local-level cooperation on bio- and agro-diversity conservation by establishing sustainable partnerships between researchers, local residents, and natural resource experts working in academia and on the ground in agriculture and forestry. For reaching this aim existing participatory methods have to be adapted to the transition context of Eastern Europe, and especially to the remote and mountain regions of the Carpathians, the Caucasus and Central Asia, e.g. the "learning for sustainability" LAS tools. Living standards and the quality of life, economic activity and creativity, the contribution of gender-age groups to livelihoods, conservation habits, economic claims, and the development priorities of stakeholder groups are recommended to research in detail - as in parallel to the data collection about biodiversity conservation and protection of rare species for the LPA's. To create income alternatives cooperation and participation with the local population in and around Large Protected Areas (LPA) is crucial. A detail analysis of current local conditions on biodiversity conservation and management of LPA must also take into account existing social-ethnographic data such as settlement patterns, ways of life, public hierarchy and religion, which are crucial to understanding the current transition period. On the national policy level compensation subsidies for not using or restricted use of private land in and around protected areas must be set priority for government negotiations and for implementing EU development instruments concerning the new EU member states of Central and Eastern Europe, e.g. Poland, Slovakia, Romania and Bulgaria with large rural and mountain regions as hotspots of Biodiversity conservation. This will be a hard and long-term process. Kick off this process is crucial but if not possible due to insufficient compensation and subsidies system and regulations for development of remote and mountain regions, first measure to be recommended is on-site cooperation and participation to generate local income for the people. This could be participatory use of non-timber products following locally defined and sustainable regulations. On the basis of this later could be created local products and labelling of these for local population. This means income generation through support and education for agro - soft - nature-based tourism and it's marketing as well. Objective should be to adapt existing participatory methods and tools to these transition countries of Eastern Europe, Caucasus and Central Asia. Examples of adapted participatory tools out of CDE's project experience: Transect walks together with local experts bringing in traditional knowledge on biodiversity conservation, assessing the local situation; identifying small scale pilot projects, implementing together with population and local experts; Learning process could be moderated inviting conservation researchers, local experts for traditional knowledge and planning specialist for small infrastructure; A central point during this joint learning process is budgeting of so called "Seed money activities (SMA)" and using this finances for implementing small "seed" pilot projects identified by locals; Reconcile scientific biodiversity and species knowledge with public participation and local knowledge. Example is the recent strategy of establishing "Advisory boards" on national level (institutionalized in the so-called parliamentary commissions on the environment of the national parliaments) and locally based as Advisory council to a LPA. Biodiversity conservation and transboundary cooperation: Transboundary cooperation "Environment and Security" includes biodiversity conservation as well - implemented on the example of the Caucasus region, e.g. between Azerbaijan, Armenia, Azerbaijan and the Russian Federation. Linking management of LPA as peace keeping and conservation factor on ideas of joint biodiversity conservation across borders. Management and zoning of LPA can be a tool for conflict mitigation in regions like South Caucasus with so called "Frozen conflicts". (see also the existing concept of "peace parks"). Combined methods on nature conservation and development cooperation could bridge the gap between systems knowledge and target knowledge - bringing in the local needs of population to be basis for a joint learning process for participatory conservation and LPA management concerning sustainable biodiversity conservation specifically for the transition countries of Eastern Europe and the biodiversity hot spots of Carpathians, Caucasus and Central Asian mountain regions. And as to say it with words of local residents in the biodiversity "hot spot" region of Lagodekhi in Georgia: "The international goals of biodiversity conservation related to international convention like CBD have been reached by our government, - but local-level resource management and participation of and benefits for local people is another story. Many local residents in Azerbaijan and Georgia, for example, feel that their local situation is not given enough attention. As one villager put it, "Much is done in [the capital cities] Tbilisi and Baku, but what about natural resources use of wood, water, pastures - restricted by the governmental regulation on nature conservation in our villages?". "Ultimately conservation is about people. If you don't have sustainable development around these (wildlife) parks, then people will have no interest in them, and the parks will not survive." Nelson Mandela, former President, Republic of South Africa in Mail&Guardian Online, 5 April 1991: "Mandela goes Green" - A hunting trip converts the ANC leader to conservation.	
Rob J.J. Hendriks	Chapter 5	24	719	24	722	The GSC scenarios introduced here seem to play an important role in para 5.2.3.1 and 5.2.3.2. However a short introduction on these GSC scenarios themselves or a reference is lacking.	Thank you for your comment. The section was rewritten slightly and now puts forward Van Vuuren et al. (2012) as the key paper in these two sections. The scenario families that Van Vuuren uses are characterised in Chapter 6 of Del 3c. We will refer to that Chapter. We will also include a reference to the GSG work.
Gunay Erpul	Chapter 5	27	788	27	795	SDG 15.3 Land Degradation (Ecosystem Degradation) Neutral World could be somewhat issued in parallel to LDRA.	Thank you for your comment. We have tried to strengthen the relationships with the LDRA now as much as possible.
Gunay Erpul	Chapter 5	28	803	28	810	Land degradation in the semiarid and arid parts of the ECA (desertification) might aggravate the inequality, as well.	Thank you for your comment. "Inequality" is added as an archetype for the Europe and Central Asia to reflect the new SSP4 scenario that has been downscaled to both Europe and Central Asia. In general terms, the scenario archetypes are describing archetypical future outlooks of the socio-economic sub-system. The descriptions include consequences for the environment, but do not close the loop by assuming environmental change influencing socio-economic change. So although it does happen and is acknowledged as important, it was not considered here.
Rob J.J. Hendriks	Chapter 5	28	817	28	818	Do the scenarios have effects or rather describe or examen them? Would it be better to have a kind of formulation similar to the title of 5.3.2.?	Thank you for your comment. Heading has been changed to "Future impacts on nature, nature's contributions to people and a good quality of life"
Rob J.J. Hendriks	Chapter 5	28	835	28	835	'Here, we focus on models' -> this is not reflected in the current title of section 5.3.	Thank you for your comment. This section has been rewritten to provide a clearer introduction to integrated methods and models. The section repeating Chapters 2 and 3 has been removed to avoid repetition and the Chapters are cited where needed instead
Rob J.J. Hendriks	Chapter 5	28	840	29	843	"The rangof coupledin section 5.3.2.' -> what is meant here? 'studies of' instead of 'study'?"	Thank you for your comment. This section has been rewritten to provide a clearer introduction to integrated methods and models.
Germany	Chapter 5	29	857	29	859	We welcome the reference to and use of the outcomes of the Deliverable 3c (Policy support tools and methodologies for scenario analysis and modelling of biodiversity and ecosystem services)	Thank you for your comment.
Paul Leadley	Chapter 5	29	867			The model typologies section is very problematic- this was one of the most difficult issues to resolve in the Scenarios & Models assessment. There are lots of classifications and it would be helpful if this was consistent with the Scenarios & Model assessment classifications. If it is felt another classification is better adapted to this chapter, this should be explained	Thank you for your comment. This section has been removed as other comments asked to reduce methodological detail. For information on models of biodiversity and ecosystem services we refer to Chapters 3 and 2, respectively. The definitions of scenarios and models from Del 3c are included in the Section 5.1 at the beginning of the chapter. Limited definition of integrated assessment is given with reference to a key paper by Kelly et al. (2013) for further details

Guy Pe'er	Chapter 5	30	892			perhaps agent-based models may fit in this table when they address human decisions and interactions between biodiversity and humans? Or does this suit integrated assessments later on? See e.g. Schlüter, M., McAllister, R.R.J., Arlinghaus, R., Bunnefeld, N., Eisenack, K., Hölker, F., Milner-Gulland, E.J., Müller, B., Nicholson, E., Quas, M., Stöven, M., (2012): New horizons for managing the environment: a review of coupled social-ecological systems modeling Nat. Resour. Model. 25 (1), 219 - 272;	Thank you for your comment. We have included agent-based models in the review. They are discussed in the Kelly et al. (2013) paper that we refer to for further information. We no longer provide a lot of methodological detail as we were asked to reduce this and focus more of findings and their policy relevance.
Allan Watt	Chapter 5	30	892	30	894	Metapopulation and island biogeography models underrepresented in this table (second row) and in the text (here and probably in other Chapters), a serious gap given the importance of this research in assessing extinction risk. The research of Hanski and others should be consulted.	Thank you for your comment. This table has been removed from Chapter 5 to address other comments on reducing methodological detail.
Gunay Erpul	Chapter 5	30	892	30	892		Thank you for your comment. This table has been removed from Chapter 5 to address other comments on reducing methodological detail. We specifically looked for integrated studies that consider below-ground biodiversity but were unable to find any. However, the issue is covered by non-integrated studies in Chapter 3
Gunay Erpul	Chapter 5	32	915	32	940	Table 5. 5. Most studies have focused on the ecological consequences of above-ground biodiversity loss; What about below ground, since a large part of Earth's biodiversity is indeed hidden below ground.	Thank you for your comment. This section has been removed. We now simply refer to Chapter 3 where needed rather than repeating their findings
Germany	Chapter 5	67	948	67	1948	Trends in soil organism biodiversity?	Thank you for your comment. This section has been removed. We now simply refer to Chapter 3 where needed rather than repeating their findings
Allan Watt	Chapter 5	32	951			This remained indeed vague.	Thank you for your comment.
Guy Pe'er	Chapter 5	33	962	33	977	Avoid "caterpillar", an informal term to describe the juvenile stage of Lepidoptera. In this example, the pine processionary moth Thaumetopoea pityocampa is referred to. However, it isn't a very good example: although spreading, this is probably the result of climate: see e.g. Battisti, A., Stastny, M., Netherer, S., Robinet, C., Schopf, A., Roques, A. & Larsson, S. (2005) Expansion of geographic range in the pine processionary moth caused by increased winter temperatures. Ecological Applications, 15, 2084–2096. Better examples include Asian longhorn beetle Anoplophora glabripennis, native to China and the Korean Peninsula and now spreading in Europe and elsewhere. See e.g. Life history of the Asian longhorn beetle Anoplophora glabripennis (Coleoptera Cerambycidae) in southern Europe (Faccoli et al. 2014). [If the example cited is retained, correct the spelling of Larsson.]	Thank you for your comment. This section has been removed. We now simply refer to Chapter 3 where needed rather than repeating their findings
Guy Pe'er	Chapter 5	33	962	33	963	Other important ecosystem services include pollination, pest control, erosion control etc - but more important potentially would be to highlight reviews that cover several or multiple ESS	Thank you for your comment. This section has been removed. We now simply refer to Chapter 2 where needed rather than repeating their findings
Germany	Chapter 5	36	1023	36	1023	It is worthy to differentiate between "most studied" and "most important" pressures/drivers, also in regards to Chapter 4. climate change might be most studied, but land-use changes including climate-driven land-use changes may be more critical. Agricultural intensification is particularly relevant in the interaction between humans and natural systems as it also drives human population away from rural areas, i.e. impeding rural vitality.	Thank you for your comment. This section has been removed. We now simply refer to Chapter 2 where needed rather than repeating their findings. However, we acknowledge the point and have tried to take it into account in rewriting the findings from the review of integrated studies. We also note the point in Section 5.2 about the dominance of single driver studies on climate change and the gaps on important drivers of biodiversity and NCP change.
Germany	Chapter 5	36	1023	36	1023	what do you mean by balanced in this context? Obviously the review still shows a strong bias towards western Europe	Thank you for your comment. We have changed the wording of the sentence to "representative". An effort has been now made to include a larger number of examples and references from eastern Europe and Central Asia, although we clearly state that there is still a strong bias to studies in Western Europe (and the European Union).
Gunay Erpul	Chapter 5	36	1057	37	1073	"4 per 1000 - Soils for food security and climate" may be worth to visit.	Thank you for your comment. We have checked this reference but have not found explicit modelling work involved
Paul Leadley	Chapter 5	37	1107				Thank you for your comment. We accept this point. The table has been kept for now to provide an overview of the review database, but it could be removed for the next version is reviewers of the SOD find it unhelpful
Germany	Chapter 5	38	1125	38	1125	Table 5.8 - methodology needs to be more clearly explained. Unsure that this level of aggregation is helpful. Perhaps it would be best to go directly to Fig. 5.7	Thank you for your comment.
Sigrid Kusch	Chapter 5	39	1138	39	1149	According to the fact that the analysis will be re-done for the SOD, we do not comment on the content of this section, as the findings may change due to the new analysis	Thank you for your comment.
Allan Watt	Chapter 5	39	1140	39	1143	Either in the text or as part of Figure 5.7 an explanation should be provided what 'biomass' means in the category 'biodiversity'.	Thank you for your comment. We use in the present version of the chapter the NCP categories agreed upon by IPBES to report information from the integrated modelling review.
Germany	Chapter 5	39	1153	39	1156	Would it be useful also to present the results according to scenario archetype?	Thank you for your comment. This has now been added (see Section 5.3.3 and Figure 5.16)
Germany	Chapter 5	39	1153	39	1156	this is a very surprising finding. Please ensure consistency across the chapters as much as possible	Thank you for your comment. The review database has been reanalysed following expansion to include more studies. We have not yet been able to compare with the findings from Chapter 2 as there review is still ongoing, but this will be done for the next version
Gunay Erpul	Chapter 5	40	1172	40	1172	In terms of "Food provision", Main Report of Status of the World's Soil Resources (Global Soil Partnership) could bring more.	Thank you for your comment. We are including here only results from integrated modelling approaches. Chapter 2 already assesses changes in key NBP using other approaches.
Mark Snethlage	Chapter 5	42	1251	42	1253	Sentence after (ii) is unclear	Thank you for your comment. Sentence rewritten as "In northern Europe, countries need to consider trade-offs between projected increases in agricultural production to meet European food demand and decreases in forestry (due to agricultural competition for land) and the associated impacts on timber, recreation and cultural identity."
Mark Snethlage	Chapter 5	43	1277	43	1277	"compliment" -> "complement"?	Thank you for your comment. Changed
Germany	Chapter 5	45	1320	45	1321	This is a very crucial part of chapter 5, so we are looking forward to reading this section in the SOD	Thank you for your comment. We have started to draw out some of these implications but intend to focus on this to a greater extent in the next version to link Sections 5.2/5.3 to 5.4/5.5
Mark Snethlage	Chapter 5	45	1326	45	1326	"compliment" -> "complement"?	Thank you for your comment. This section has been removed. The review on values has been integrated throughout the Chapter focusing on how values are represented in scenario, visioning and pathway studies
Tom West	Chapter 5	45	1328	45	1329	Although this section is explicitly about the value of ecosystem services for human wellbeing, and thus excludes nature's intrinsic value, how will intrinsic value be dealt with, given that it is a key part of the IPBES conceptual framework?	Thank you for your comment. We have completely revised our work on values and it has been mainstreamed into the other reviews. Here we looked how different values are considered in the different studies reviewed. Indeed we found that intrinsic values are often ignored. See also key finding on values in the executive summary.
Tom West	Chapter 5	45	1330	46	1331	Is it necessarily a market-based valuation, or rather an economic or monetary valuation? Consider that a number of economic tools in this field, such as stated preference models, are not market-based on account of the fact that there is no market for the services.	Thank you for your comment. We have completely revised our work on values and the text on which this comment is based does no longer exist.
Germany	Chapter 5	46	1360	46	1363	The TEEB reports provide a more nuanced picture of the role that monetary valuation can play within the context of (economic) valuation and possible instruments and incentives.	Thank you for your comment. We have completely revised our work on values and the text on which this comment is based does no longer exist.
Allan Watt	Chapter 5	46	1363			Not in reference list.	Thank you for your comment. We have completely revised our work on values and the text on which this comment is based does no longer exist.
Tom West	Chapter 5	47	1370	47	1373	Do the worldviews of 'diverse' and 'single' here mean the same as the worldviews of 'multiple values' and 'monetary value'? Also, not clear where these figures came from	Thank you for your comment. Yes, diverse worldview = multiple values; single worldview = monetary. This characterization was taken from IPBES deliverable 3d (IPBES, 2015).
Tom West	Chapter 5	47	1375	47	1376	Good to define 'value', and encouraging to see the broad scope taken by IPBES - but this is not the only way that IPBES understands 'value', as evidenced by the fact that it includes nature's intrinsic value. Same issue revealed in line 1389.	Thank you for this comment on which we agree. Conceptual issues and definitions are, however, part of chapter 1 and to some extent chapter 2 and we try to not be repetitive.
Germany	Chapter 5	47	1384	47	1384	"To counteract the hegemonic position" please consider rephrasing	Thank you for your comment. We have revised the whole text on values.
Germany	Chapter 5	47	1385	47	1386	There are many studies that use non-market based techniques to assess cultural values, which still provide a monetary estimate	Thank you for your comment. We have omitted now most of the methodological discussions and mainstreamed the values review into the other reviews. Therefore, this comments might no longer be relevant.
Tom West	Chapter 5	47	1390	48	1393	Would be useful to have definitions and overviews of all these different types of valuations.	Thank you for this comment on which we agree. Conceptual issues and definitions are, however, part of chapter 1 and to some extent chapter 2 and we try to not be repetitive.
Paul Leadley	Chapter 5	48	1397			Values - should have a look at the the values guide	Thank you for pointing out this valuable source of information, we made use of the guide now extensively.
Tom West	Chapter 5	48	1414	48	1432	This section doesn't actually provide any information about valuation methods. Different methods may well be required for different spatial scales, but we need to know what the methods are and why they are required for different spatial scales first.	Thank you for your comment. We were asked to omit the methodological questions in our chapter altogether and therefore will not be able to properly address this comment in our chapter.
Tom West	Chapter 5	48	1417	48	1417	What are the remainder? Still 21% left	Thank you for your comment. We have redone the figures and the text for this comment no longer exists.
Gunay Erpul	Chapter 5	49	1436	49	1436	Box 5.5., World view: including clean air, water, food and building materials could be rewritten as including clean air, water, soil, food and building materials	Thank you for your comment. The box on which this text was based on no longer exists.
Gunay Erpul	Chapter 5	49	1436	49	1436	Box 5.5., Policy instrument: Nature, (Agriculture???) forestry and water policy in Flanders	Thank you for your comment. The box on which this text was based on no longer exists.
Gunay Erpul	Chapter 5	49	1436	49	1436	Policy instrument, could the policy that ecosystem and biodiversity degradation neutral world be possible with reference to SDG 15.3?	Thank you for your comment. Unfortunately, we did not capture the suggestion in this comment

Tom West	Chapter 5	49	1440	49	1441	What about those from the arts and humanities?	Thank you for your comment. Unfortunately, we did not capture the suggestion in this comment
Santosh Kumar Mishra	Chapter 5	50	1472			In the section 5.3.4 Linking integrated assessment to key sustainable development issues (Page 50, Line 1472); the word sustainable needs to be corrected.	Thank you for your comment. Corrected
Tom West	Chapter 5	50	1472	50	1492	Again, why is there this sudden jump to 'sustainable development' from 'biodiversity and ecosystem services'? These are not the same concepts, and treating them as such is problematic. This is especially the case given the acknowledged focus "particularly on visions of sustainable development", as backed up by the internet search keyword used in lines 1550-51. Furthermore, it is quite possible that what "society as a whole, or groups within society, want to happen" (1486) is as influenced by visions that have nothing to do with the environment, nature, biodiversity or sustainable development: and that these visions (political, business, ideological etc) will actually affect the state of biodiversity and ecosystem services even more.	The focus on "sustainability" results from the scoping documents, where we were asked to assess key issues concerning sustainable development and possible pathways towards sustainable development. While we agree that there might be many other visions out there, due to time and resource constraints we focused on visions in relation to sustainability. Moreover, we know acknowledge the existence of diverse or even conflicting visions: "In particular, Sections 5.4 and 5.5 focus on visions and pathways for sustainable development (...) Beyond this, we note that societal visions are diverse and some visions may aspire to futures not related to, or even conflicting with, sustainable development."(Section 5.4, 1st paragraph)
PESC-3	chapter 5	50	1472	50	1481	This section (and maybe at some other places, e.g. chapter 5.5) should be used to make explicit the links to the SDGs	Thank you for your comment. We have completely revised sections 5.4 and 5.5 and made multiple linkages to the SDGs, e.g. 5.4.4, 5.4.6 and 5.5.1
Allan Watt	Chapter 5	50	1487			General point: other references appear to be missing e.g. Yasmi et al.	Thank you for pointing out this gap. We have tried to capture all references in this version.
Tom West	Chapter 5	49	1492	52	1540	Are 'visions' the same as 'policy targets'? Lines 1492-93 suggest that they are not, but line 1540 suggests that they are.	Thank you for your comment. We have rephrased the definition already now in section 5.1: "visions" are defined as a desirable future (an endpoint in time) which society or parts of society want to achieve. They usually consist of statements depicting the explicit desires, assumptions, beliefs and paradigms that underlie the desired future. Visions can take the form of policy targets, but can also be formulated by actors, e.g. from private sector to address business targets or civil society to address social targets."
Tom West	Chapter 5	51	1499	51	1537	This section would be clearer if the relevant SDG and Aichi targets were listed and their overlaps etc drawn out.	...The analyses on SDGs and Aichi targets has been further developed for the SOD. Visions were now checked for overlaps/synergies between these two sets of goals and discussed against expected overlaps. A list of the Aichi Targets and of the SDGs, to guide readers, is being considered in Chapter 1.
Mark Snethlage	Chapter 5	51	1500	51	1500	"initiates" -> "initiates"	Thank you.
PESC-3	Chapter 5	51	1506	51	1508	the issue of efficiency should be better explained and the dimension what efficiency should mean (maybe for different resources) should be clearer to avoid misunderstandings	Thank you. The text was revised and this comment may no longer apply
Mark Snethlage	Chapter 5	51	1517	51	1518	... "could risk ensuring sustainable and resilient agriculture"...? Not sure what is meant here.	Thank you. The text was revised and this comment may no longer apply
PESC-3	Chapter 5	51	1526	51	1537	For Aichi targets reference, we recommend to check for the work on biodiversity indicators on them for GBO4, which includes; use the work of Tittensor et al. For GBO4, Summary: http://science.sciencemag.org/content/346/6206/241 ; technical report series of the CBD, vol. 78, 79, 81: available at: https://www.cbd.int/Gbo4/	Thank you for your comment. References are included in the text. Thank you
PESC-3	Chapter 5	51	1526	51	1537	In this paragraph, the further link between SDGs and not only the Aichi targets but also the CBD's vision for 2050 should be made. [This is also mentioned in the placeholder, lines 1630-1632 - thank you!]	Thank you for your comment. The analyses on SDGs and Aichi targets has been further developed for the SOD, including linkages to the CBD Biodiversity Strategy, see for example table 5.8
Rob J.J. Hendriks	Chapter 5	52	1546	52	1547	"This assessment provides the basis for assessing the ..." -> 'Wouldn't it be possible to actually perform the assessment rather than providing a basis for it?'	Thank you for your comment. We have rephrased this sentence now.
PESC-3	Chapter 5	52	1557	52	1557	Please check whether the CBD vision and maybe other biodiversity visions could be included in table 5.10	Thank you for your comment. The CBD strategic vision and its Aichi Targets are now further introduced in section 5.4.1. The analyses on SDGs and Aichi targets has been further developed for the SOD, including linkages for the CBD Biodiversity Strategy, see for example table 5.8
Tom West	Chapter 5	52	1563	53	1564	What are the names of these visions? Who wrote them and why? What qualifies them as 'visions'?	Thank you for your comment. Not all visions have a name and some visions are related to more than one reference. Therefore, we opted to indicate the reference. The criteria for inclusion in the review will be made more clear, in section 5.4.2
Zsolt Molnar	Chapter 5	53	1577	53	1577	It seem that not only politicians but also researchers miss to acknowledge and study ILK-type scenario-building. Unfortunately this is the case (the authors of the chapter made a thorough literature check) but this gap and its consequences should be made explicit in the text, also in the SPM.	Thank you for your comment. We have looked into the ILKP&ILKC topic in depth and conclude the following: Participatory scenario development is a powerful approach for knowledge co-production and has great potential for the explicit inclusion of ILKC and ILKP (established but incomplete) (5.4.3, 5.5.1, 5.5.2, 5.5.6). Many vision and pathways exercises include local stakeholders and their valuable knowledge and practices. However, the terms ILKC or ILKP were rarely explicitly mentioned making it difficult to assess whether the knowledge included meets the IPBES definition of ILKP. Based on the explicit examples found (see Boxes 5.7 and 5.10), which included ILKC and ILKP, innovative forms of agriculture combining ILKP with technological innovations, cultural diversity and the importance of maintaining ILKP norms and customary rights were highlighted to foster transformative capabilities and maintaining ecosystems qualities.
Tom West	Chapter 5	53	1580	53	1580	What is the 'goal of sustainable development'? Is it really understood in the same way by all the visions: sustainable development is a notoriously malleable concept.	Thank you for your comment. We have used the SDGs now and assessed in how far the visions are addressing the different SDGs. We found a great diversity of meanings in the definitions.
Sigrid Kusch	Chapter 5	54	1610	54	1615	This overview is very insightful and well done. In line 1614, related to SDG15 ('Life on Land') it should read "...were identified in 11 visions..." instead of "were identified in 14 visions".	Thank you. It was corrected.
Douglas Nakashima	Chapter 5	56	1661			Visions Helander 2004 (Finland - Sami people): (p304-305) "There is no doubt in my mind that traditional knowledge has a major part to play in the efforts to resolve the ongoing crisis as well in the further, sustainable development of modern economies. The Sami traditional livelihoods have always sought to live in harmony with the environment, to avoid upsetting the delicate balance of nature. In the Sami society, in tradition, knowledge brings obligations. The Sami concept of the environment consists of different components including - the natural environment - the cultural environment - the social environment and - the linguistic environment. All these environmental elements, such as ice conditions, cultural ways, what takes place in the society, language behaviour etc., respond to changes. These elements go together to make up a whole which must always be viewed as a single entity. If one of the elements changes, there will be necessarily changes in the other elements as well" (Helander 1993). Mustonen & Salin 2004. A hunter, elder, father, friend, a person of knowledge. Finland: (p??) Words of Aslak Ola Aikio, Sami hunter and elder, from Ohcejohka / Utsjoki Sami community, Northern Finland "I reproach people for they have become estranged from the nature, they don't understand it! In the old times when living depended on having reserves in nature, then it was well taken care of. Not too many fish were caught for example. With the modern civilization it seems that the most important thing is to get tourists here and they need to fish. With hunting it is the same. It is only for fun now; there is no other reason. I don't understand if all the people did as they are speaking, I don't know where that would take us. I think it would lead to catastrophe. Nature can not be exploited. The natural populations are of course tough, they will survive, there is always some reserve. If human being was so stupid to have eaten itself out of food in the last century, I'm sure there would not be one single person here anymore."	Thank you very much for this very interesting material. Since we are already having a box dealing in depth with Sami (Box 5.7) we were not 100% sure how to include your comment.
Douglas Nakashima	Chapter 5	56	1661			Nieminen et al. 2004 (Faroe islands, Denmark): (p248) "The future... I hope we can take the whale, I also hope that the people outside look after us so we do it in human way, always, it's important. What I also hope is the people outside Faroe islands, they will understand that we need it, it's important for us. It's not only for whale it's for everything which is living in this world. You have to take care of everything. It's the same with fish. As we say in the Faroe Islands: everybody can't go out fishing, it will take five six years, -no more fish. So, I think we have learned it. If we do not have fish we cannot live on these islands. I think we will take care of this. I am sure about it." [Danjal Adreasen]	Thank you very much for this comment. We found that several groups of people making use of different renewable natural resources: RNR (fishing, whaling, hunting, agriculture, forestry) could be identified throughout Europe and central Asia. However, only the Sami example in Box 5.7 presents a vision based on broad stakeholder involvement (Sami parliament). No other visions from other groups have been identified. Hence, we were not sure on how to include your suggestion.
Tom West	Chapter 5	57	1686	57	1696	We need to know the connotation of the comparison between Aichi/SDG and visions. Can we rely on the SDG/Aichi as representative of the direction society as whole wants to head, or is there something important they don't capture?	Thank you for your comment. The text discusses how visions capture SDGs and Aichi targets and how they can promote synergies when pursuing these goals. However, because several of the visions were developed considering SDGs (or MDGs) and Aichi targets, it won't be possible, or logical, to assess if SDGs/Aichi are representative of the overall visions in society. We assume they are representative, since they were developed/adopted by the CBD parties and the UN.

Sigrid Kusch	Chapter 5	58	1700	59	1770	This subchapter addresses bioeconomy visions. As a general comment, the bioeconomy could be addressed in more detail throughout the whole chapter 5, and including in this sub-chapter 5.4.4. One reference that might be useful in this context is the scenario-based evaluation of the European bioeconomy published in 2016 by the European Commission ("Drivers of the European Bioeconomy in Transition (BioEconomy2030)", available online https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/drivers-european-bioeconomy-transition-bioeconomy2030-exploratory-model-based-assessment)	Thank you for the suggestion. The reference you have mentioned in now included in section 5.2 on the review of exploratory scenarios. We have dealt now with the topic across sections, however since the literature is often referring to the concept of green economy, you will find this term to be used more often throughout the paper. An exception is box 5.9, where we address the topic more specifically.
Tom West	Chapter 5	58	1700	59	1763	It's not entirely clear why 'bioeconomy' receives such a high level of focus here. It's not clear that it's a particularly useful term, nor is it clear that it is particularly relevant to IPBES, given that where bioeconomy visions addressed environmental issues, this was mostly done "not in relation to the state of biodiversity and ecosystem services" (1732) and that "we could not identify the Aichi targets in any of the visions on bioeconomy" (1753). This would seem to suggest that if the bioeconomy is to be discussed, it is to be with caution for the potential negative impacts on biodiversity and ecosystem services through bioeconomy's apparent focus on provisioning services.	Thank you for your comment. We have now added the following justification: In the scoping document for this chapter, a special request was included to "consider issues that include increasing demand for biological raw materials in a bioeconomy context (bioenergy, fibres and organic matter), and water availability." However, we have revised and shortened this section into a box 5.9 now.
PESC-3	Chapter 5	58	1701	58	1705	chapter on bioeconomy (see also comment on according executive summary paragraph): we think that it should be carefully evaluated whether the European Commission's as a political definition of bioeconomy is adequate to be used here - e.g. the following sentence from Hagemann is better as it opens the definition. For example, check for the OECD definition	Thank you for your comment. We have now revised the text to include the following definitions: "A number of definitions exist for the bioeconomy, e.g. the OECD "refers to the set of economic activities relating to the invention, development, production and use of biological products and processes." The European Commission [EC, 2012] (p. 3) defines bioeconomy as "the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy. Its sectors and industries have strong innovation potential due to their use of science, enabling and industrial technologies, along with local and tacit knowledge". The underlying intention is, however, similar namely the substitution of fossil resources and to close material cycles in industrial processes by using renewable resources such as plant materials like wood, agricultural crops, animal by-products and waste (Hagemann, Gawel, Purkus, Pannicke, & Hauck, 2016)."
Germany	Chapter 5	58	1701	59	1770	We welcome the focus on Bioeconomy in this chapter. This has already been outlined in the scoping document. Still, it appears a bit unlinked to the rest of the chapter, therefore a short introduction and explanation of this focus would be advisable.	Thank you for the suggestion. We have dealt now with the topic across sections, however since the literature is often referring to the concept of green economy, you will find this term to be used more often throughout the chapter. An exception is box 5.9, where we address the topic more specifically.
Germany	Chapter 5	58	1738	58	1740	To be clarified: The sentence relate the analyzed papers to the SDGs but the papers were published before the SDGs. Indeed some of the papers relate indirectly to topics focused by the SDGs.	Thank you for your comment. We have now clarified, that most of the papers do not include a direct reference to the SDGs.
Gunay Erpul	Chapter 5	59	1748	59	1748	"Land and soil degradation" (SDG 15)	Thanks!
Germany	Chapter 5	59	1769	59	1770	We strongly encourage the assessment of the feasibility of the visions through a comparison with the results of the integrated models- this would be a very helpful outcome of this chapter for policy-makers.	Thank you for your comment. Our analysis shows, that the feasibility of the visions is best assessed by looking at the pathways to achieve them, as there the trade-offs become much more obvious. We have been connecting the results of the different sections of the chapters respectively, but more work needs to be done still.
Guy Pe'er	Chapter 5	59	1772			Section 5.5: Some thoughts on this section: pathways for sustainability could (should?) include concepts such as sustainable intensification (which should be examined carefully given the lack of evidence that it can actually be achieved without just "intensification"), as well as bottom-up processes such as community-based conservation (developing and utilizing ILK) and market-based developments (increased demand for healthy food could meet also the need for "environmentally-friendly / sustainable" food).	Thank you very much for these suggestions. We have included these notions now in our pathways narratives, e.g. 5.5.2
Tom West	Chapter 5	59	1772	59	1772	Again, the restriction to 'sustainable development' does not seem justified.	Thank you for your comment. The focus on "sustainability" results from the scoping documents, where we were asked to assess key issues concerning sustainable development and possible pathways towards sustainable development.
PESC-3	Chapter 5	59	1772			pathways chapter should check the work in EEA on "late lessons and early warnings": http://www.eea.europa.eu/publications/late-lessons-2/at_download/file	Thank you very much for this very interesting material. We have looked at it, but due to our review criteria, the study was not considered to be included in our in-depth review.
Tom West	Chapter 5	59	1777	60	1787	It would be useful to have an (abridged) example of a pathway to help understand what is being referred to - could go in a box?	Thank you for your comment. We hope that by providing the pathways narratives in 5.5.2, the idea of pathways now becomes more clear. In addition Boxes 5.7 and 5.8 provide two specific examples for Spain and Romania respectively.
Tom West	Chapter 5	60	1791	60	1793	Backcasting needs defining - and the relationship with the scenarios needs more explanation too.	Thank you for your comment. We have now explained this in 5.5.4, but since we were asked to not include too much technical/methodological detail, the text remains brief.
Tom West	Chapter 5	67	1979	70	1986	The fourth column of these tables (Biodiversity and ecosystem service related actions) should be what the entire section is about. The whole point of discussing these pathways must be to see how they will affect biodiversity and ecosystem services.	Thank you for your comment. This section has now been totally revised. The tables are no longer current and actions relating to BD and ES are described in the text as well as in Appendix 5.5.2
Tom West	Chapter 5	70	1988	71	2012	These trade-offs and synergies between ecosystem services is something worth talking about. A tangible example of each would be good, discussing how different pathways would focus on different ecosystem services and why, and also how it is often possible to improve ecosystem functioning and hence many ecosystem services, as identified by a particular pathway.	Thank you for your comment. Different pathways don't focus on specific ES. Rather we have identified the main trade-offs which pathways (and visions) focus on, and identified resulting pathways in ES/BD. A new paragraph is also added highlighting critical trade-offs resulting from the pathways (see 5.5.3 & 5.5.4)
Germany	Chapter 5	72	2020			Table 5.20 Please ensure a consistent categorization of ecosystem services across all chapters and across all regional assessments. This is a crucial precondition for the global assessment.	Thank you for your comment. We have tried as much as we could to adapt to the new concept of NCPs, but it is not always possible to be consistent as the literature is inconsistent as well.
Germany	Chapter 5	74	2026	74	2030	Having read the chapter, it seems very technical. How the links look like (...) "establish links between the influence of indirect drivers ... on direct drivers and in turn assess the effects of changes in direct drivers on nature..." - as is the stated goal of the chapter - is not easy to grasp after having read the - still incomplete- FOD. We would encourage the authors to make the evidence they found in order to answer the overall goal of chapter 5 more explicit and easier to understand for readers	Thank you for your comment. We have now completely revised section 5.5, removed much of the technical and descriptive parts of the text and tried to use an accessible language
Rob J.J. Hendriks	Chapter 5	74	2031	74	2034	Long sentence, which makes it more difficult to grasp the message.	Thank you for your comment. The conclusions have been completely rewritten now.
Tom West	Chapter 5	74	2066	74	2067	This is the problem with using the term 'sustainable' - there is not one thing it means, with the consequent risk that it doesn't really mean anything.	Thank you for your comment. The text, on which this comment is based has been removed.
Tom West	Chapter 5	76	2120	76	2123	There needs to be a reference to intrinsic value here and how it pieces into IPBES' conception of integrated valuation.	Thank you for your comment. The text, on which this comment is based has been removed.
Tom West	Chapter 5	76	2134	76	2135	This (less focus on marine ecosystems) is an important finding, but was not treated in any detail in the main body.	Thank you for your comment. In spite of a thorough search including grey literature we have not been successful in identifying more marine pathway studies - even when relaxing selection criteria. However, we introduce a marine vision now in 5.8.
Rob J.J. Hendriks	Chapter 5	76	2139	76	2143	Split this sentence for clarity? As it is written now, it's difficult to tell which elements are analysed in many pathways studies and which elements were largely absent.	Thank you for your comment. The conclusions have been completely rewritten now.
Zsolt Molnar	Chapter 5	76	2154	76	2154	The definition of ILK in IPBES is not narrow but I accept that citizen science and knowledge of modern farmers is important, though not ILK. Art is also missing, this would also be an important knowledge system useful for IPBES... Delete "23".	Thank you for your comment. We now conclude concerning ILK&ILKC: Participatory scenario development is a powerful approach for knowledge co-production and has great potential for the explicit inclusion of ILK and ILKP (established but incomplete) (5.4.3, 5.5.1, 5.5.2, 5.5.6). Many vision and pathways exercises include local stakeholders and their valuable knowledge and practices. However, the terms ILK or ILKP were rarely explicitly mentioned making it difficult to assess whether the knowledge included meets the IPBES definition of ILKP (5.6.3). Based on the explicit examples found which included ILK and ILKP (see Boxes 5.7, 5.10 and 5.11), innovative forms of agriculture combining ILKP with technological innovations, cultural diversity and the importance of maintaining ILKP norms and customary rights were highlighted as fostering transformative capabilities and maintaining ecosystem qualities (5.5.2, 5.5.6).
Allan Watt	Chapter 5	94	2924			Delete "23".	Thanks