Reviewer ID	Chapter	Section	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	Author response
Alejandro Parra-Hinojosa	2	ES	5	13	5	13	More than fertilisers, agrochemicals like insecticides are in fact the threat to the pollinators. Must be clarified.	The pesticide point is throughly dealt with in two separate key finding statements in the ES
Alejandro Parra-Hinojosa	2	Intro	11	175	11	176	Hence, it has been practically mentioned all kind of bees. Omit then what is in parentheses.	Herewith we want to make explicit, that we deal with the entire spectrum (which might not be clear otherwise to non-specialist readers)
Alejandro Parra-Hinojosa	2	Land management	21	511	21	511	Include a reference	Done.
Alejandro Parra-Hinojosa	2	Land management	24	585	24	586	Define "visit" in terms of time.	changed to bout
Alejandro Parra-Hinojosa	2	Land management	25	638	25	640	Here, then has to be considered (as another example) the coffee variety cultivated, since there are significant differences between coffee for agroforestry and coffe for open areas.	Certainly, for a reference is missing.
Alejandro Parra-Hinojosa	2	Land management	26	648	26	648	Omit "logged"	Deleted sentence.
Alejandro Parra-Hinojosa	2	Land management	26	648	26	652	Rewrite this paragraph, the use of the term "logged" - "logging" appears repetitive	Logged is deleted.
Alejandro Parra-Hinojosa	2	Land management	27	698	28	713	Has been use the term "per annun" but later is used "tons/yr"; Should homogenized the expression.	Changed to "per year".
Alejandro Parra-Hinojosa	2	Land management	29	760	29	765	In the andean region the grazing is one of the most evident process of land transformation.	Thank you for your note.
Alejandro Parra-Hinojosa	2	Land management	32	857	32	857	Consider another word instead "extirpating"	Changed to eliminating.
Alejandro Parra-Hinojosa	2	Land management	32	860	32	860	There is a problem to be considered as example and related with burning in indigenous lands, since is in this case is a cultural practice too.	Thank you for the suggestion, but to incorporate this aspect recommendation on a peer-reviewed paper would be needed to cite.

Alejandro Parra-Hinojosa	2	Land management	35	934	35	934	Increased with increasing seems redundant	Revised.
Alejandro Parra-Hinojosa	2	Land management	36	992	36	993	Explain what "citizen science data" means.	This study has now been described in more detail and explains how data were collected.
Alejandro Parra-Hinojosa	2	Land management	37	1015	37	1016	Hence, there is a redundancy since diversity is a measure of richness and abundance.	Richness is deleted.
Alejandro Parra-Hinojosa	2	Land management	38	1054	38	1054	There is an extra space between "and" and " ,"	Deleted.
Alejandro Parra-Hinojosa	2	Pesticides	40	1121	40	1121	It will be better to refer as "purchasing capacity" instead "purchasing power"	amended
Alejandro Parra-Hinojosa	2	Pesticides	44	1249	44	1250	So repetitive: "assessment", "assessing" and "assessment" again in a single sentence.	amended
Alejandro Parra-Hinojosa	2	Pesticides	49	1404	49	1407	Some references about the effect of neonicotinoids (related to seed blindage): doi:10.1371/journal.pone.0029268, doi: 10.1016/j.neuint.2012.09.020 and 10.1371/journal.pone.0030023	these citations are not related to the econmic benefits
Alejandro Parra-Hinojosa	2	Pesticides	63	1826	63	1826	Detail "hive matizes"	added
Alejandro Parra-Hinojosa	2	Pesticides	67	1960	67	1961	Once the acronym is used, is not necessary to explicit it again.	amended
Alejandro Parra-Hinojosa	2	Diseases	73	2148	73	2148	Not only "domesticated"	corrected
Alejandro Parra-Hinojosa	2	Diseases	73	2163	73	2163	It seems that the behaviour of seed collecting by some Melipona is related to to the antibacterial properties of these seeds	Thank zou for this information, however defense mechanisms description was deleted and just the most important parts were moved into other subsections.

Alejandro Parra-Hinojosa	2	Diseases	74	2193	74	2193	"Saccharibacter" is a genus, then must be written in italic. On the other hand it´s a Gram-negative bacteria, then why to separate it from section 2.4.1.4.3...	corrected
Alejandro Parra-Hinojosa	2	Diseases	75	2208	75	2219	In a general manner, soliary bees´ nests die by establishment of generalist fungi when humidity is uncontrollable. See doi.org/10.1098/rspb.2015.0212	Yes, you are righ, that is absolutely true. However, we concentrated on other fungi related effects.
Alejandro Parra-Hinojosa	2	Bee management	76	2256	76	2258	Repetitive	did not modify as some redundency is acceptable
Alejandro Parra-Hinojosa	2	Bee management	77	2279	77	2279	It is inaccurate claim that propolis could represent a vector for diseases.	The statement is that bee products can move disease and while it is less likley with propolis it is still possible that propolis can contain AFB spores or other pathogens.
Alejandro Parra-Hinojosa	2	Bee management	77	2298	77	2298	Place an space between author and year in the Roubik & Wolda citation	Done
Alejandro Parra-Hinojosa	2	Invasives	90	2693	90	2693	Must take care with nomenclature	Two typos of scutella replaced with correct scutellata
Alejandro Parra-Hinojosa	2	Climate change	96	2878	96	2878	Check citation format	done
Alejandro Parra-Hinojosa	2	Multiple effects	109	3284	110	3336	It should be synthesized this issue more objectively for avoid repetition	we have done our best to ensure that the paragraphs do not become unduly repetituous, the separate paragraphs do however make distinct points (sometimes arising from peer review feedback) and so we have justification in maintaing the overall strucutre here. We hope you understand and thanks for your feedback.
Alejandro Parra-Hinojosa	2	Multiple effects	112	3376	112	3376	Globalization or globalisation?	US English now used

Anders Nielsen	2	Land use	12	209	12	209	Grazing can also halt scrub encroachment and facilitate diversity of flowering plants, e.g. by defining the treeline towards the alpine (Speed, J. D. M., G. Austrheim, A. J. Hester, and A. Mysterud. 2010. Experimental evidence for herbivore limitation of the treeline. Ecology 91:3414-3420) or by upholding flower diversity in grazinga areas that would otherwise be dominated by grasses and ultimately forested through succession (Sjødin, N. E., J. Bengtsson, and B. Ekbom. 2008. The influence of grazing intensity and landscape composition on the diversity and abundance of flower-visiting insects. Journal of Applied Ecology 45:763-772. and Vulliamy, B., S. G. Potts, and P. G. Willmer. 2006. The effects of cattle grazing on plant-pollinator communities in a fragmented Mediterranean landscape. Oikos 114:529-543.). See also page 29, line 760-762 and page 30, line 786-787 and page 38, line1058-1062	Following this, and as this is discussed more thoroughly later in the chapter (section on pastures and rangelands), we warn the reader about these points and refer to that section.
Anders Nielsen	2	Land management	20	466	20	466	Land management such as agricultural and conservation practices have a…	Done.
Anders Nielsen	2	Land management	20	477	20	477	… within-field wild plants, crops…	Done.
Anders Nielsen	2	Land management	21	489	21	491	Rephrase sentense	Done.
Anders Nielsen	2	Land management	21	491	21	491	This pattern was most apparent in Mediterranean and teperate regions…	Rephrased acc. to comment 267.
Anders Nielsen	2	Land management	21	493	21	494	… pollinator community composition and pollinator trait diversity, which can be important for…	Revised sentence acc. to comment 271.
Anders Nielsen	2	Land management	21	501	21	501	…conventional fields plants receiving insufficient pollination dominated, presumably due to pollinator deficit (Gabr..).	We deleted this part of the sentence.

Anders Nielsen	2	Land management	21	510	21	511	Rephrase sentense	Done.
Anders Nielsen	2	Land management	22	528	22	532	Move this to section 2.2.2.1.2?	We would rather keep it there,as it fits to the management system effects.
Anders Nielsen	2	Land management	22	539	22	539	Does "it" refer to "polyculture systems"?	Yes, revised.
Anders Nielsen	2	Land management	22	544	22	545	...the next floral season. Of what?	…of maize. Added.
Anders Nielsen	2	Land management	22	549	22	549	… on insect pollination world wide.	The sentence was deleted to avoid repetation through the assesment.
Anders Nielsen	2	Land management	23	558	23	560	Odd sentence	Revised sentence.
Anders Nielsen	2	Land management	23	569	23	569	…2009), but also for crop yield.	Added.
Anders Nielsen	2	Land management	23	576	23	577	Wild flowers left in crop fields…	Done.
Anders Nielsen	2	Land management	24	587	24	587	Mass flowering crops receive…	Done.
Anders Nielsen	2	Land management	24	593	24	594	Rephrase last part of sentense	Revised.
Anders Nielsen	2	Land management	24	594	24	603	… mass flowering…	Corrected.
Anders Nielsen	2	Land management	25	628	25	640	Ricketts (2004) - parentheses around year published not the entire reference	Done

Anders Nielsen	2	Land management	26	664	27	688	It might be worth noting that different forests are adapted to different disturbance regimes. For example the boreal forest are (at least historically) adapted to intense fires with subsequent regrowth of the vegetation. Logging will in that sense to a certain degree resemble a more "natural" disturbance process. This might not be the case in e.g. tropical forests. It also matters what becomes of the logged forest; regenerated forest containing a relatively similar tree species composition or oilpalm fields or sitka spruce plantations will have obivious differences in impact.	Details on boreal forests are included.
Anders Nielsen	2	Land management	29	757	29	757	…ecosystems through selective vegetation consumption…	Done.
Anders Nielsen	2	Land management	29	758	29	758	These alterations affect plant production and the amount of floral and nesting resources available…	Done.
Anders Nielsen	2	Land management	29	767	29	767	Find a better wording than "the flower-pollinator mutual structure"	Mutual structure is changed to "network".
Anders Nielsen	2	Land management	32	843	32	844	… as are ground-nesting bee species…	Done.
Anders Nielsen	2	Land management	35	959	35	963	What did Baldock et al. (2015) and Deguines et al. (2012) find? Se line 975	We have added a summary of findings for both studies.
Anders Nielsen	2	Land management	37	1004	37	1006	"The pollinator corridor" established in Oslo, Norway could be mentioned as a management effort to increase the available amount of nesting and floral resources throughout the city (pollinatorpasasjen.no/intro) In Norwegian though (http://www.theguardian.com/environment/2015/jun/25/oslo-creates-worlds-first-highway-to-protect-endangered-bees)	There are many initiatives such as this in many countries, including the B-Lines projects in the UK. However to our knowledge none of these initiatives have published scientific studies showing that these activities are beneficial for pollinating insects. We are not sure that mentioning these initiatives falls within the remit of the IPBES report and so have not added any further text.

Anders Nielsen	2	Land management	37	1015	37	1016	Use either "richness" or "diversity"	Richness is deleted.
Anders Nielsen	2	Climate change	93	2786	93	2786	Hegland et al. (2009) could be added to the reference by Memmott	done
Anders Nielsen	2	Climate change	98	2959	98	2959	Include reference to Memmott et al. (2007)	done
Anders Nielsen	2	Climate change	99	2978	99	2981	Jeff Ollerton and colleagues did an experiment where they removed all floewers of the most visited species to se what the pollinators did. They showed clearly that the pollinators switched to the second most visited plant species. I saw this at a conference and I have not been able to find a good reference so it might not be published yet. If found it might be included in the discussion here.	We have checked and asked the reviewer directly; unfortunately there is only recent conference contribution which can't be included because of the deadline (and which also is not really a citable publication)
Anders Nielsen	2	Climate change	102	3088	103	3097	I find this paragraph a bit odd. Should be rephrased	We tried to rephrase this
Anders Nielsen	2	Climate change	103	3101	103	3101	Define "services"	We added: "(like pollination)"
Anders Nielsen	2	Multiple effects	106	3192	106	3192	Something strange in the sentense here	Now reads: Changes in land-use or climate, intensive agricultural management and pesticide use, invasive alien species and pathogens affect as well as directly affecting pollinator health, abundance, diversity and pollination services (Sections 2.2-2.6). Moreover these multiple direct drivers also have the potential to combine, synergistically or additively, in their effects leading to an overall increase in the pressure on pollinators and pollination (González-Varo et al., 2013; Goulson et al., 2015; Vanbergen and the Insect Pollinators Initiative, 2013).
Andreas Kruess	2	Land management	29	774	29	775	The cited study (Kruess and Tscharntke 2002) was carried out in northern Germany not around the Mediterranean	Corrected.

Andreas Kruess	2	Invasives	85	2533	85	2535	It would help for clarification to give precisely the definitions as given in the cited publication because <outside of the natural range> is important and also the focus on <threatining biodiversity>: “Alien invasive species” means an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity. “Alien species” (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce	We have added the suggested text to be precise, edited slightly for flow and readability
Andreas Kruess	2	Climate change	101	3036	101	3038	A remark to the note: In general it is to be expected that availability of suitable habitats and requisites will be of greater importance than the potential of individual/species climate adaptation	We agree, but this is true for both groups considered here and thus we don not highlight this here
Andrew Lewis	2	Diseases	74	2245	78	2313	This section might be improved by discussing efforts being made to improve the efficiency of use of honey bees as pollinators by optimizing intra-orchard hive location. Http://www.beeswax.me.uk http://almopol.com/	added new text on line 2309 with reference
Andrew Lewis	2	Bee management	84	2510	84	2524	There should be an upbeat addition to the conclusion to the effect that work into optimization of intra-orchard beehive location may bring beneficial results to counter the difficulties face by losses of popolations of species through disease etc. Http://www.beeswax.me.uk http://almopol.com/	thank you for this comment, however, here we are dealing with the effect bee managment has on pollinator decline, not how it is solving wild pollinator losses.

Athayde Tonhasca,	2	ES	6	34	6	35	to say that "lethality increases with inappropriate use" is a truism	OK, but it is an important point to make clear in this context of this global assessment, for example where regulation of education is limiting, negative environmentla impact may be worse.
Athayde Tonhasca,	2	Land use	13	250	13	257	data indicate that butterflies have no relevance as pollinators in the UK; this segment suggests otherwise.	We do not understand what the reviewer means when saying that butterflies have "no relevance as pollinators". Butterflies are efficient pollinators, which are in many cases associated with their host plants in very specialized ways (see for example Chapter 1). The data reviewed in Potts et al, 2010 shows that butterflies have already started to show decline, and further, that probably the data related to butterflis is the best data we have to now on this topic. The fact that one of the studies done in the UK (Biesmeijer et al, 2006) and mentioned in Potts et al (2010) does not include butterflies, but only bees and hoverflies, does not mean that butterflies play no role in pollination. For these reasons, we have decided to maintain the sentence as it initially appeared.
Athayde Tonhasca,	2	Pesticides	50	1448	50	1448	Suggested addition to the table: Moffat et al 2015 (Chronic exposure to neonicotinoids increases neuronal vulnerability to mitochondrial dysfunction in the bumblebee (Bombus terrestris)) have shown that miniscule volumes of neocots accumulate in B. terrestris brains and deficits in colony growth.	Added
Canadian Governmen t	2	GMO	57	1654			It should be noted that GMOs may contain one or more introduced transgenes	done

Carolina Morales	2	Diseases	67	1988	67	1988	Reference to add: Goulson D, Nicholls E, Botías C, Rotheray EL (2015) Bee declines driven by combined stress from parasites , pesticides , and lack of flowers. 2010:1–16.	added Goulson et al. 2015
Carolina Morales	2	Diseases	68	1992	68	1992	In Table 2.4.1, In the line Israeli acute paralysis virus (IAPV), please add Bombus spp. as another reported host, source: Goulson D, Hughes WOH (2015) Mitigating the anthropogenic spread of bee parasites to protect wild pollinators. Biol Conserv 191:10–19. doi: 10.1016/j.biocon.2015.06.023 and references therein	added Bombus and reference to Table
Carolina Morales	2	Diseases	68	1992	68	1992	In Table 2.4.1, In the line Lake Sinai Virus (LSV) add Bombus spp. as a reported host, source: Gamboa V, Ravoet J, Brunain M, et al (2015) Bee pathogens found in Bombus atratus from Colombia: A case study. J Invertebr Pathol. doi: 10.1016/j.jip.2015.05.013 (in press)	added Bombus and reference to Table
Carolina Morales	2	Diseases	68	1992	68	1992	In Table 2.4.1, In the line Sacbrood virus（SBV), please add Bombus spp. as another reported host, source: Goulson D, Hughes WOH (2015) Mitigating the anthropogenic spread of bee parasites to protect wild pollinators. Biol Conserv 191:10–19. doi: 10.1016/j.biocon.2015.06.023 and references therein	done
Carolina Morales	2	Diseases	68	1992	68	1992	In Table 2.4.1, In the line Apicystis (=Mattesia)bombi, add Apis mellifera as another reported host. Source: the references 19 quoted in the same line	done
Carolina Morales	2	Diseases	69	2030	69	2031	I would add "geographical" in: "The wide host and geographical range" because the spatial extent is also of epidemiological relevance	Done
Carolina Morales	2	Diseases	71	2101	71	2101	Here the paragraph turns from Crithidia bombi to another different Protoza, Apicystis bombi, hence please start the Sentence with the complete species name: Apicystis bombi (Liu, MacFarlane y Pengelly; Neogregarinida: Ophrocystidae)	We refer actually to C. bombi, not A. bombi, as erroneously typed, thanks for highligting. Next sentence fixed accordingly.

Carolina Morales	2	Diseases	71	2102	71	2102	Reference to add after Otterstater et al. 2005: Gamboa V, Ravoet J, Brunain M, et al (2015) Bee pathogens found in Bombus atratus from Colombia: A case study. J Invertebr Pathol. doi: 10.1016/j.jip.2015.05.013. in press	It is not clear that this reference is adding to our text.
Carolina Morales	2	Diseases	71	2111	72	2115	Not clear whether those effect demostrated for C. bombi and N. bombi have also been demostrated for Locustacarus or inferred from extensive spread whithin host colonies	True. Corrected.
Carolina Morales	2	Diseases	72	2118	72	2120	However, in colonial bees where the queen is the only egg-laying female, diseases that affect queens may have strong population consequences	Corrected accordingly
Carolina Morales	2	Bee management	77	2280	77	2282	honeybee pollen used to feed managed bumblebee hives can also spread bee diseases (Graystock et al. 2013 quoted in this chapter)	added reference to bee pollen and bumblebee disease spread
Carolina Morales	2	Bee management	77	2296	77	2298	The following two papers, "Thomson, D. (2004). Competitive interactions between the invasive European honey bee and native bumble bees. Ecology, 85(2), 458-470" and "Thomson, D. M. (2006). Detecting the effects of introduced species: a case study of competition between Apis and Bombus. Oikos, 114(3), 407-418" provide strong evidence based on a comprehensive experimental study that Apis competitively suppresses a native social bee (Bombus occidentalis), through changes in colony foraging behaviour (lower mean rates of forager return and a lower ratio of foraging trips for pollen relative to nectar) that translated into reduced male and female reproductive success	added two Thompson references to support competition argument

Carolina Morales	2	Bee management	78	2320	78	2321	considering that >230 Bombus species are known worldwide, a third less explored kind of risk is the reproductive interference due to interspecific mating between introduced and native bumblebee species, see: Kanbe Y., Okada I., Yoneda M., Goka K., Tsuchida K. (2008) Interspecific mating of the introduced bumblebee Bombus terrestris and the native Japanese bumblebee Bombus hypocrita sapporoensis results in inviable hybrids, Naturwissenschaften, 95, 1003–1008.	Added
Carolina Morales	2	Bee management	78	2332	78	2332	Recent relevant citation where an uptodate list of bumbleebee pathogens reported in the literature is provided: Goulson D, Hughes WOH (2015) Mitigating the anthropogenic spread of bee parasites to protect wild pollinators. Biol Conserv 191:10–19. doi: 10.1016/j.biocon.2015.06.023	The list has also been built in section 2.4.1.2
Carolina Morales	2	Bee management	81	2403	81	2408	Although hybridization has been only demostrated at the intraspecific level, interspecific mating can lead to reproductive failure, even if no hybrid descendence is produced (see coment above in this spreadsheet)	True. Modified accordingly.

Carolina Morales	2	Bee management	81	2411	81	2411	In Table 2.4.2, For the line "Bombus terrestris dalmatinus (Europe 1997, Asia 1992, South America 1998)", add under the column "Negative effects on wild pollinators": displacement of native bumblebee (HIGH CONFIDENCE) due to a potential combination of competition for resources and pathogen spillover, sources: Morales CL, Arbetman MP, Cameron SA, Aizen MA (2013) Rapid ecological replacement of a native bumble bee by invasive species. Front Ecol Environ 11:529–534. doi: 10.1890/120321; Schmid-Hempel R, Eckhardt M, Goulson D, et al (2013) The invasion of southern South America by imported bumblebees and associated parasites. J Anim Ecol. doi: 10.1111/1365-2656.12185; Arbetman MP, Meeus I, Morales CL, et al (2013) Alien parasite hitchhikes to Patagonia on invasive bumblebee. Biol Invasions 15:489–494. doi: 10.1007/s10530-012-0311-0	Added.
Carolina Morales	2	Bee management	81	2424	81	2428	Poverty alleviation is not the only and probably not the main reason for Meliponiculture to persist. This traditional use of native melipon bees in the Americas comes from the prehispanic times and hence, has a strong cultural value in many cultures and peoples. Source: Guzman M y Vandame R . (2015). Manejo de las abejas sin aguijón en Mesoamérica. 77pg. Jalisco, Mexico.	this paragraph was deleted as some of the information was doubling after correcting the section according to the reviewrs suggestion
Carolina Morales	2	Bee management	83	2481	23	2481	Megachile rotundata also introduced to South America, source: Ruz, L. (2002). Bee pollinators introduced to Chile: a review. Pollinating Bees. The conservation link between agriculture and Nature, Ministry of Environment, Brasil, 155-167	corrected, thank you for this information
Carolina Morales	2	Bee management		2248		2252	See "Aizen, M.A. & L.D. Harder (2009) The global stock of domesticated honey bees is growing slower than agricultural demand for pollination. Current Biology 19: 915-918" for global trends on number of honeybee hives and disussion of potential drivers	added

Chiara Polce	2	Land use	12	216	12	216	and at the global scale' is redundant	The use of "most continents' and 'global scale' is not redundant, since there are continents where that trend is not present, although the increase in croplands is indeed the global trend. The sentence has been reorganized to reflect this.
Chiara Polce	2	Land use	12	231	12	232	In relation to the claim that most studies have focused on bees (line 231), it is not clear from the next sentence what the authors consider as 'pollinators', and therefore if their review will be limited to 'bees' or will also expand to non-bees pollinators (albeit available evidence might be scarce).	This has been now clarified.
Chiara Polce	2	Land use	13	245	13	245	Why 'Instead of leading to habitat loss'? Consider using 'In addition to habitat loss'	See point 146
Chiara Polce	2	Land use	13	262	13	262	Why is 'vitality' within ""? Can it be better defined? (e.g., colony strength, if this is its meaning, or…?). 'Vitality of bees': can 'bees' be replaced by a more specific definition, if, for instance, it refers only to honeybees?	This is the wording used in the initial anthropological investigation. The mention "[sic]' has been now added to clarify this.
Chiara Polce	2	Land use	16	341	16	341	Add a word after 'these' --> affected by these…??	see comment 207.
Chiara Polce	2	Land use	17	377	17	378	Replace 'decreases' with 'decrease', replace 'it negatively affects' with 'they negatively affect. In both cases, the subjects are 'habitat fragmentation and patch size'	done
Chiara Polce	2	Land management	21	494	21	494	A full stop is missing before 'Increased numbers'.	Done.
Chiara Polce	2	Land management	25	627	25	627	Move citation before th efull stop.	Done
Chiara Polce	2	Land management	25	628	25	632	Edit citations so that, when relevant, authors are moved outside the brackets.	Done
Chiara Polce	2	Land management	27	701	27	701	Replace 'benefitial' with 'beneficial'	Done.

Chiara Polce	2	Land management	30	789	30	780	Missing reference at the end of the sentence	Added.
Chiara Polce	2	Land management	32	865	32	865	Insert something like 'Some studies, however', at the beginning of this sentence, since it provides a contrasting evidence to what stated before.	Done.
Chiara Polce	2	Land management	33	897	33	897	Misspelt reference (Garrat --> Garratt)	Corrected.
Chiara Polce	2	Land management	34	925	34	925	Replace 'within for example in cherry and almonds', with ', for example, within cherry and almond orchards'	Done.
Chiara Polce	2	Land management	34	929	34	929	distance in' should probably be 'distance at'	Changed.
Chiara Polce	2	Bee management	77	2289	77	2289	Missing full stop after '2015)'	changed
Chiara Polce	2	Bee management	77	2299	77	2299	Remove second 'that', possibly replace it with 'then'	changed
Chiara Polce	2	Bee management	78	2303	78	2303	Insert a comma ',' between 'spread' and 'modern' --> 'spread, modern'	done
Chiara Polce	2	Bee management	78	2306	78	2306	Replace 'were' by 'where'	changed
Chiara Polce	2	Bee management	78	2307	78	2307	Insert space in 'useof' --> 'use of'	done
Chiara Polce	2	Bee management	78	2311	78	2311	and or be used' does not read well, consider replacing with 'and used to'	done
Chiara Polce	2	Bee management	78	2312	78	2312	Insert comma after 'Currently', remove semicolon after 'production'	done
Chiara Polce	2	Bee management	81	2403	81	2403	For consistency with the rest of the text, replace 'bumble bees' with 'bumblebees'	Done

Chiara Polce	2	Bee management	84	2502	84	2502	Insert 'they' between 'where' and 'started' --> 'where they started'	corrected
Chiara Polce	2	Bee management	84	2505	84	2505	Not clear to whom 'its impact' refers to (e.g. 'Disease spread'?)	corrected
Chiara Polce	2	Bee management	84	2506	84	2506	large aggregation size may pose a threat of spreading diseases': what does 'large aggregation size' mean? Consider replacing 'may pose a threat of spreading diseases' with 'may cause disease spread (or facilitate disease spread, or increase the risk of spreading diseases)'	corrected
Chiara Polce	2	Bee management	84	2514	84	2514	Insert comma between 'decline' and 'are' --> 'decline, are'	done
Chiara Polce	2	Bee management	84	2517	84	2518	Consider replacing 'in spite of the negative effects it has.' with 'in spite of its negative effects.'	done
Chiara Polce	2	Bee management	84	2518	84	2519	Re-organise the first part of this sentence: (e.g.) 'If pollinator-friendly habitates cannot be created, it is advisable to manage native rather than non-native bee species. …'	corrected
Chiara Polce	2	Bee management	84	2521	84	2522	Move 'are still scarce' to the end of the sentence --> 'Empirical studies on the impact…are still scarce'.	done
Chiara Polce	2	Bee management	84	2522	84	2524	Improve the flow of this sentence; e.g. 'Yet, to foresee and avoid the possible pitfalls of solitary and stingless bee management, we also have to keep in mind the negative impacts that bee management have had so far.'	corrected
Chiara Polce	2	Invasives	92	2748	92	2748	Remove 'therefore'	Altered sentence for readability
Chiara Polce	2	Invasives	92	2768	92	2768	Put 'less commonly' in between commas: ' and, less commonly, '	Done
Chiara Polce	2	Invasives	92	2770	92	2770	Move 'by altering the plant community' to the beginning of the sentence: --> 'By altering the plant community, introduced mammal herbivores can have profound effects on…'	Done

Chiara Polce	2	Climate change	93	2807	93	2807	What is the meaning of 'averaged geographical scales'?	We hve now changed this into: "..non-overlapping temporal and/or spatial time series and scales…" and hope this makes it clearer
Chiara Polce	2	Climate change	96	2873	96	2874	Replace 'The empirical evidence was found that' with "The empirical evidence showed that'	Sentence modified into: "There empirical evidence suggests that climate change over the last 120 years may have resulted in phenological shifts…"
Chiara Polce	2	Climate change	96	2877	96	2882	Consider re-order this sentence, to avoid breaking its flow, and adding some punctuation; e.g. 'With high confidence due to high agreement and medium evidence (Settele et al. 2004), an increased number of observational and experimental studies across many organisms suggest that climate change has contributed to the overall spring advancement observed especially in the Northner Hemisphere; additionally, there is some evidence that daily activity patterns may change with climate change (e.g. Rader et al. 2013). However, the effects of these shifts ...'.	thanks for this proposal, which we have partly adopted in combination with comment 858
Chiara Polce	2	Climate change	102	3066	102	3070	I am not sure that 'While' is well placed, in relation to the second part of this sentence ('Carvalheiro et al. show that'). Consider re-phrasing this sentence.	Sentence re-written and partly deleted
Chiara Polce	2	Climate change	102	3075	102	3075	Something is missing here: 'Climate change may contribute by modifying'…'Climate change may contribute TO SOMETHING, by modifying…'	Thanks, now we wrote: Climate change might modify….
Chiara Polce	2	Climate change	102	3076	102	3076	Remove comma after 'state'	done
Chiara Polce	2	Climate change	102	3088	102	3090	Consider reducing the use of 'mostly' and 'more' witin this sentence.	We tried to rephrase this
Chiara Polce	2	Climate change	103	3103	103	3103	Typo within the word 'communities'. Not clear the causality linking the difference part of this sentence: insect-pollinated crops, different pollinator communites and presence of pollination service. Consider re-phrasing the sentence making these links more explicit.	Re-phrased and deleted to a large extent

Chiara Polce	2	Climate change	103	3105	103	3105	What does 'this' at the beginning of the sentence refer to? ('More generally, this relates to climate change…')	Re-phrased and deleted to smeextent
Chiara Polce	2	Climate change	103	3106	103	3106	Replace 'can't' with 'cannot'	Done
Chiara Polce	2	Climate change	103	3115	103	3115	Remove 'of' between 'outside' and 'protected areas' --> 'outside protected areas'	Done
Chiara Polce	2	Climate change	103	3118	103	3119	Not clear the flow of this sentence: 'Climate hifts have resulted in vegetation types in th epast that have no current analog'	re-written
Chiara Polce	2	Climate change	103	3136	103	3140	Edit these two sentence to improve their style (e.g. moving the verbs, replacing 'as being overestimations' with 'being overstimated', etc.)	re-written
Chiara Polce	2	Climate change	105	3158	105	3158	Reaplce 'higher in altitude' with 'to higher altitudes'	Done
Chiara Polce	2	Climate change	105	3175	105	3175	Missing space 'landscapewill' --> 'landscape will'	thanks, done
Chiara Polce	2	Climate change	105	3183	105	3183	Missing space 'mountaintops" --> 'mountain tops'	Done
Chiara Polce	2	Multiple effects	106	3190	106	3194	Consider splitting and re-prasing this sentence: e.g. "Changes in land-use, …directly affect pollinator health, […]; moreover, they can potentially act synergistically, leading to…'	Now reads: Changes in land-use or climate, intensive agricultural management and pesticide use, invasive alien species and pathogens affect as well as directly affecting pollinator health, abundance, diversity and pollination services (Sections 2.2-2.6). Moreover these multiple direct drivers also have the potential to combine, synergistically or additively, in their effects leading to an overall increase in the pressure on pollinators and pollination (González-Varo et al., 2013; Goulson et al., 2015; Vanbergen and the Insect Pollinators Initiative, 2013).
Chiara Polce	2	Multiple effects	106	3213	106	3213	Consider finding a more appropriate word rather than 'precise' to describe 'combination' (e.g. exact, specific, etc.); it might also be left out without loosing the meaning: e.g. 'although their combination will vary…'	replaced with exact

Chiara Polce	2	Indirect effects	112	3386	112	3382	Insert references for cited figures (i.e. percentage of exploited Earth's terrestrial surface; projected net forest loss, etc)	We have rearranged the sequence of citations and tried to put it in more specifically
Chiara Polce	2	Indirect effects	112	3394	112	3394	more trade': check the use of 'more' in combination with 'trade'	Rephrased to be clearer: Food sovereignty may offer an alternative direction than ever increasing trade for feeding the world and reducing negative impacts on ecosystems (Moon 2011; Billen et al. 2015; Pirkle et al. 2015)
Chiara Polce	2	Indirect effects	112	3398	112	3398	Replace 'data is' with 'data are'	changed
Chiara Polce	2	Tables	Table 2.6.1				Complete table and define the meaning of the sub-heading columns witin the caption.	Table will be transferred into a figure (with pie charts)
Chiara Polce	2	Figures	Figure 2.3.4				Caption: remove '}' in 'applied } at high rate'	done
Chiara Polce	2	Figures	Figure 2.6.1				I would suggest keeping it within the chapter, after redrawing it (e.g. a legend illustrating the meaning of the different colors; defining AUC or removing it from the boxes - perhaps only recalling the original source for additional details; etc.)	We will try to come up with a much more appealing version including updates on the caption along your comment.
Chiara Polce	2	Figures	Figure 2.7.1				Arrows are all in black, while the caption describes 'yellow and red arrows'.	Colours were changed to black and white.
Chiara Polce	2	Figures	Figure 2.7.1				Replace 'Native plants crops' with 'Native plant crops' within the bottom picture.	corrected, should Native plants, crops
Chiara Polce	2	Tables	Table 2.5.1				Column 'Effect of invasive': what does '=' mean?	The equal symbols indicates a neutral or no effect. We have now added to the table legend: Effect of invasive alien: - negative impact, + positive effect or = neutral or no effect.
Chiara Polce	2	Tables	Table 2.7.1				First row ('Land-use') under the column 'Climate change': replacing 'affects' with 'affect' (the subject is 'Combined effects')	corrected
Chiara Polce	2	Tables	Table 2.7.1				Second but last row ('Diseases'), under column 'Invasive species': it is not clear to what 'and the spread of diseases' refers to, or what it should be connected to.	corrected
Chiara Polce	2	General	THROUGHOUT				Ensure consistency in citations (e.g. et al., vs. et al)	Will be done in a final step all across the assessment

Chiara Polce	2	General	THROUGHOUT				Ensure consistency in the use of 'honey bee' vs. 'honeybee', 'bumble bee' vs. 'bumblebee', 'land-use', vs. 'land use', etc.	Will be done in a final step all across the assessment
Chiara Polce	2	General	THROUGHOUT				Replace short forms by full forms: e.g. can't, aren't, that's, etc.	We hope to do so successfully all across the assessment
Chinese government	2	Pesticides	44	1243			Pesticides are not major factor for causing to decline of managed honeybee colonies in China.	no supporting reference provided so unfortunately information cannot be added
Chinese government	2	Invasives	90	2701			The introduction of the exotic honeybee, A. mellifera ligustica, in 1893, have considerable implications for an observed population decline of Asian honeybees （Li, et al., 2012)	We added: However in China, the distribution and population size of A. cerana in China has reduced by over 75% and 80%, respectively following the introduction of A. m. ligustica in 1896. Coupled with overall losses of food and nesting resources, direct competition with A. m. ligustica and inter-species transfer of pathogens (e.g. Sacbrood viruses) to A. cerana have been implicated in this decline (Guan_Huang, 2005; Ji et al., 2002)
Chinese government	2	Invasives	90	2704	90	2704	add: In China due to introduce of west honey bee, the native chinese bee(Apis cerana Fabricius)decline 75-80% in recent decades. (Yang,Guan-huang, Harm of introduceing the western honey bee Apis mellifera L.to the Chinese honeybee apis cerana F. and its ecological inpact.Conservation and Use of Chinese honeybee. p.234-245.)	We added: However in China, the distribution and population size of A. cerana in China has reduced by over 75% and 80%, respectively following the introduction of A. m. ligustica in 1896. Coupled with overall losses of food and nesting resources, direct competition with A. m. ligustica and inter-species transfer of pathogens (e.g. Sacbrood viruses) to A. cerana have been implicated in this decline (Guan_Huang, 2005; Ji et al., 2002)

Chinese government	2	Invasives	91	2737	91	2737	add before While: For example, oriental honey bee (Apis cerana F.)distributed in Asian country and is main pollinators of local plants. West honey bee Apis mellifera L. cann not instead of its ecological impact.(Yang,Guan-huang, Harm of introduceing the western honey bee Apis mellifera L.to the Chinese honeybee apis cerana F. and its ecological impact.Conservation and Use of Chinese honeybee. p.234-245.)	We have cited two Chinese example papers earlier in the section, highlighting the impact on A.cerana. However, we do not feel that these papers are the best examples of the point about plant fitness made in this sentence, so with due respect we decline to cite them here.
Cynthia Scott-Dupree	2	ES	7	67	7	67	bids should be birds	Text deleted and replaced with other content.
Cynthia Scott-Dupree	2	ES	9	120	9	120	should be "high-end"	Done
Cynthia Scott-Dupree	2	Land management	23	555	23	555	amount should be "amounts"	Done.
Cynthia Scott-Dupree	2	Land management	24	588	24	588	has "an" important effect	Done.
Cynthia Scott-Dupree	2	Land management	27	682	27	682	CO2 subscript the 2	Done.
Cynthia Scott-Dupree	2	Land management	27	701	27	701	"beneficial"	Done.
Cynthia Scott-Dupree	2	GMO	61	1787	62	1816	I suggest that the paper Flockhart et al 2014 Journal of Animal Ecology doi 10.1111/1365-2656.12253 be read and included in this Case Box discussion	done
Cynthia Scott-Dupree	2	Pesticides	63	1829	63	1829	There is more "anectdotal" evidence…..	it is not anectdotal as data exist
Cynthia Scott-Dupree	2	Pesticides	64	1889	64	1889	Here "honey bee" is 2 words but elsewhere in chapter its one word "honeybee", which is it and then be consistent	corrected

Cynthia Scott-Dupree	2	Pesticides	65	1905	65	1914	On line 1905 its bumblebee and on line 1914 its bumble bee. Again which is your choice then be consistent	corrected
Cynthia Scott-Dupree	2	Pesticides	66	1948	66	1948	("e.g." land-use……	added e.g.
Cynthia Scott-Dupree	2	Pesticides	67	1960	67	1960	delete (Genetically Modified Organisms)	amended
Cynthia Scott-Dupree	2	Pesticides	67	1961	67	1961	delete (Herbicide Tolerant)	amended
Cynthia Scott-Dupree	2	Diseases	68	2000	68	2000	define BQCV and Nosema needs to be italized; why isn't a species given for Nosema or refered to a Nosema sp.; finally add comma after (Doublet et al 2015)	Done
Cynthia Scott-Dupree	2	Diseases	69	2029	69	2029	N. should be Nosema; always in full at beginning of sentence	corrected
Cynthia Scott-Dupree	2	Diseases	69	2032	69	2033	several Genus species given in this sentence that need to be italized	corrected
Cynthia Scott-Dupree	2	Diseases	70	2050	70	2050	pest should be "pests"	changed to pests
Cynthia Scott-Dupree	2	Diseases	70	2053	70	2053	I think this title should be BB Pests and Pathogens; parasites have a specific definition and nothing contained in this paragraph has anything to do with parasites; someone needs to think about what a parasite, predator, pathogen etc. are because in this section and all the sections that follow on stingless bees this is very confusing and unprofessional	We have actually homogenized the titles of all subsections "parasites and pathogens", considering the definition of parasites in wide sense given and used by Paul Schmid-Hempel in his 1998 book "Parasites in social insects". In this sense, viruses, bacteria, protozoa, fungi, nematodes, mites and parasitoids can all be considered as parasites. However, not all of parasites are pathogenic to their host, so that we added the pathogens in the titles of paragraph.

Cynthia Scott-Dupree	2	Diseases	70	2076	70	2076	delete "Viruses are a factor decline." Unnecessary.	Sentence corrected
Cynthia Scott-Dupree	2	Diseases	70	2078	70	2078	delete (ABPV); delete Black Cell Virus and use the acronym that is already previously deinfed BQCV; dlete Kashmir Bee Virus and use acronym only because its already defined	Fixed
Cynthia Scott-Dupree	2	Diseases	70	2093	70	2094	convert to all acronyms for the viruse - all are previously defined	Fixed
Cynthia Scott-Dupree	2	Diseases	71	2101	71	2101	A. bombi should be Crithidia bombi - italized	Fixed
Cynthia Scott-Dupree	2	Diseases	71	2111	71	2111	Sentence should read "…. can affect natural bumble bee….	Sentence modified
Cynthia Scott-Dupree	2	Diseases	72	2118	72	2118	Sentence should read "The entomopathogenic nematode, Sphaerularia bombi is a well known pest of bumblebees that only attacks queens, ….	Corrected
Cynthia Scott-Dupree	2	Diseases	72	2122	72	2122	Should be called "Stingless bee predators and pathogens"	Structure was corrected for this section
Cynthia Scott-Dupree	2	Diseases	72	2130	72	2130	This section 2.4.1.3.1 should be 2.4.1.3.2 - switch places with next section	Structure was corrected for this section
Cynthia Scott-Dupree	2	Diseases	73	2167	73	2167	Sentence should read: "Stingless bee colonies should be regarded….."	sentece was deleted
Cynthia Scott-Dupree	2	Diseases	74	2179	74	2179	Section 2.4.1.4.1 should be a subsection under Pathogens	no change
Cynthia Scott-Dupree	2	Diseases	74	2189	74	2189	Section 2.4.1.4.2 Protozoa should be a subsection under Pathogens or possibly Parasites depending on how they are defined by the authors	no change
Cynthia Scott-Dupree	2	Diseases	74	2196	74	2196	Section 2.4.1.4.3 Bacteria and Mollicutes should be a subsection under Pathogens	structure corrected and unified

Cynthia Scott-Dupree	2	Diseases	74	2197	74	2198	All genus and species need to be italicized	corrected
Cynthia Scott-Dupree	2	Diseases	75	2207	75	2207	Section 2.4.1.4.4 Fungi should be a subsection under pathogens	structure corrected and unified
Cynthia Scott-Dupree	2	Diseases	75	2208	75	2208	Ascosphaera needs to be italicized	done
Cynthia Scott-Dupree	2	Bee management	80	2372	80	2372	Bombus should be "B." italicized	Done
Cynthia Scott-Dupree	2	Bee management	81	2403	81	2403	bumble bees should be "bumblebees"	Done
Cynthia Scott-Dupree	2	Bee management	82	2431	82	2431	delete "rather"	corrected
Cynthia Scott-Dupree	2	Bee management	82	2432	82	2432	do should be "does"	corrected
Cynthia Scott-Dupree	2	Bee management	82	2456	82	2456	Nannotrigona should be N.; Melipona should be M. please check for this throughout	done
Cynthia Scott-Dupree	2	Bee management	82	2458	82	2458	Nannotrigona should be N. - please check for this throughout	corrected according to suggestion
Cynthia Scott-Dupree	2	Bee management	84	2514	84	2514	comma after decline	done
Cynthia Scott-Dupree	2	Invasives	86	2556	86	2556	should be "advantage; and iv)"	typo corrected
Cynthia Scott-Dupree	2	Invasives	86	2582	86	2582	Should be "invasive alien plant pollen"	Corrected
Cynthia Scott-Dupree	2	Invasives	87	2611	87	2611	Should be "Invasive alien plants"	Corrected

Cynthia Scott-Dupree	2	Invasives	88	2635	88	2635	Replace Novel with Invasive	Replaced with 'Alien, potentially invasive, pathogens' because no evidence of invasion per se
Cynthia Scott-Dupree	2	Invasives	90	2690	90	2690	Apis should be italicized	This must have been changed during formatting of whole document, fine in my original text and double checked revised text. Formatting will be checked again before print.
Cynthia Scott-Dupree	2	Climate change	99	2966	99	2966	Xylocopa should be italicized	done
Cynthia Scott-Dupree	2	Climate change	105	3173	105	3173	wich should be which	thanks, done
Cynthia Scott-Dupree	2	Multiple effects	109	3296	109	3296	delete "both certain"	deleted
Cynthia Scott-Dupree	2	Multiple effects	109	3307	109	3307	should be "the neonicotinoid insecticide - imidacloprid"	Accepted edit
Cynthia Scott-Dupree	2	Multiple effects	109	3309	109	3309	should be "the neonicotinoid inseciticides - thiamethoxam and clothianidin"	Accepted edit
Cynthia Scott-Dupree	2	Multiple effects	110	3312	110	3312	should be "the pyrethroid insecticide - lambda-cyhalothrin" (symbol can also be used)	Accepted edit
Cynthia Scott-Dupree	2	Indirect effects	112	3390	112	3390	should be "industrialized agriculture (e.g. conventional and organic)"	Added
Cynthia Scott-Dupree	2	References	157	5512	157	5512	All authors should be listed - no et al. in the reference section; check all references to ensure this is not occuring elsewhere	Updated, thanks
Dan Cariveau	2	Land use	12	272	12	272	Note that this is for honey bees to help the reader transition.	Done.

Dan Cariveau	2	Land use	12	275	12	280	The Williams study is good but there are many studies showing opposite or no effects for nesting. Cane 2006 Ecological Applications, Matteson et al. 2008 Ann Entom Soc, Fortel et al 2014 PLoS One all show positive effects of urbanization on cavity nesters	This topic is treated in section 2.2.2. Because this comment is important, we have now directed the reader to that section.
Dan Cariveau	2	Land use	13	242	13	247	I found this paragraph slightly difficult to follow. I think it could be cut.	We have now rewritten a part of the paragraph and deleted some sentences. However, we have decided to keep this paragraph, since it introduces a set of important concepts that will be used in the following paragraphs
Dan Cariveau	2	Land use	13	248	13	250	Two points that may be worth noting at some point. "Natural habitat" is a really vague term. Not all natural habitat is good for bees. For example, coniferous forests are often depauperate in term of abundance and diversity. In fact, many studies in Europe do not classify forest as semi-natural habitat. For example, Steffan-Dewenter and Westphal do not include forests as natural but do include grazing meadows as natural. This is true for many studies in Kennedy et al. as well. Also, the studies finding a strong negative trend in habitat loss are those that are done in highly degraded systems. See Winfree et al. 2009 and Winfree et al. 2011. What is not well understood is how well studies represent actual land-use change.	Based on this and other comments, we have now revised the document to make sure that we are using terms like "habitat" consistently and that these concepts are clearly communicated. For this reason, we have now added a definitions box, and we now refer to habitat and not "natural habitat", what can lead to misunderstandings. Thus, we are confident that the current structure and content of the section has gain in clarity.

Dan Cariveau	2	Land use	14	291	14	291	The authors should discuss recent papers by Kleijn et al. 2015 (Nature Communications) and Winfree et al. 2015 (Ecology Letters). They show that diversity is generally not a important abundance of common species. It is fine to note potential importance of diversity but the importance of abundance should also be highlighted. Also in Garibaldi et al. 2013, the authors note: "However, richness did not enhance model fit when added to a model with wild insect visitation (table S4, model F versus model G), which suggests that the effects of richness on fruit set reflect increased wild insect visitation (i.e., co-linear effects; fig. S13)." What is particularly informative is Table S4 models F vs G and P vs Q.	These studies have been now integrated and their findings are presented. See also our answer to comment 180.
Dan Cariveau	2	Land use	15	303	15	306	Could the authors elaborate as to why smaller patches increases competition among plants. Also it is important to note that this study was done in small area (all plots in a 1 ha area) so to a pollinator, it may be one large patch.	This sentence has been now deleted, since it was not adding clarity to the text, and was superfluous.
Dan Cariveau	2	Land use	15	307	15	307	This is a nice paper. The paragraph could use a more direct and to the point topic sentence to highlight the main point.	Done.
Dan Cariveau	2	Land use	16	344	16	347	Citations that demonstrate that connectivity increases biodiversity would be useful here. In total, the paragraph has 3 citations. Two of which do not support this last point and one that partially does. At the very least it seems that connectivity is not critical.	There are not many studies investigating this in an explicit and extensive manner, as it has been done for biodiversity in general. Because this is an importnat point, we have now added a sentence presenting this and pointing to that knowledge gap. We thank the reviewer for bringing our attention to this.
Dan Cariveau	2	Land management	24	597	24	600	Great point!	Thank you!
Dan Cariveau	2	Land management	35	959	35	961	A short summary of the Baldock paper would be great here. The authors note some findings later but it awkward here.	We have added a summary of findings from Baldock et al. 2015

David Aston	2	Pesticides	40	1118	57	1650	This chapter appears biased in the sense that these effects are not assessed with reference to the systems used in the regulatory process and no reference is made to the need to balance the benefits with their use	see Chapter 6 - this section deals only with exposure and effects not cost benefit
David Aston	2	Pesticides	47	1316	47	1317	There is no indication as to whether these effects are being commented on fom an individual bee or from the honeybee colony perspective	note added
David Cooper	2	ES	5	1	10	150	Generally, very clear ES statements. But please refer to my comments on SPM.	We have tried to further improve the consistency between SPM and ES
David Cooper	2	ES	5	30	5	32	the Bold statement here needs to be discussed in a follow up statement, noting that, in line with the statement on lines 3-5, "abandonment" could also lead to ecosystem restoration and increaed connectivity in landcapes. Perhaps the potential for managed change to lead to win-win situations. Generally, there is a need for a more compleete and nuanced disucssion of the landscape level changes and tradoffs, across spatial and temporal time scales.	Revised sentence now extends the point more precisely in the context of particular temperate regions (e.g. Europe): Extensively used traditional landscapes frequently contain high quality habitats and species-rich pollinator communities (well established). These landscapes are often threatened by abandonment of farming (cessation of grazing or mowing of grasslands), which has been observed in temperate regions (well established). (2.2.2.2.1). We think this revised statment is now right (by and large), some nunaces are in the term "frequently" and there is more details about the landscape level changes.
David Cooper	2	ES	5	42	5	54	"controversial". Yes, but can a positve statment still be made? eg: "under field sites there is evidence for impacts on wild bees but not for honeybees (E/I)". The latter relates to the "field realistic dose". (or "what is a relaisti dose under field condistions is likely to be").	The revision now has a more extensive and nuanced treatment of these points.

David Cooper	2	ES	6	33	6	40	This parargaph (or another) should include a point about the limittions of current risk analysis refletcing those referenced in the body of the chapter proposed in numerous meta-analyses: lines 1482-3; 1512-3; 1523-4; as well as the unsutiablity of the wdely used honeybee as a model lines: 1291-2 see also Rundolf et al Nature 521 77-80 (2015)).	added and this has potential implications for comprehensive risk assessment (line 48)
David Cooper	2	Pesticides	41	1137	41	1137	"over 1000 different crops and application" 1000 crops? Or 1000 crop/application combinations. If latter illustate what they are	amended as source of information for 1000 could not be identified
David Cooper	2	Pesticides	41	1146	41	1150	"appropriately" "eg in an IPM". Perhaps need to uppack this. What is meant by appropriate and IPM? Does IPM imply no (or reduced) prophylatic use of systemics? As implied by EASAC report and the EU policy referred t therein?	appropriate defined as suitable effective mitigation and use
David Cooper	2	Pesticides	49	1408	49	1408	"chronic exposure"? Word missing	amended
David Cooper	2	Pesticides	51	1469	54	1545	This review of reviews relating to sub lethal impacts covers a lot of ground. Not all of it seems to be adequately covered in the chapter summary and SPM. In addition, the section could be strengthened with a little more information, inclduign for example indicating in relation to each set of "studies" (referenced in lines 1474, 1479, 1489, 1495, 1504, 1510, 1518, and perhaps others I have missed), (i) whether they use controlled conditions, field conditions, or both and (ii) whther they look at honey bees or wild bees or both (and if the latter, which). Perhaps a summary table of the studies could help. The distinction between managed honeybees and wild bees seems to be particualry important (and the results of Rundolf et al Nature 521 77-80 (2015) dont eem to be fully reflected here), in underpinning statements in the summary and SPM.	We have checked carefully the possibility to include further information for each review, but each of them deal with tens or even hundreds of papers, encompassing in each case lab and field data, with managed and wild bees. The analysis suggested should be the matter for a meta-analysis, but is hardly doable here. In turn, we have introduced more details on the Rundlöf 2015 paper.

David Cooper	2	Pesticides	53	1525	53	1534	This synthesis statement should distinquish between the impacts under field conditions on maganed honeybees and wild bees.	Same as above: each of the reviews deal with wild and managed bees, so that in the general statement, it is hard to make a distinction. We acknowledge this with a small addition.
David Epstein	2	ES	1	1	164		Honey bee vs honeybee - choose one and use throughout	Will be streamlined
David Epstein	2	ES	5	30	5	30	define use of term, "cultural landscapes"	Replaced by traditional and point expanded:Extensively used traditional landscapes frequently contain high quality habitats and species-rich pollinator communities (well established). These landscapes are often threatened by abandonment of farming (cessation of grazing or mowing of grasslands), which has been observed in temperate regions (well established). (2.2.2.2.1)
David Epstein	2	ES	6	35	6	35	define use of term "inappropriately"	An e.g. is now given in the revision
David Epstein	2	ES	6	45	6	45	are effects "underestimated" or poorly understood?	Now reads: Debate surrounds what constitute a field realistic exposure, and the potential synergistic and long-term effects of pesticides and their mixtures (unresolved). (2.3.1.4)
David Epstein	2	ES	7	65	7	67	"Airborne clouds of Bt GMO pollen drifting off-site and descending in neighboring habitats…" sounds like the script to a horror film - can this be written with a bit more scientific accumen.	Text deleted and replaced with other content.
David Epstein	2	ES	7	74	7	75	Is this true for short-term introduction of honey bees for foraging purposes, without establishment of managed bees in targeted habitat? Is this conclusion worthy of a bolded line in the executive summary when a conclusion on page 77, lines 2301-2302 states that, "To date there is only limited evidence that competition is sufficient to lead to major declines of local bees or other pollinators."	Revised, now reads: There are examples globally where the introduction of non-native managed bee species (honeybees, bumble bees) has resulted in escapes that subsequently led to competitive exclusion of native bee species (established but incomplete)

David Epstein	2	Land use	14	290	15	313	Kleijn et al. 2015. Delivery of crop pollination services is an insufficient argument for wild pollinator conservation, NATURE COMMUNICATIONS | 6:7414 | DOI: 10.1038/ncomms8414. Findings of this study conflicts with some of the arguments made here: "...while the contribution of wild bees to crop production is significant, service delivery is restricted to a limited subset of all known bee species."	We disagree that this study contradicts what is presented in this section. Indeed, the mentioned study investigated pollination services in crop plants only, and not in wild plants. However, because this is a central work on pollination services in crops, we have now included a paragraph presenting its main results and their importance. Further, and to clarify our point, we also put the Kleijn and Winfree studies in the context of previous researches having shown a mechanistic ground for effects of diversity on crop yield and pollination. We thank the reviewer for pointing this to us.
David Epstein	2	Land management	20	482	20	485	Focus of IPM is informed use of chemicals as part of a systems approach, not use of chemicals as a last resort. All of the systems mentioned use chemicals, including organic.	Revised.
David Epstein	2	Land management	22	521	22	521	define "industrial agriculture" - seems to be a limited view of available ag systems, organic vs. industrial - addressed in the next paragraph, but this type of extreme polarizing language is inflamatory, shows bias and is unnecessary - the chapter, in general, suffers for it. The authors should guard against using unscientific language and characterizations generally championed by advocacy groups.	Changed to conventional that is described in the glossary.
David Epstein	2	Land management	25	628	25	628	remove parentheses around "Ricketts 2004"	Done
David Epstein	2	Land management	26	666	26	666	"total fertiliser use has increased" - provide a percentage increase	Figure is added and more details are provided within the text.
David Epstein	2	Land management	38	1034	38	1049	Farming systems aslo need to be economically practical, in addition to productive, diverse and sustainable. There is no discussion or acknowledgement here to economics.	Economic aspects are included.

David Epstein	2	Pesticides	41	1127	41	1130	are we concerned with "level of hazzard" posed by pesticides or with risk assessment?	hazard for these classes of human toxic pesticides
David Epstein	2	Pesticides	42	1170	42	1188	A bit disingenuous to have a discussion of pesticides used in organic production and not discuss that almost all organic insecticides are general nerve poisins that are harmful to pollinators; also focus on heavy metals for organic fungicide use are of concern for pollinators. It is difficult to have an honest discussion on improving farming systems when even scientists don't address these issues.	Barbosa et al 2014 reference added to text
David Epstein	2	Pesticides	47	1340	47	1340	"…dust from talc/graphite…" or from abrasion of pesticide from neonic treated seed mixed with soil, and talc/graphite?	amended
David Epstein	2	Pesticides	48	1375	48	1379	The bumblebee/dinotefuran (mispelled in manuscript) incident reported here resulted from an off-label application resulting in regulatory penalies for the applicator - should be noted.	typo corrected; text amended http://portlandtribune.com/sl/206414-62081-bumblebee-incidents-result-in-pesticide-violations
David Epstein	2	Pesticides	49	1404	49	1406	EPA report cited here is specific to soybean, not all seed treatments	amended
David Epstein	2	Pesticides	49	1408	49	1408	"…chronic to certain insecticides…" What does this mean?	amended
David Epstein	2	Pesticides	52	1501	52	1503	Why are these conclusions "more clearly" concluded - were the conclusions found in the previously cited studies less clear?	Bad wording, sorry - fixed.
David Epstein	2	Bee management	78	2313	78	2314	"…tendency to maximize production;" this phrase is used several times in this chapter to infer a negative aspect of agriculture - is increased food production in a world with a growing human population and shrinking land devoted to that production a negative? Value judgements like these should be avoided.	Point taken but decided not to be this specific to any one area of the world

Deepa Senapathi	2	Land use	13	245	13	245	The wording of the sentence beginning 'Instead of leading to habitat loss….' seems to contradict the previous sentence. Rephrasing to say 'Other than leading to habitat loss…. ' or in 'Even if land use does not lead to complete habitat loss…' may better re-iterate the point that other than loss of habitat, degradation and deterioration is also a real concern	Done.
Deepa Senapathi	2	Land use	16	340	16	341	The phrase 'larger vetebrate pollinators were more affected by these (Table 1)' - It remains unclear what these refers to as the sentence is quite complex and would be better if replaced by habitat loss/ fragmentation.	based on this comment, we haave now modified this part of the paragraph.
Deepa Senapathi	2	Pesticides	44	1232	44	1281	Section 2.3.1.2 on the Potential impact of pesticides on pollinators needs to include a recent studies by Kessler et al. 2015 Nature doi:10.1038/nature14414 showing Bees prefer foods containing neonicotinoid pesticides	this is a subelthal effects and has been picked up in that section
Deepa Senapathi	2	Climate change	93	2795	96	2886	Section 2.6.2.1 Phenology change and interaction mismatch focuses mostly on temperate zone studies and the effect of temperature. Mismatches in the tropics are likely to be induced by changes in rainfall / precipitation and these need to be mentioned and highlighted as an area requiring study if no example studies are found especially since climate studies show that frequency and intensity of rainfall in the ropics is set to change in the tropics and sub-tropics (e.g. Zhang et. al. 2007 Nature 448, 461-465)	We have no included the study by Abrahamczyk et al (2011) to make some points in relation to tropical situations clearer
Deepa Senapathi	2	Climate change	93	2796	93	2798	Examples of phenology being affected by climate could included flight times of pollinators	Included, thanks
Deepa Senapathi	2	Climate change	93	2799	93	2799	Southern Hemisphere climate impact studies available from Australia and South America as well	Included, thanks

Deepa Senapathi	2	Climate change	93	2800	93	2800	Examples of studies on plants could include Amano T. et. al. 2010 A 250-year index of first flowering dates and its response to temperature changes. Proc R Soc Biol Sci Ser B 277. 2451-2457.	Included, thanks
Deepa Senapathi	2	Climate change	97	2913	97	2916	Recent study on range shifts in bumblebees in North America and Europe have shown that "bumblebee species show opposite range responses across continents relative to most terrestrial assemblages: rapid losses from the south and lagging range expansions in the north" - Kerr et. al. 2015 Science 349: 177-180. This study and it's findings need to be included in the text.	included, see comment 860 and also number 901
Deepa Senapathi	2	Climate change	100	3028	100	3028	The letters R and LR that I presume stand for Risk and Low-Risk need to be utilised earlier in the text in lines 3024-3025 to signifiy what they stand for.	These are explained further up in (previous) lines 3001-3006
Deepa Senapathi	2	Climate change	104	3143	104	3145	Sentence beginning 'This is even the case when many pollinators aren't less able….. ' is ambiguous and unclear.	re-written
Deepa Senapathi	2	Multiple effects	107	3220	107	3226	Section 2.7 Multiple interactions - unable to comment on text without corresponding figure and table 2.7.1	Figures and tables were provided in a separate but accompanying document
Deepa Senapathi	2	Multiple effects	108	3252	108	3252	A wild plant species' - mention which species and where the study was carried out as this is a case study.	Added Claytonia virginica L.
Deepa Senapathi	2	General	General comment on overall chapter contents				Unable to comment on table and figure legends due to non-availability of tables or figures	You may have missed the additional documents which have been provided as separate files (other reviewers succeeded in doing so)

Diane Castle	2	TOC	3	not applicable	4	not applicable	The Table of Contents highlights differences in structure in each section - it would help the reader if there was more consistency in covering the Drivers of Change as described in the title of this Chapter ie Pollination, Pollination Networks and Pollination Services. Also the conclusions to each section should include these 3 aspects. This point is reflected in the comments on the relevant sections below.	Thanks for this comment; unfortunately information is not that balanced and we preferred to design the strucutre along the drivers
Diane Castle	2	ES	6	45	6	46	Given that the statement regarding synergism, long term effects and mixtures is described as notional it should be reported as " ...may be under estimated....." and/or re-positioned below the emboldened text.	Now reads: Debate surrounds what constitute a field realistic exposure, and the potential synergistic and long-term effects of pesticides and their mixtures (unresolved). (2.3.1.4)
Diane Castle	2	ES	6	51	6	51	Does the text "....lack of evidence of effects...." mean an absence of effects or and absence of evidence? If the former it should read "...evidence of lack of effects..."	After revision this reads; There is evidence from a recent study showing field-scale impacts of neonicotinoids on wild pollinator survival and reproduction (established but incomplete). Evidence, from this and other studies, for effects on managed honey bee colonies is conflicting (unresolved).
Diane Castle	2	ES	9	123	9	123	Word missing	This typo has been corrected in a full revision of this statement: The change in climatic conditions, especially under mid- and high-end scenarios, exceeds the maximum speed at which several groups of pollinators (e.g. many bumblebees or butterflies) can disperse or migrate (well established). Such species are predicted to find themselves in unfavorable climates and unable to reach areas of potentially suitable habitat (established but incomplete).

Diane Castle	2	ES	10	148	10	148	This is not a supportable or crebible statement even as a "notional" point and discredits the report. Sales of pesticides reflect trends in agricultural production, occurence of pests and diseases and weather. Globally there is an growing demand for quantity, quality and range of foods and agricultural production reflects this. Also agricultural production is a key factor in emerging countries.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Diane Castle	2	Land management	38	1048	38	1048	The wording is not useful in global context as "conventional scale agriculture"can mean different things in different areas so suggest being more specific or deleting this sentence	Revised.
Diane Castle	2	Land management	39	1061	39	1062	This sentence does not make sense - suggest improve or remove	Revised.
Diane Castle	2	Pesticides	40	1118	57	1649	This is a longer section than any other at 17 pages and has expanded considerably since the first draft. It goes into a lot of detail on a number of possible effects of pesticides which could be significantly shortened with out affecting the conclusions or the boxed section starting on page 55 line 1599 which is useful to retain.	discussion with co-authors identified it is appropriate for this high profile topic
Diane Castle	2	Pesticides	42	1163	42	1163	Not a valid comment as toxicity data on pesticides is publically available	toxicity data are but not how pesticides were used; clarification added
Diane Castle	2	Pesticides	42	1164	42	1164	Not a useful request on a global scale - as with assessing pollinators it is the local level of detail that is important and "granularity" is more feasable at this scale.	amended text

Diane Castle	2	Pesticides	55	1587	55	1585	The position with regard to over-wintering honey bee colony losses needs to reflect to most recent data from Epilobee 2013/2014 which shows that overwintering losses have decreased. This occured whilst neonicotonoids were still being used in the EU and the overwintering losses seemed to correlate with difficult weather conditions. It is also important to put these over-wintering losses in context with the significance of the Varroa and associated viral diseases affecting honeybee colony survival. Particularly in light of the fact that there are no reported over-wintering losses in in Australia where the they do not have the Varroa destructor mite but do use neonicotinoids.	losses dealt with in Chapter 3
Diane Castle	2	Pesticides	56	1631			The Rundlof study cited here aims to investigate insecticide-containing seed coatings on wild and managed bees. Care is taken in the design of the large scale landscape monitoring study to detect effects on honeybee colonies and the results of this element of the study is consistent with previously published field studies such as Cutler et al 2014 (Canada). However other elements of the study regarding the wild bees and residue levels do not have the same level of discriminatory power making it difficult to draw robust conclusions. For example the overall numbers of wild bees recorded are very low which limits confidence in the	comment relates to the bumble bee component
Diane Castle	2	Pesticides	66	1940	66	1940	This sentence needs to be qualified with "depending on exposure and not necessarily representing realistic field conditions" otherwise it can be misleading.	wording amended

Diane Castle	2	Diseases	67	1994	75	2242	The impact of varroa (and virus) is rather under-stated here there are many papers (Dainan et al, 2012; Martin et.al, 2012; Guzman-Nova, et al, 2010; Szabo et al 2012 (bumble bees); Charriere & Neumann, 2010; Nazzi et al, 2012; Genersch, 2010; Rosenkranz et al, 2010; van Enngelsdorp et al, 2012; Neumann & Carreck, 2010; Godfrey 2t al , 2014) which all conclude that combination of Varroa + virus is probably one the most major threats facing honeybees.	Added text on Varroa effects and added references
Diane Castle	2	Multiple effects	109	3284	110	3336	Most of the studies looking at interactions are done under laboratory conditions and the ecological relevance is not understood. A recently published review paper would be useful to cite here as it looks at the methodology used to study the interactions between pathogens and pesticide exposure and bee health (Collison et al 2015 in Biological Reviews).	Thanks for the suggestion. This review is now included in the revision alongside the other citations.
Diane Castle	2	General					The authors have a challenging task in producing this chapter especially as the value of the report will depend upon its scientific integrity. As such in the final review it is essential that the scientific robustness of any cited research publications is considered. If studies have shortcomings in design these should be commented on and if this produces misleading results they should not be included in the report. It should also be recognised that there is a publication bias against no effects.	Thank you; hard to judge on the potential content of publications which have not been written (unclear to which driver/aspect the no-effects-statement refers to, in many cases these are also actually published, e.g. for pesticides)
Emily Marquez	2	ES	6	33	6	35	Use of the word "inappropriately": The sentence itself is correct, however, the statement belies other uses that may have lethal effects and yet are "appropriate," i.e., according to label. For instance, the generation of dust from sowing treated seeds (evidence is cited p. 45, lines 1273-1281) is not due to incorrect usage of treated seeds. A lethal exposure to dust containing insecticide is not an incorrect use and yet can have lethal effects, therefore it should be stated that not all lethal exposures occur from inappropriate use.	Now reads: For example, insecticides are toxic to insect pollinators and the lethal risk is increased if they are used inappropriately, e.g. if label information is insufficient, not respected or where application equipment is not fit-for-purpose or faulty (well established).

Emily Marquez	2	ES	6	36	6	37	Encounters can include encounters with lethal combinations of pesticides.	Revision now reads: Pollinators are likely to encounter combinations of pesticides applied in the field during foraging or flight (well established). These may result in unpredictable sometimes harmful effects; such combinations may interact in a complex and/or non-linear way (e.g. synergy) (established but incomplete).
Emily Marquez	2	ES	10	142	10	145	In addition to the indirect drivers mentioned, large-scale agricultural systems heavily reliant on agrochemicals have also transformed "climate, land cover, etc." Also, it should be mentioned that in terms of indirect drivers, factors such as pesticide usage are one driver that can be changed in a relatively quick fashion, whereas human population increases would be a more difficult problem to tackle.	We have now inserted the following text: International trade is an underlying driver of land-use change, species invasions and biodiversity loss (well established). The global expansion of industrialised agriculture driven by increased or changing consumption in the developed and emerging economies will continue to drive ecosystem changes in the developing world that are expected to affect pollinators and pollination services (established but incomplete)
Emily Marquez	2	Land management	38	1037	38	1042	Crop yield is a partial measure of total agricultural productivity, but in and of itself is not the sole marker of agricultural productivity. In these lines it should also be mentioned that organic agriculture has been shown to be significantly more profitable, even with yield being lower (Crowder and Reganold 2015), because discussion of yields frequently gets conflated with profitability for farmers. Also, the Rodale Farming Systems Trial reported from their 30-year study several results on organic farming yields, citing competitiveness of organic farming with conventional in terms of yield and profitability. Other markers such as resilience in drought were also assessed in the Rodale report.	Study by Crowder and Reganold is included.

Emily Marquez	2	Pesticides	39	1072	39	1074	Again, even with known risk mitigation measures, exposure to lethal doses of pesticides can occur. Examples include mass bee die offs which are not always going to be due to applicator errors or lack of appropriate risk mitigation. Risk mitigation measures such as applying only after bees are in the hive ignore the fact that exposure can occur in the days following an application, as pesticides are known to remain in the environment for far longer than a day and depending on environmental conditions can persist for longer periods of time. There are many examples of this but a study on neonicotinoids persisting in soil in the UK is cited here.	wording amended to clarify- if die offs occur then by definition risk mitigation is not effective; the reference to soils shows low levels residues can be detected in soil not that it is by definition a risk to pollinators
Emily Marquez	2	Pesticides	45	1279	45	1281	However, widespread adoption of these technical measures may take time for uptake without regulatory action requiring them. In addition, it should be mentioned that these treated seeds are solely prophylactic in nature, with no decisionmaking allowed on the part of a farmer to use these pesticide coatings... seeds come pre-treated. The EPA evaluation finding these treated seeds to have zero benefit to farmers might also be cited here, as use of pre-treated seeds is an excellent example of a failure to utilize integrated pest management principles.	this is related to chapter 6

Emily Marquez	2	Pesticides	49	1383	49	1386	Even if labels provide mitigation measures, situations may arise from insecticide applications that result in death. For instance, exposure to insecticide-contaminated dust generated from sowing treated seeds; or pesticide drift, which is known to occur even if applications occur according to label (i.e., a change in wind direction or speed can cause pesticides to drift). It sholud be stated that even if applied according to label and with mitigation measures taken, lethal situations may arise because not all environmental factors can be strictly controlled (such as wind).	mitigation for seed is through dust reduction, pesticide drift through buffer zones; but in order to accommodate your comment, we have now used one of your references and have tried to make this clearer by writing: "In principle, however, even if insecticide is applied according to labeling and with mitigation measures taken (see below), bee mortalities may occur because not all environmental factors (such as wind) can be strictly controlled (Nuyttens et al., 2013), in addition to issues such as human error or synergistic effects. But beyond some country-level incident schemes there is little data available on incidents occurring following approved uses or on the scale of poor practice/non-compliance."
Emily Marquez	2	Pesticides	66	1939	66	1940	and risk can be increased even if the label is adhered to. This is a common misconception that is not scientifically accurate, that acute exposures to pesticides only occur if the pesticide is misused!	wording amended

Geoff Hicks	2	General	0	0	0	0	General comment on the chapter - this is a good review of drivers of change but we are concerned that its assessment approach is light. There is a need to take the reviews into scenarios and present the reader with what this means and where to next information. We found the subchapter conclusions very light and with insufficient advice for guidance. We suggest the really key findings be pulled out and boxed or bold headed as the key messages to be communicated. We also note that there did not appear to be any real discussion on niche replacement, ie do wild pollinators move in and replace exotics when they are decimated. "The fence line" we found little discussion on the dynamics and implications of wild bees crossing over the fence line to managed (arable systems), more detail is needed on the impact on indigenous pollinators on exotic land practices. Finally the whole document can be rendered more accessible with illustrations. We get a sense that the structure of the chapter is dominated by narative while figures and tables might be more user friendly.	Thanks for your general comment; we have tried to improve the key messages which end up in the ES. Se e.g. reply on your comment 905; A number of illustrations is included as well (as was in the previous version)
Geoff Hicks	2	Pesticides	50	line 1440		Line 1442	accepted, but where are the conclusions in the text? If they are present they need to be made clearer.	Reworded as suggested.
Geoff Hicks	2	Pesticides	53	Line 1524		line 1534	This para is not that clear particularly around the conclusion with regard to neonicitonoids and other pesticides. Some rewording is needed to give better clarity. We need to have a stronger position statement around uncertainty and inconclusiveness of the data as this will be an area of high public interest.	We reuse the words of the authors in saying that neonics actual levels of residues are "likely to have large-scale and wide ranging negative biological and ecological impacts", and cannot make a stronger statement than the authors. Furthermore, we introduce the paragraph saying that neonics "very likely have a negative impact in individual and social performances of bees", which is sort of general conclusion for the 4 reviews.

Geoff Hicks	2	Pesticides	54	line 1545	This is an area of text that could greatly benefit from some scenarios results that might look at different combinations of pollinator type, insecticide use, and land scale as drivers of pollinator decline.	only possible when models are available to integrate drivers; this has not been possible until BeeHave was availabe
Geoff Hicks	2	Pesticides	57	line 1650	Section 2.3.1.4.3 General comment.This whole section needs a synthesis and conclusions section to follow the pesticide presentation that puts the UK position into perspective.	There is now a conclusions section (2.3.5) summarizing main elements of section 2.3 "Pesticides, GMOs, …"
Geoff Hicks	2	GMO	58	line 1696	the fact diptera pollinators were not tested is a major shortcoming, is there any advice on what the impact is likely to be, given their role in pollinating a number of unique plant species.	We have now added a short sentence mentioning that this is a knowledge gap.
Geoff Hicks	2	Pesticides	65	line 1915	What about pasture application of ammonia/urea as a source of nitrogen? Has New Zealand looked at this in light of the high use of N fertilizers in our agriculture systems?	Yes, there are studies showing nitrogen emission rates from manure in New Zealand. Due to space restriction we did not mention it specifically in this Chapter, but generally described the effect of nitrogen deposition. Nonetheless, thank you for mentioning it.
Geoff Hicks	2	Diseases	69	line 2035	This is a wholly inadequate description of the scale and scope of the varroa problem. Where is the detail and discussion of whether the problem is getting worse or improving and what are the effects of better management other chemical treatment with miticides. Also it is not clear from the document whether stingless bees suffer from varroa, can you clarify this somewhere	Several comments wanted more detail on effects of Varroa; added extra text and references on Varroa to the end of section 2.4.1.1.4 Parastitic mites.

Geoff Hicks	2	Invasives	88	line 3645	line 2679	This section could benefit from reference and discussion around the interaction between exotics bees and exotic wasp in native forests in New Zealand, particularly with regard to the competitive relationship that exist around honey dew beech forests. Further discussion could also be added around competing energetics with regard to exotic honey bees and other nectar feeding species including reptiles, birds and bats.	Thanks for this example, we have added a short sentence recognising this situation as it adds to the geographic coverage: "In New Zealand beech (Nothofagus solandri var. solandri) forests, invasive alien wasps (Vespula vulgaris, V. germanica) compete for energy rich food, in the form of honeydew secretions produced by native scale insects, with alien honeybees (A. mellifera) and also native vertebrate (birds) pollinators. The wasps significantly appropriate and reduce this food resource thereby representing a threat to the native bird pollinators (Markwell et al., 1993; Moller et al., 1991)."
Geoff Hicks	2	Climate change	101	line 2784	line 3184	The whole section on climate change is too long, it is only one driver. Given that the analysis is only based on scenario based risks, it is a bit of a so what, and needs to be summarised to main findings. The really useful material is on line 2978-2981 and the threats status material in line 3051-3061.	We decided to basically keep it that long; there have been other comments in favour of keeping the graph and the table (but the latter to be transfomred into a pie chart); because the case study is a box, it is separate from the main text and due to the graphical components it should help to better bring across some of the messages; see comments 871 and 1165
Geoff Hicks	2	Multiple effects	106	line 3190	line 3194	Endorse the section on combined effects which recognises drivers of change are multifactorial	Thank you for your endorsement of this important section.
Geoff Hicks	2	Intro	page 11	line 177		We find the list of pollinators confining, we expect some analysis of alternative pollinators to bees - most studies already focus on bees, this assessment needs to be wider than that.	We agree and have tried to put more examples into the assessment which refer to groups other than bees
Geoff Hicks	2	Land use	page 15	line 313		insert the following after the word network at end of para - network, which might suggest that endemics are more generalist (successful) then exotics which might also argue for more targetted protection of endemics.	Although what the reviewer mentions may be correct, we are not referring to endemics vs exotic here. Further, that topic is already presented in the invasives section.

Geoff Hicks	2	Land management	page 27	line 708			General comment - re weed diversity - this is an important dilemma for biodiversity values as weeds are beneficial for bees as diverse sources of nectar and pollen however most conservation agencies spends vast amounts erradicating these.	Yes, thank you for your note.
Geoff Hicks	2	Land management	page 32	line 867			Re fires for seed dispersal etc, needs to include as an additional example the schlerophylic vegetation in Australia (reference needed).	Thank you very much for the suggestion, but a suggested refernce would have been needed.
Geoff Hicks	2	ES	page 5	Line 21			juxtaposing exotic pollinators alongside indigenous vegetation offers transboundary benefits and access to more diverse foraging opportunities - this needs to be included in the paragraph.	We are not sure, whether this is the most appropriate place for your point as the bullet of the ES deals with messages from land management for wild pollinators; the proposal is more a solution and would fall into chapter 6; would also have been good if there had been some reference to make this point more explicit
German Government	2	Land use	12	208	12	209	Desertification means land degradation in arid, semiarid and dry sub-humid areas. It is thus land degradation in drylands. Based on this definition provided by the UNCCD, you may wish to reorder the terms here. For example: "...grazing can lead to land degradation/desertification and scrub encroachment."	Done.
German Government	2	Land use	14	293	14	293	Habitat loss is probably an important indicator for degradation. Shouldn't it therefore read 'habitat loss' or 'degraded habitats'? (see also page 15, lines: 299; lines 310; 317 or page 37, line 1014).	We agree with the reviewer. To clarify this, we have now modified the sentence and it reads "… habitat loss and habitat degradation ...".
German Government	2	Land use	17	365	17	365	Habitat loss and fragmentation can be seen as indicators of degradaton, and not as stand-alone phenomena besides degradation.	We here refer to habitat loss, habitat degradation and habitat fragmentation following the definitions we present in the new definition box. We think that the current version of the draft succesfully clarifies this point. We thank the reviewers for pointing this unclear point.
German Government	2	Land management	27	710	28		It would be helpful if a table could be provided, which quantifies the use of herbicides in North America and/or Europe (if possible with Central Asia) during the past decades.	Unfourtunately I could not include such a table due to the lack of suitable information dataset.

German Government	2	Land management	28	729	28	730	Why is an 'empty' chapter reserved for pesticides, if pesticides are treated in another section of the report?	Following comments during the former revisions it was found necessary to acknowledge this point here, since pesticide use is important aspect of land management, therefore it is reasonable to refer to that here even it is detailed in a a separate section..
German Government	2	Land management	28	732	28	733	In order to understand the titles given here, it would be appreciated, if a footnote can be inserted that provides an explanation for the following terms used: 'pastures' / 'rangelands' / 'prairies' and maybe even 'grasslands' (grasslands is used on page 29, line 775).	This subsection was replaced and the whole land management section was restructured to cover better arable lands, grasslands and different aspects of management on these. Application of the different terminologies is simplyfied, the remaining ones are defined.
German Government	2	Land management	34	910	34	916	Are there examples that compare the cost of hand-pollination with insect pollinations in relation to yields?	No such data are published in this study.
German Government	2	Pesticides	43	1193	43	1193	It would be helpful, if some definitions of organic farming could be included in a footnote.	see overall definitions within full report
German Government	2	Pesticides	49	1397	49	1397	Are there some best example cases, which show, how training/awareness raising in the use of insecticides reduced misuse? Maybe you wish to add a reference here, or which part of the assessment report provides this information.	see chapter 6
German Government	2	Diseases	68	1994	76	2242	The titles of the sub-chapters of "2.4.1.1 Honeybee diseases and pests"; "2.4.1.2 Bumblebee parasites and pathogens"; and "2.4.1.4 Solitary bee parasites and pathogens" need to be differentiated more clearly in order to avoid misunderstandings. The following simple way forward could support such a differentiation: "2.4.1.1.1 Viruses in honeybees" (see page 68) and equivalent to this: "2.4.1.2.1 Viruses in bumblebees" (see page 70) and: "2.4.1.4.1 Viruses in solitary bees" (page 74)	Added "in honeybees" to each subheading as suggested

German Government	2	Climate change	105	3179	105	3184	Please check the logic between both sentences in this section: The first sentences states that "species occupying extensive flat landscapes are particularly vulnerable …". The second sentence states that "cimate change will particularly affect species with spatially restricted populations". The content of both sentences may be scientifically correct. But in order to improve the understanding, the logical relationschip between both sentences might have to be improved.	We have tried to modify the text accordingly
German Government	2	Multiple effects	107	3234	17	3234	In chapter 2.7.1, the authors outline that pollinator species "… may migrate with global warming into new geographic regions thus increasing the aboundanc and diversity of recipient communities ...". Based on this statement, please provide some thoughts about potential risks emerging from migrant species into existing systems.	Added this sentence in response with cross ref to other relevant Chapter sections: However, if such immigrants are highly invasive there may be an attendant risk of further ecological changes, for example through alteration of pre-existing plant-pollinator relationships, or interspecific competition for food or transfer of pests and diseases (2.4, 2.5).
German Government	2	ES	Executive Summary				This reads very well. Summary point 141-146 could be used as the first point, not the penultimate, as it underpins many of the other problems. Also, this point, in addition to 'expanding human population' and 'globalisation' could include 'the need to feed the expanding population'	We agree and have put this part at the beginning of the ES (while in the text it remained where it was before - but that's not problematic as we point to the reelvant section 2.8 in the ES)
German Government	2	General	General Comment				This interlinkage between the assessments outlined in chapter 2 (specifically: '2.2 on land use and its changes' and '2.5 on invasive species' on the impacts of degradation and invasive speecis on pollinators and pollination should be reflected in the assessments D3b(i); D3b(ii) and D3b(iii)	Yes, you are right - and that will be the task of the authors working on these deliverables; there will be sufficien time to do so after the presnet assessment is published
Ir. Ali Mahamane	2	Land use	17	413	18	414	There is need to take into account the environmental parameters	we do not understand what the reviewer means here. We do refer to the environmental parameters, by saying that the there is spatial variation in the the resources available to pollinators.

Ir. Ali Mahamane	2	Land management	21	523	21	526	diversity of plants	Added.
Ir. Ali Mahamane	2	Land management	23	581	23	582	The downside is the phenology of culture that does not cover the 12 months of the year. Should develop transitional habitats to allow the colony to survive and reach the next phase of cultivation	It is mentioned mainly at the monocaulture vs. polyculture section.
Ir. Ali Mahamane	2	Land management	25	624	25	627	In Sahelian Africa is agroforestry system albida that blooms during the dry season than other species lose their leaves to adapt to drought conditions. This is a kind of relay allowing colonies to survive the dry season during which resources are scarce.	This would be a great interest to cite, but the reference is missing.
Ir. Ali Mahamane	2	Pesticides	38	1073	38	1074	For example in Africa Sudan, one suspects that misuse of pesticides in cotton cultivation has an impact on pollinators especially bees	no reference provided so not possible to add such a statement
Ir. Ali Mahamane	2	Bee management	76	2246	76	2252	In sub-Saharan Africa, beekeepers Apis mellifera rise in several agroforestry systems based on biclimats.	Point taken but decided not to be this specific to any one area of the world
Jan Axmacher	2	General	5	1	164	5853	While the authors present a much improved, i.e. more taxonomically balanced account in comparison to the earlier draft of this chapter, and they clearly outline the groups they are considering, it is still somewhat disappointing that beetles are still only considered in the context of "pest species".	Yes, we hope for your udnerstanding that it is not easy to cover each group which might play a role, but it is very much appreciated that you noticed that we put quite some efforts into this
Jan Axmacher	2	ES	5	30	5	32	This to me appears to be a very "westernized" outlook focussed on temperate regions (where overall biodiversity, including diversity of pollinator species - with the exception of some groups like bumblebees - is very low in comparison to the tropics). I have very severe doubts that extensively used cultural landscapes are to be promoted in a global context, where e.g. tropical forests form potential alternative habitats. Maybe clearly state that this is relevant only for temperate regions?	This clause has been added and the detail expanded to ensure temperate region is clear: Extensively used traditional landscapes frequently contain high quality habitats and species-rich pollinator communities (well established). These landscapes are often threatened by abandonment of farming (cessation of grazing or mowing of grasslands), which has been observed in temperate regions (well established). (2.2.2.2.1)

Jan Axmacher	2	ES	7	65	7	67	I am puzzled how airborn pollen clouds are supposed to adversely affect moths and butterflies. This statement requires substantial elaboration and contextualization (or omission).	Text deleted and replaced with other content.
Japanese Governmen t	2	Pesticides	47	1337	47	1338	Please revice the URL of the incident scheme in Japan. The new one was published on June 23 this year. New URL : http://www.maff.go.jp/j/press/syouan/nouyaku/150623.html	amended
Jari Niemelä	2	ES	executiv e summary				there is nothing about the effects of urbanization on pollinators whereas in the text there is a relatively good treatmen of the issue (2.2.2.4. urban management)	We have now included the key word "urbanisation" prominently in one of the ES paragraphs
Jari Niemelä	2	General	title				I'm not quite sure I understand the title. There are many issues in the long and rather cumbersome title, please clarify.	The title is set by the IPBES plenary; no way for changes
Jean-Pierre Sarthou	2	Land manageme nt	20	472	22	532	Luscher et al. (2014) showed (beyond the dominant effect of geographic location) a strong influence of agricultural management on wild bees and that the effect of the surrounding landscape was of minor importance and inconsistent in their data.	Added and cited.

Jean-Pierre Sarthou	2	Land management	20	472	22	532	Rollin et al. (2013) [Rollin O., Bretagnolle V., Decourtye A., Aptel J., Michel N., Vaissière B. E. and Henry M. (2013). Differences of floral resource use between honey bees and wild bees in an intensive farming system. Agriculture, Ecosystems and Environment 179, 78-86.] and Sarthou et al. (2013) [Sarthou J. P., Choisis J.P., Amossé A., Arndorfer M., Bailey D., Balázs K., Balent G., Deconchat M., Dennis P., Eiter S., Fjellstad W., Friedel J.K., Jeanneret P., Jongman R.H., Kainz M., Moreno G. , Ouin A., Paoletti M.G., Pointereau P., Stoyanova S. , Viaggi D., Vialatte A. , Wolfrum S., Herzog F. (2013). Indicateurs de biodiversité dans les exploitations agricoles biologiques et conventionnelles des Vallées et Coteaux de Gascogne, cas d'étude français du projet européen BIOBIO. Innovations Agronomiques 32: , 333-349.] have demonstrated that in entomophilous crops where flower resources are very important but of short time, wild flower diversity in the field (ie weeds with flowers) is more important for favouring diversity of wild bees, and is promoted by organic farming.	Added and cited.
Jean-Pierre Sarthou	2	Land management	20	472	22	532	An opening has to be made about the potential of conservation agriculture (direct sowing plus 2 other levers, see below) to favour wild pollinators since Shuler et al. (2005) [Shuler, R.E., Roulston, T.H., Farris, G.E., 2005. Farming practices influence wild pollinator populations on squash and pumpkin. Journal Econ. Entomol. 98, 790–795.] showed that pollinator abundance, particularly of the squash bee, was greater in no-tillage than in conventional tillage.	Details on conservation agriculture (as mitigation method) was mowed to Chapter 6 according to former comments and revision.

Jean-Pierre Sarthou	2	Land management	20	472	22	532	This latter remark has to be accompanied by the one showing that conservation agriculture (i.e. no-tillage plus elongated rotation plus soil always covered) is not automatically synonym of greater herbicide use. CA can even be conducted in an organic way (e.g. Baral (2012) [Baral, K. R. (2012). "Weeds management in organic farming through conservation agriculture practices." The Journal of Agriculture and Environment 13: 60-66.],	See answer to comment 253.

Jean-Pierre Sarthou	2	Climate change	96	2888	96	2934	Insert this information: Kerr et al. (2015) [Kerr J. T., Pindar A., Galpern P., Packer L., Potts S.G., Roberts S.M., Rasmont P., Schweiger O., Colla S.R., Richardson L.L., Wagner D.L., Gall L.F., Sikes D.S., Pantoja A. (2015). Climate change impacts on bumblebees converge across continents. Science, 349(6244): 177-180.] found "cross-continentally consistent trends in failures to track warming through time at species' northern range limits, range losses from southern range limits, and shifts to higher elevations among southern species. They also found that these trends are independent of changing land uses or pesticide applications and underscore the need to test for climate impacts at both leading and trailing latitudinal and thermal limits for species."	We have isnerted this study in relation to climate change (further down in this section), but did not refer to the other parts; there is an explanation in the multiple factors section (comment nr. 901). The data used to attribute changes in bee range limits to neonicotinoids and land-use change are at a coarse scale (land use change measurements were available through time from 1900 to 2005 across both Europe and North America at 5'(~10km);annual area of pesticide/imidacloprid application per administrative county 1992-2009). This was doubtless a reflection of the characteristics of the available data and the authors had little option here. However, in our assessment of this paper we consider that it is perhaps unsurprising that there was no detectable effect of pesticides (or to an extent land-use) on range limits. Detection of changes in range limits in response to these management factors would have to be profound (i.e. consistent extinctions) for it to be detected in this large-scale analysis. If land-use change and pesticide use have an impact it is likely any effects would occur on populations/diversity in more subtle ways and at finer scales (eg habitat, landscape). Potentially there could be severe declines (or increases) in populations within a species
Jeff Ollerton	2	ES	7	67	7	67	Typo - "birds"	Text deleted and replaced with other content.

Jeff Ollerton	2	ES	9	123	9	123	Word missing - "climatic….?" Possibly "envelope"?	This typo has been corrected in a full revision of this statement: The change in climatic conditions, especially under mid- and high-end scenarios, exceeds the maximum speed at which several groups of pollinators (e.g. many bumblebees or butterflies) can disperse or migrate (well established). Such species are predicted to find themselves in unfavorable climates and unable to reach areas of potentially suitable habitat (established but incomplete).
Jeff Ollerton	2	Land management	22	527	22	528	Two references missing	References are added.
Jeff Ollerton	2	Land management	23	553	24	589	This whole section has a lot of grammatical errors and needs some editing	The section is revised and restructured to improve clarity..
Jeff Ollerton	2	Land management	23	567	23	567	It's the stigmas that are blocked, not the stamens	Corrected.
Jeff Ollerton	2	Land management	23	570	23	570	What is meant by "higher profit for the pollinated plants"?	higher pollination success; added
Jeff Ollerton	2	Land management	23	582	23	583	"Oil seed rape" is not a term used much in other parts of the world. I suggested using "canola (oil seed rape)"	Changed to canola.
Jeff Ollerton	2	Land management	30	780	30	78	Missing reference	Added.
Jeff Ollerton	2	Land management	33	871	35	937	This whole section has a lot of grammatical errors and needs some editing	Edited.
Jeff Ollerton	2	Pesticides	44	1247	44	1247	"curcubits" should be "cucurbits"	amended
Jeff Ollerton	2	Pesticides	48	1366	48	1366	Author is "Yeo-Chang" not "Yeo-Change"	amended

Jeff Ollerton	2	Pesticides	55	1600	57	1648	There should be some mention of the recent re-analysis of the FERA report by Goulson (2015) - see: https://peerj.com/articles/854/	The paper by Goulson (2015) in PeerJ is now mentioned
Jeff Ollerton	2	Bee management	84	2518	84	2519	This sentence is unclear	corrected
Jens Dauber	2	ES	5	30	5	33	It might be mentioned here that those extensive agricultural landscapes are often threatened by abandonment of farming.	Explicitly mentioned in revision: Extensively used traditional landscapes frequently contain high quality habitats and species-rich pollinator communities (well established). These landscapes are often threatened by abandonment of farming (cessation of grazing or mowing of grasslands), which has been observed in temperate regions (well established). (2.2.2.2.1)
Jens Dauber	2	Land management	24	603	24	608	On this topic see also Diekötter et al. GCB Bioenergy (2014) 6, 219–226, doi: 10.1111/gcbb.12080: "Thus, growth of the co-occurring species' community is not stimulated by the resource pulse provided by oilseed rape early in the year, but by persistent resources provided by seminatural habitats after mass flowering."	Inserted into the former paragraph.
Jochen Frund	2	ES	7	74	7	74	make clearer that "introduction of non-native species" refers to species escaping from managed populations here, to avoid confusion and keep the topic of the paragraph focused	Revised, now reads: There are examples globally where the introduction of non-native managed bee species (honeybees, bumble bees) has resulted in escapes that subsequently led to competitive exclusion of native bee species (established but incomplete)

Jochen Frund	2	ES	7	78	7	79	(here and elsewhere) I find the combination of "empirical evidence lacking" and "well established" quite confusing wording; I wouldn't use such apparently contraditctory combinations (well established to be unknown??). Otherwise, the new categories (that replaced the levels of confidence used in the first order draft) are an improvement.	The terms are used are in reference to the facts mentioned, and if it is the limited knowledge, then this lack of knowledge might be a well established fact. However we agree in this case that the wording was confusing, Accordingly we reworded this bullet. It now reads : The same risks may exist for intensively managed solitary and stingless bees, but as these species are generally managed on a smaller scale than honeybees, empirical evidence is still lacking (speculative).
Jochen Frund	2	ES	7	83	7	84	the grouping of bees is a bit unclear here: if bumblebees and solitary bees are together, who are the "other wild bees"? Stingless bees? Or does it include social halictids? Or sth else? This might be solved e.g. by changing the "solitary bees" in L83 to "a few solitary bees"	Now reads: "major threat to the health of managed bees - including honeybees (well established), bumblebees and solitary bees (established but incomplete) - and also to wild bees (established but incomplete)." The point is that managed bees include those separate groups but there are also wild relatives who can be similarly threatened.
Jochen Frund	2	ES	8	108	8	108	the statement as written doesn't seem to be that well established, and it also has a different meaning than the "climatic debt" described in 2.6.2.2; 2.6.2.2 actually describes that insect pollinators may not have this long response time; in addition, species that are slow in tracking climate change and move to new areas might still be immediately negatively affected ("impacts" sounds like a focus on the negative effects of climate change); range shifts and other adaptation mechanisms might actually make impacts appear more drastic on the short term than on the long term, quite different from the message of this sentence (notwithstanding that what the sentence currently says might be true for some cases and systems)	Revised in light of this comment now reads: Climate change impacts on pollinators, pollination and agriculture may be manifested in the short-term (years) to longer-term (decades) depending on the pollinator species, but it is possible the full impacts on nature and agriculture will not be fully apparent for many decades, due to long response times in and complexity of ecological systems (well established).

Jochen Frund	2	ES	10	148	10	150	These two sentences don't justify a separate paragraph; just notional evidence and slightly beyond the scope of the chapter.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Jochen Frund	2	Land management	28	733	28		this subsection seems to have a misleading title, as results discussed do not appear to focus exclusively on prairie habitats	This subsection was replaced and the whole land management section was restructured to cover better arable lands, grasslands and different aspects of management on these.
Jochen Frund	2	Bee management	79	2352	80	2391	This is an interesting box, but I think the title is somewhat misleading: it doesn't present much information about effects on crop pollination; regarding the single case study on crop pollination discussed, it should be made clearer how overabundance of B. terrestris could negatively effect raspberry pollination (of which it should be a good pollinator)	The text was initially longer and dealing with crop pollination, but had to be shortened. The title is changed accordingly, thanks for highlighting.
Jochen Frund	2	Invasives	87	2589	87	2605	the stabilizing effect of network nestedness should be treated more carefully here; it has not been shown empirically and relies on likely unrealistic models (no competition for floral resources, static network structure); it's effect on robustness against species loss is contingent on which species are lost (related to what is being said in LL 2606-2610, asymmetry and nestedness may cause particular vulnerability to loss of the "generalist core"); a decrease in modularity might also mean a decrease in stability; in short, I would focus on describing that invasive plants are integrated into pollination webs and what the empirical patterns are, and then finish with a cautious note about potential consequences based on models; the very fact that alien plants are integrated into pollination webs calls for caution regarding conclusions from models that assume static network structure.	Thank you for this valid point. We have added words that imply caveat e.g 'potential' and 'may' along with a new sentence highlighting the lack of biological realisim, due to data limitations, and thus due caution in interpretation

Jochen Frund	2	Invasives	90	2705	91	2720	I have the feeling that this paragraph represents a view somewhat underemphasizing negative effects of invasive Apis species; I think that negative effects are widely believed by scientists, e.g. in the Neotropics (Roubik et al./ Journal of Tropical Ecology / Volume 2 / Issue 02 / May 1986, pp 97-111) and Australia, and this literature is not well represented in this paragraph; current evidence may not be very clear, but still the more pessimistic view should be mentioned	Revised: "Alien honey bee populations have become readily integrated into pollinator communities and direct competition for food has sometimes altered native wild bee behaviour and reproductive success in a locale, although these species interactions are highly dynamic (Dohzono and Yokoyama, 2010; Roubik, 1980; Roubik and Wolda, 2001; Thomson, 2004; Traveset and Richardson, 2006). There have been very few reports of invasive alien honey bees through such competition reducing the survival or densities of native wild bees (Kenis et al., 2009; Paini, 2004; Roubik and Wolda, 2001; Yang, 2005) and to date no extinctions recorded (Goulson, 2003; Moritz et al., 2005; Paini, 2004; Traveset and Richardson, 2006). "
Kailash Chandra	2	General	1	1	164	5853	The chapters have been compiled very meticulously, there are very minor corrections in the whole documents like et al. have not been made italic; few places species names are not italic ; under 'References' Journal names are not uniform, abbreviations and full nme of journals are given.	Thaks for your nice comment; details will be streamlined
Kailash Chandra	2	Tables	1	5	1	5	Winfree et al. will be Winfree et al.,	Will be streamlined (we guess you mean "italics")
Kailash Chandra	2	Tables	1	7	1	8	Syrphids may be changed to Flies (Syrphids)	Thanks, done
Kailash Chandra	2	Tables	2	13	2	14	et al. in all references will be et al.	Done
Kailash Chandra	2	Tables	4	15	4	15	Valk et al 2012 shall be Valk et al 2012	corrected
Kailash Chandra	2	Figures	4	44	4	45	neonicotinoids shall be Neonicotinoids	no capital
Kailash Chandra	2	Tables	5	55	5	55	van der Valk et al 2012 shall be van der Valk et al 2012	this refers to the table part; there we have adjusted this

Kailash Chandra	2	ES	8	28	10	29	et al. in all references will be et al.	IPBES style will be standardised throughout the document at final copy editing.
Kailash Chandra	2	ES	9	111	9	112	the species names of butterflies and bumble bees may be written in italics	The page and line numbers seem to be erroneous here. However all styles will be standardised on IPBES style during copy editing
Kailash Chandra	2	ES	9	113	9	113	Rasmont et al. 2015a shall be Rasmont et al. 2015a	The page and line numbers seem to be erroneous here. However all styles will be standardised on IPBES style during copy editing
Kailash Chandra	2	ES	9	113	9	114	Settele et al. 2008 Settele et al. 2008	The page and line numbers seem to be erroneous here. However all styles will be standardised on IPBES style during copy editing
Kailash Chandra	2	Figures	10	146	10	147	In the figure 2.7.1 there are no yellow or red arrows	Will be corrected while working with the graphic designer
Kailash Chandra	2	Tables	11	35	11	36	et al. in all references will be et al.	corrected
Kailash Chandra	2	Tables	12	39	16	40	All the places change from A . cerenae to A. cerena; all the species names in italic	Done.
Kailash Chandra	2	Tables	16	42	19	136	The species names available in the references may be written in italics	Done.
Kailash Chandra	2	Land use	20	139	20	139	et al. to be changed to et al.	will be harmonized later
Kailash Chandra	2	Land use	20	140	20	141	et al. to be changed to et al.	will be harmonized later
Katherine Baldock	2	Intro	11	176	11	176	Replace 'like' with 'including'.	Done
Katherine Baldock	2	Land use	12	221	12	223	This sentence needs a supporting reference.	Done.
Katherine Baldock	2	Land use	13	235	13	238	Suggest using colours that are contrasting different for arrow colours. I struggled to note the difference between orange and brown and these are colours a colour-blind perosn may struggle to distinguish between.	the colors and shapes have been changed.

Katherine Baldock	2	Land use	13	235	13	238	I'm not sure that the legend appropriately reflects the figure. Can the word 'relationships' be replaced with something else as I'm not sure how this shows relationships. Rather it is a flow of potential effects of factors on different features of plant and pollinator biodiversity	The legend has been reworded.
Katherine Baldock	2	Land use	13	242	13	242	Both 'changed' and 'changes' used in same sentence. Suggest 'changed' is replaced with 'altered'.	The first sentence has been now deleted.
Katherine Baldock	2	Land use	13	243	13	243	Again suggest replace 'change' with 'alter'.	We have kept our initial wording, since here the land cover is changed (replaced) by another type of land cover.
Katherine Baldock	2	Land use	13	245	13	246	I think a 'change' is missing after 'land use'.	Done.
Katherine Baldock	2	Land use	13	245	13	246	I think you mean 'As well as' rather than 'Instead of'.	See point 146
Katherine Baldock	2	Land use	13	246	13	247	This implies that species don't survive if the land use changes completely rather than deteriorates, which is not always true.	We think that this comment issues from a misunderstanding of the definition of 'habitat' we use in this work. Indeed, habitat has been defined (see definition box) as the locations in which all the resources exist for a species to survive and reproduce. From that perspective, habitat loss directly implies the dissaperance of the species in question. It is indeed important to differentiate habitat loss/degradation from land use change. We are confident taht teh inclusion of a new definition box, in which these terms are explicitly defined improves the clarity of this section.
Katherine Baldock	2	Land use	13	248	13	248	Rephrase 'reduces' with 'can reduce'. The phrasing at the moment implies that destruction of natural habitat will always have these effects but this is not true (as shown in Table 2.2.1).	Done.
Katherine Baldock	2	Land use	13	250	13	250	Not clear which Figure is referred to here - is is Fig. 2.2.2? Likewise Table 1 numbering needs updating.	corrected. Thanks for pointing this.
Katherine Baldock	2	Land use	13	250	13	250	Replace 'Certain pollinators' with 'Some pollinator groups'.	Done.

Katherine Baldock	2	Land use	13	251	13	251	Will readers understand what Hymenoptera and Lepidoptera are or do these terms need further text added to explain that this means bees, wasps and ants for Hymenoptera and butterflies and moths for Lepidoptera. In fact do the studies only shown serious decline for bees, rather than wasps and ants - in which case be clear you mean bees rather than all Hymenoptera.	Chapter 1 gives an introduction to the different pollinator groups. From that persepctive, when the reader gets to Chapter 2, these concepts should have been already clarified. In that context, when we here refer to Hymenoptera and Lepidoptera, we make reference to those that are actual pollinators, and not necessarily all the species included in these orders. We think that put in that context, the sentence does not need to be modified.
Katherine Baldock	2	Land use	13	252	13	252	Clarify what is meant by 'habitat conversion history', this needs a bit more explanation.	Done.
Katherine Baldock	2	Land use	13	253	13	253	Replace 'certain' with 'particular'.	Done.
Katherine Baldock	2	Land use	13	256	13	256	replace 'to monocultures' with 'with monocultures'.	Done.
Katherine Baldock	2	Land use	13	259	13	259	Be clear what you mean by 'pollinator responses', as you are referring to beekeepers I think you mean responses by honey bees rather than other pollinator groups as well so make sure it is clear you are talking about honey bees only.	The sentence has been modified accordingly.
Katherine Baldock	2	Land use	13	262	13	262	Again be clear about what type of 'bees' you are talking about. I think you mean honey bees.	Done.
Katherine Baldock	2	Land use	13	264	13	264	Do you mean 'often' as in it happens sometimes and not others. I think better to replace this word with 'can'.	Done.
Katherine Baldock	2	Land use	14	274	14	274	You need to explain what beebread is, or make sure it is in the glossary, also make it clear that this sentence is about honey bees rather than all bees.	"beebread" has been replaced by "pollen loads". See also answer to point 171.
Katherine Baldock	2	Land use	14	274	14	277	Are there any other references to support this point.	The mentioned reference is a meta-analysis, meaning that it already includes several studies.
Katherine Baldock	2	Land use	14	277	14	280	This is a fairly definite statement, but I would argue the evidence doesn't exist to support this point conclusively. Can you rephrase to make the statement less definite and suggest this as a possible explanation.	Done.

Katherine Baldock	2	Land use	14	281	14	288	These are important points. Thank you for including.	thanks!
Katherine Baldock	2	Land use	14	291	14	291	Rephrase 'Many studies have shown fruit set to be directly correlated…'	Done.
Katherine Baldock	2	Land use	14	292	14	294	I don't agree with this statement. What if changes in pollinator diversity mean reduced competition for one pollinator species which then increases in abundance - plants pollinated by this species may increase their fruit set.	Although this is a logical option, the data does not demonstrate that is the case. The sentence has been now modified to justify our statement.
Katherine Baldock	2	Land use	14	294	14	294	Replace 'hard' with 'difficult'.	Done.
Katherine Baldock	2	Land use	14	297	14	297	Rephrase as 'habitat loss more negatively affects'.	Done.
Katherine Baldock	2	Land use	15	301	15	301	Specify where to look below for more information - which section?	Done.
Katherine Baldock	2	Land use	15	301	15	301	Don't put insect in brackets.	Done
Katherine Baldock	2	Land use	15	306	15	306	I've never seen the term 'out-competition' before. I think I can work out what it means but could you use a different word?	see answer to comment 191.
Katherine Baldock	2	Land use	15	310	15	310	Give more information about what the 'intrinsic characteristics' are. Anyone who doesn't work with pollination networks won't know what this means.	The paragraph has been now reworded and this mention does not appear anymore. Also, we now direct the reader to a definition box of ecological network concepts, as well as to Chapters 1 and 3, where the concepts related to networks are presented and explained.
Katherine Baldock	2	Land use	15	311	15	313	Explain more about how generalist pollinators confer resilience to pollination networks. Again if someone doesn't work with pollination networks they won't know what this means.	Following this, the reader is now sent to the following section, where these concepts are more developed, as well as to Chapters 1 and 3.
Katherine Baldock	2	Land use	15	317	15	317	Words are missing from this sentence. I think you mean 'changes in land use fragments and alters…'.	Done
Katherine Baldock	2	Land use	15	318	15	318	Again, I think 'changes in' is missing before 'land use'.	Done
Katherine Baldock	2	Land use	15	321	15	321	Switch word order to read 'relative spatial'.	Done

Katherine Baldock	2	Land use	15	325	15	325	Re Fig. 2.2.2 I don't understand why the green rectangles simply reduce in size. If they represent fragmentation than surely the middle rectangle should be made of multiple smaller rectangles and the top one made up of even more and smaller rectangles.	Thanks for pointing this out. We have now modified the figure accordingly.
Katherine Baldock	2	Land use	15	326	15	326	This figure is not referred to in the text.	corrected. Thanks for pointing this.
Katherine Baldock	2	Land use	16	349	16	349	Remove the braackets around 'functional' and briefly explain what functional diversity is.	Based on this comment we have reevaluated this sentence, and we have now deleted the word "functional". We think that the word does not add clarity to the message and has the potential to divert the reader's attention towards a non-fundamental detail.
Katherine Baldock	2	Land use	17	370	17	376	Can you add some specific examples in to illustrate these points.	done.
Katherine Baldock	2	Land use	17	379	17	379	Modularity will need further explanation for non-network specialists.	see response to comment 194
Katherine Baldock	2	Land use	17	381	17	381	Further explanation of rewiring required.	see response to comment 194
Katherine Baldock	2	Land use	20	461	20	463	It is not clear to me what is meant by 'land use' in this table. Do you mean 'land use change'?	This category has been now modified into "landscape modification"
Katherine Baldock	2	Land management	20	466	20	466	The word 'field' is not needed.	Done.
Katherine Baldock	2	Land management	21	498	21	499	What do you mean by 'potential' of strawberry pollination?	Revised.
Katherine Baldock	2	Land management	21	499	21	502	I don't follow the intention behind this sentence, I can't see how the first part of the setence relates to the second part. Further clarification is needed.	Revised sentence.
Katherine Baldock	2	Land management	23	571	23	576	It is not clear to me how this example results in facilitation. Further clarification required.	Revised.

Katherine Baldock	2	Land management	25	625	25	625	There have also been studies on almonds (including papers by C Brittain) and apples (including papers by M Garratt). Almonds and apples both grow on trees so would they count as agroforestry systems?	This is not really fitting with the definition of agroforestry that we provided at the beginning of the section.
Katherine Baldock	2	Land management	25	628	25	631	The second part of the sentence contrasts solitary bees with bees in the first part of the sentence. Should the first part of the sentence mention a particular type of bee rather than just 'bees'. Comparing solitary bees to bees doesn't make sense.	Good point; wording fixed.
Katherine Baldock	2	Land management	26	666	26	666	Give an idea of the scale of the increase in use of fertiliser - is it a small increase, or has it doubled, or tripled?	Figure is added.
Katherine Baldock	2	Land management	26	676	26	676	What is a small-scale plant-pollinator network - clarification of this will help non-specialist readers.	Revised as "plant-pollinator networks at small spatial scale ".
Katherine Baldock	2	Land management	27	702	27	702	What is a squash bee?	Explained. Peponapis spp. and Xenoglossa spp.
Katherine Baldock	2	Land management	28	734	28	735	Can you define what a prairie is as I don't know what it is. In which kinds of agricultural systems are they found and in which parts of the world? We don't have them in the UK, for example.	Defined.
Katherine Baldock	2	Land management	30	783	30	783	In which country is the Cevennes National Park?	In France, added.
Katherine Baldock	2	Land management	33	875	33	877	What do you mean by 'leading countries'?	Sentence is revised, word "leading" is deleted.
Katherine Baldock	2	Land management	33	897	33	898	Can you add some references to support this statement?	Done.

Kimiko Okabe	2	ES	5	13	5	13	I do not understand the logic of increased firtilizer use declined pollinator richness.	It is an indirect effect on pollinators mediated by loss of floral resources in nutrient enriched fields (certain plants e.g grasses are able to exploit the nutrification to dominate other, often flowering, plant species. The statement in bold is built upon the non-bold text where this is explained further and then referenced to relevant section of the report.
Kimiko Okabe	2	ES	7	81	8	89	One of the major threats of commercialized bee colonies (A. mellifera) is the Varroa mite, which was introduced into A. mellifera colonies in Europ by beekeepers from the Russian far east in around 1904 and later (Crane E (1988) In Africanized honey bees and bee mites, Ellis Horwood). Mite introduction is also concerned in commercialized bumblebees (Goka 2001 Molecular Ecology 10, 2095–2099). Thus, not only direct cause, i.e. host-shift but introduction of exotic pathogens and organisms should also be focused here and in the section 2.4.	Varroa is specifically mentioned in the revision and also the point about humna-mediated host shifts, it now reads: Pollinators often suffer from a broad range of parasites and pathogens, including the Varroa mite and the viral strains it transmits to honeybees (well established). Emerging and re-emerging diseases (e.g. due to host shifts, including those mediated by accidental human transport of alien pests) are a major threat...
Kimiko Okabe	2	Invasives	85	2551	88	2632	In the sub-section, interactions between exotic and native polant species is mostly discussed although the effect of results of the interactions on food production/ pollinators usuful for food production should be more focused.	Added text: There have been no studies (to our knowledge at the time of writing) that have examined the impact of invasive alien wild plants on food crops, which represents a significant knowledge gap.
KR Shivanna	2	Land use	13	250	13	250	Should be Figure 2.2.1 and Table 2.2.1	corrected. Thanks for pointing this.
KR Shivanna	2	Land use	18	405	18	407	Along with self-incompatible plants, dioecious plants may also be included with an explanation that both require pollen transport across conspecific plants.	Although this may be so, we could not find any study demonstrating such a trend. For that reason, we have now added a mention to this, and pointed that this is a knowledge gap.
KR Shivanna	2	Land use	18	413	18	413	Figure No. has to be corrected with reference to Chapter 3	We are here referring to Figure 2.2.3. To clarify this, the reference here has been now corrected.

KR Shivanna	2	Land management	23	567	23	567	stigmas causing pollen clogging (block of stamens) The matter in parenthesis is not clear, it may be removed	Removed.
KR Shivanna	2	Land management	24	585	24	585	400 oilseed rape flowers per visit Is this per bout?	changed to bout
KR Shivanna	2	Land management	24	608	24	610	Although …. is unlikely to cause reduction in seeds set of wild plants. Not necessarily so. In fact it may indicate less number of visits of the pollinators to the wild plants and thus pollination limitation of wild plants. In the absence of data on pollination efficiency and the number of conspecific pollen on the stigmas of wild plants, this conclusion cannot be drawn.	It is acknowledged that reduced flower visitation rates may also cause compatition.
KR Shivanna	2	Land management	35	953	35	957	The extent of pollution in the urban area may also be added as a determinant.	We are not aware of any published studies that link pollution levels with pollinator abundance, diversity or pollination services. We could consider adding this to the text if the referee can provide a reference linking pollinators or pollintion to pollution levels.
KR Shivanna	2	Diseases	70	2076	70	2076	Viruses are a factor decline. I cannot understand this sentence.	Fixed
KR Shivanna	2	Figures	Figure 2.6.1				Arrows have to be coloured (yellow/red)	Colours were changed to black and white.
KR Shivanna	2	Figures	Figure 2.7.1				Not clearly understandable in the present form.	corrected
KR Shivanna	2	Tables	Table 2.6.1					Sorry, no comment has been in the document, thus we can't reply
KR Shivanna	2	Tables		Table 2.2.1			Difficult to understand this Table in the present form	see answer to comment 976
KR Shivanna	2	General					Not clearly understandable in the present form.	Sorry, no idea to which part of our text this refers to
Leonel Sierralta	2	ES	10	148	10	150	No information enough in the main document to sustain that. It could cause a strong reaction from "other markets" countries.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement

Leonel Sierralta	2	Land use	14	281	14	282	Very loose concept of niche. There is no empty niche since niche is a particular relation of one species with its environment, so there is no available niche. Probably right idea is that species can exploit a greater number/variety of resources.	based on this comment, we have now deleted the mention to niche. Indeed, the use of that concept was unclear and redundant. We thank the reviewer for pointing this.
Leonel Sierralta	2	Land use	17	382	17	382	Clarify concept of secondary extinctions.	Done
Leonel Sierralta	2	Land management	26	665	26	666	Give a figure of the fertilizer increase since 1960.-	Figure is added.
Leonel Sierralta	2	Land management	27	690	27	702	A figure should mention about differences in productivity between tillage and no tillage agriculture systems. As is writen seems obvious that non tillage should be adopted right a way and that is not the case. Production differences could be huge.	New content is added about the effect of no-till systems on crop yield.
Leonel Sierralta	2	Land management	30	782	30	786	Language should be more neutral. Looks like authors are recommending practices, and this not the place to do it in the chapter.	Modified.
Leonel Sierralta	2	Land management	31	825	32	868	Fire: Should be clarified that the examples given corresponds to areas where natural fires are occurring and has been an evolutive force. In areas where fire is not an evolutive force (Central Chile, for example where fire is man made from recent history) other results could be obtained	Thank you for the suggestion, but to incorporate this aspect recommendation on a peer-reviewed paper would be needed to cite.
Leonel Sierralta	2	Pesticides	50	1424	50	1424	Error in word "applied". Same error in figure 2.3.4.	amended
Leonel Sierralta	2	Pesticides	55	1588	55	1588	Error in words contributeto	amended
Leonel Sierralta	2	Pesticides	64	1868	64	1868	Nickel and aluminium are not common soil pollutants. Aluminium is a common soil constituent. Nickel is a very uncommon polutant.	corrected
Leonel Sierralta	2	Pesticides	64	1882	64	1882	Arsenic is a common by product in copper production	corrected
Les Davies	2	ES	6	34			Insecticides are not the only pesticides that can be toxic to bees - fungicides and some of the 'inerts', esp. surfactants, can be toxic as well.	added for example

Les Davies	2	Land use	16	348	16	349	Research by ME Saunders (2014) on the juxtaposition of commercial almond plantations and native woodlands and wild pollinator communities can be found at http://garyluckresearch.com/attachments/MESaunders_Thesis_2014.pdf (with other publications listed therein).	added. Thanks for the reference!
Les Davies	2	Land management	24	587			Caution in stating that Australian oilseed production is not steadily increasing in Australia - see Figure 3 at http://cereals.ahdb.org.uk/markets/market-news/2014/september/16/prospects-australian-crop-update.aspx and table of exports to the 2012/13 season at http://www.australianoilseeds.com/oilseeds_industry/industry_facts_and_figures. While canola production in 2013/14 was down 12% nationally, impacted by drought in the eastern states, this canola harvest is the second-largest on record (http://www.abc.net.au/news/2014-02-11/record-winter-crop-for-wa/5251438).	Australia is deleted.
Les Davies	2	Land management	27	691		702	Australia has been a major adopter of no-till farming systems and there should be some data on its impacts on native bees eg. http://agex.org.au/media/native-bees-in-cropping-systems?/	I could not find a good peer-reviewed paper on this particular subject to cite, however, Ch6 also deals with conservation farming systems and might include more details on that
Les Davies	2	Invasives	90	2681	91	2739	DC Paton has published on the impacts of introduced European honey bees on Australian flora and fauna e.g. http://catalogue.nla.gov.au/Record/1548556	This citation is now covered by the inclusion of a review (Paini D.R. (2004). Impact of the introduced honey bee (Apis mellifera) (Hymenoptera: Apidae) on native bees: A review. Austral Ecology, 29, 399-407.) as suggested by another reviewer, there are many examples in this review of impacts in Australia

Les Davies	2	General					General comments: The chapter contains a reasonably well-balanced discussion of the ongoing controversy about bees and neonicotinoid insecticides. The chapter contains a lot of useful infiormation - although a concern is that the length of the document might limit its use.	Thank you! In order to have digestible information for different levels of in-depth-interest there is the divison between main text, executive summary and SPM
Les Davies	2	Land management					I note that the full citation for Hoyle et al (2010) – cited on page 23 and 24 (lines 584 and 586) is missing from the reference list.	Thanks; actually the citation had the wrong year, it is Hoyle et al. 2007 and now is included in the references: Hoyle M, Hayter K, Cresswell JE. Effect of pollinator abundance on self-fertilization and gene flow: application to GM canola. Ecol Appl. 2007;17:2123–2135.
Liliana Bravo	2	General	0	0	0	0	General Comments In general terms and given the global character of IPBES, it could be useful to cite more studies from different parts around the world: Europe, the Americas (North, Central, South), Africa, Asia, Australia/Oceania. In line with this and according to the availability of bibliography, it might be useful and informative to mention explictly the geographical location of studies.	We have tried to get mores studies included especially from areas not well represented in order to achieve a better balance and also have tried to mention the geographical framing of the studies (see e.g. comments 847 and 848)

Liliana Bravo	2	General	0	0	0	0	It might be also beneficial to include a section that describes in more detail indirect drivers of change in pollinators and polination services e.g. institutions, agricultural policies, governance arrangements, markets, several social factors, attitudes and perceptions, etc. Current draft slightly includes info as well as one page at the end of the chapter (section 2.8, p.112). Given that both farm mangement and the surrounding landscape are strongly influenced by the local / regional socio-cultural context, it could be interesting to provide more info in this regard (see for instance, Bravo-Monroy et. al 2015; full citation is mentioned above).	Thanks for this valuable comment. Unfortunately at this late stage and given the available expertise we cannot delve very deeply into the indirect social drivers you mention. We have however responded to several reviewer comments which have greatly improved section 2.8. We have also, following your comments, added in this revision a sentence: "For example, direct drivers of change in pollinators and pollination such as land management and landscape structure are are strongly influenced by the local or regional socio-cultural or economic context (Bravo-Monroy et al. (2015) Agriculture, Ecosystems and Environment 211: 145-154)
Liliana Bravo	2	ES	5	2	5	2	Regarding the Executive Summary: It might be helpful to include an introductory paragraph describing/presenting the common thread running through the chapter: in making-decision processes. The use of accessible and simple language can help to facilitate multiple drivers of change of pollinators…It could be also useful to provide more information since it may be aimed for those involved in making-decision processes. The use of accessible and simple language can help to facilitate its reading.	We have now followed the more scientific orientation and the idea of highlighting specific elements; while it will be the SPM where the main threads across the assessment are coming together and where the attempt is to have an ever better accessible language
Liliana Bravo	2	Intro	11	172	11	177	In relation to Introduction: 1) From a reader's point of view, it might be convenient to include a sentence that describes a more direct link between pollinators, pollination, food production, and semi-natural parts of ecosystems. For instance, it could be interesting to mention info related to the crucial role of pollinators and their pollination services in gene flows to maintain biodiversity, ecosystem restoration and food production	These aspects are dealt with in chapter 1, which sets the overall scene

Liliana Bravo	2	Intro	11	191	11	195	2) It may be possible that a reader reads this chapter independent of the rest of the report, it could be relevant to mention that possible responses / opportunities / options / tools / instruments / recommendations / or practices for decision makers at different scales can be found on a subsequent chapter	Thanks; we have now added the following sentence: "Possible responses and options to remediate effects of drivers, incl. tools or instruments are dealt with especially in chapter 6, with specific discussions pertaining to scale (local, national, regional and global)"
Liliana Bravo	2	Land use	11		19		With regard to Section 2.2 Land use and its changes: 1) It could be helpful to include a brief introduction (e.g. a paragraph) on this section related to the influence of socio-economic and/or policy factors, which affect decisions about land-use, landscape structure and land management at global / regional / local scales, since changes in land-use influence pollinators, plants and their interactions. For instance, the changing demand for food in ways that are socially and environmentally sustainable. First and second paragraph on page 12 include general ideas but it could be helpful to include more information (Please see my second general comment below). 2) In general terms, from a reader's perspective, it would be interesting to include specific info/cases related to: locations (e.g. regions), natural ecosystems, agroecosystems, particular crops. In other words, to locate information in defined places and (agro)ecosystems. In this way, the reading of the section can be enhanced.	For 1), we have now treated this topic at the beginning of the ES, and this appears now as an introductory paragraph. This is also covered partially in the land management section. For 2), we have now taken care of adding more examples.
Liliana Bravo	2	Land use	12	213	12	214	It could be useful to provide some details concerning cultural background.	We have now clarified this sentence.

Liliana Bravo	2	Land use	13	235	13	238	Figure 2.2.1: It could be useful to change the graphic visual representation of information. For instance: to include real pictures of pollinator diversity, plants/forests and a real photo where the interaction plant-pollinator is visible. Orchid bees (Tribe Euglossini) show variety of beautiful colours that may be useful as well as vibrant interactions with orchids. Similarly, photos where reader can see example(s) of habitat loss or increased isolation of forest patches; finally to include images of plant reproductives success e.g. fruits, seeds, new plants.	This is a good point. However, because of the conceptual nature of this figure, and to avoid comments such as #136, we have decided to use some graphics instead. Moreover, chapter 1 already presents pictures as the one the Reviewer mentions.
Liliana Bravo	2	Land use	14	290	15	306	It could be useful to mention cases related to the negative effect of habitat loss/degradation on fruit set and insect-pollinated plants.	Done.
Liliana Bravo	2	Land use	18	403	19	459	It might be useful to present graphic visual information about habitat isolation and connectivity e.g., by using a map of a land-use cover.	Thanks for the comment. We are already showing this type of information in Figure 2.2.2. Further, the legend for that figure has been now reworded, to make this more explicit.
Liliana Bravo	2	Land management	20	472	20	485	It might be useful to adopt a different approach here. For instance, starting from global to regional/local ideas e.g., a brief introduction with data of global land cover by continents; afterwards continuing with information related to regional / local land-uses e.g., agri-environmental schemes, environmental friendly management methods, IPM, tropical agroecosystems, etc.	Previously we did use this organisation but reviewers suggested to organise other way to avoid high redundancy.
Liliana Bravo	2	Land management	20	487	21	490	It might be useful to provide some details or types of diversified farming systems.	More details are provided in the glossary, as cited.

Liliana Bravo	2	Land management	21	494	21	497	"... Pollination success of different crops": It might be useful to provide more examples about success in terms of increment on quality, quantity of fruit/seed set of different crops located on several regions.	More details on organic farming and other diversification methods as mitigation processes in agricultural fields are provided in Chapter 6 (cross referenced).
Liliana Bravo	2	Land management	21	518	22	532	A comment regarding the use of language or expressions such as: "organic and conventional fields" ; "organic and industrial agriculture" It might be helpful to also take account of conventional fields can include different management styles compared to industrial agriculture. For instance, conventional management can be found in coffee agroforestry systems (e.g. smallholders) and that management is different to industrial agriculture (e.g. large scale farming). The farm scale perspective is particularly important in Latin America where smalholder production is predominant.	The term "industrial agriculture" is changed to "conventional" through the land management section.
Liliana Bravo	2	Land management	22	535	22	549	A comment related to the approach to the subject: I would kindly suggest to adopt a general-to-particular approach i.e. from generalities about types and locations of diverse agricultural systems to detailed ideas about pollination. Thus, wording might place emphasis on the impact of both floral abundance and the availability/type of crop and non-cropped flowers on the temporal and spatial availability of food, nesting, overwintering and mating sites for pollinators.	Thank you for your suggestion, but this kind of general introduction is the subject of Chapter 1.

Liliana Bravo	2	Land management	23	570	23	578	According to the same bibliographic reference (Carvalheiro et. al 2011): It might be helpful to also refer to interactions between honeybees and other insects (e.g. butterflies and moths), which enhance honeybee movement among sunflower heads. Additional references might be also useful to mention such as Rader et al. (2013), who studied pollination services by bees and flies which display different effectiveness of pollination. It is due to they provide pollination services at different times of the day. The full citation is the following: Rader, R., W. Edwards, W., Westcott, D.A., Cunningham, S.A., and Howlett, B.G. (2013). Diurnal effectiveness of pollination by bees and flies in agricultural Brassica rapa: implications for ecosystem resilience ." Basic and Applied Ecology 14(1): 20-27. Herrera (1990) also analyses similar topics as the fact that foraging activity of a pollinator assemblage depends on a combination of factors, e.g., insect body size determines differences in activity patterns. The full citation is the following: Herrera, C. M. (1990). "Daily patterns of pollinator activity, differential pollinating effectiveness, and floral resource availability, in a summer-flowering Mediterranean shrub."	Thank you for the suggestions. Reference (Carvalheiro et al. 2001) and suggested content is added. Deatails and reference by Rader et al. 2013. and Herrera 1990. were finally not added to avoid repettition through the assessment.

Liliana Bravo	2	Land management	23	580	25	618	Regarding mass-flowering crops: It might be helpful to support this topic by mentioning that spatial and temporal changes in lanscape composition can cause transient concentration or dilution of pollinator populations with functional consequences (fourth hypothesis of Tscharntke et. al. 2012). The full citation is the following: Tscharntke, T., Tylianakis, J. M., Rand, T., Didham, R.K., Fahrig, L., Batary, P., Bengtsson, J., Clough, Y., Crist, T.O., Dormann, C.F., Ewers, R.M., Fruend, J., Holt, R.D., Holzschuh, A., Klein, A.M., Kleijn, D., Kremen, C., Landis, D., Laurance, W., Lindenmayer, D., Scherber, C., Sodhi, N., Steffan-Dewenter, I.,Thies, C., van der Putten, W., Westphal, C. (2012). "Landscape moderation of biodiversity patterns and processes - eight hypotheses." Biological Reviews 87(3): 661-685.	Thank you, added.

Liliana Bravo	2	Land management	25	621	25	627	It might be helpful to support this topic by mentioning some ideas related to agribiodiversity and tropical agricultural systems as habitats supporting biodiversity with high-quality matrix that permit the movement of organisms between patches of natural vegetation. More ideas can be found in the following reference: Perfecto, I. and J. Vandermeer (2008). "Biodiversity conservation in tropical agroecosystems: a new conservation paradigm." Annals of the New York Academy of Sciences 1134: 173-200. Ideas related to Traditional multiple cropping systems might be also helpful (for instance, see Altieri 2000, 1999). According to author's studies, those systems are estimated to provide 15–20% of the world's food supply. Altieri, M. A. (2000). "Multifunctional dimensions of ecologically-based agriculture in Latin America." International Journal of Sustainable Development and World Ecology 7(1): 62-75. Altieri, M. A. (1999). "The ecological role of biodiversity in agroecosystems." Agriculture, Ecosystems & Environment 74: 19-31. The following idea according to McNeely and Scherr (2003) might be also helpful: In the Tropics, approximately 70% of land is given over to pastures, agriculture, or a mixture of managed landscapes. McNeely, J.A. and Scherr, S.J. (2003). Ecoagriculture:	We included part of these references.

Liliana Bravo	2	Land management	25	638	25	640	It might be helpful to include a recent study (Bravo-Monroy et. al 2015) related to the effect of both crop management (organic vs. conventional) and the distance to the nearest forest on pollinators which in turn provided a 10.5 ± 2.0% increase in final coffee fruit set. Agricultural practices were assessed (e.g., shade cover, tree densities, tree diversity, coffee plantation age) Full citation is as follows: Bravo-Monroy L., Tzanopoulos J. and Potts S.G. (2015) "Ecological and social drivers of coffee pollination in Santander, Colombia". Agriculture, Ecosystems and Environment 211: 145-154	Ref added.
Liliana Bravo	2	Land management	26	665	26	671	It might be helpful to contrast fertilisers with the use of manure as it is cited by Altieri and Nicholls (2003): the application of animal manures as nutrient sources generally increases the abundance and activity of soil biota. Microbial and protozoan activity are highest in organically fertilized agricultural soils, and the application of manure has been found to increase collembolan populations as well as the abundance and biomass of earthworms in cropped soils. Full citation is as follows: Altieri, M. A. and Nicholls, C. (2003). "Soil fertility management and insect pests: harmonizing soil and plant health in agroecosystems." Soil & Tillage Research 72(2): 203-211.	Thank you for the suggestion, however to keep the content more focused and condensed, this study on soil biota may not be included here.

Liliana Bravo	2	Land management	28	725	28	727	About weed control management: It might be valuable to take some particularities into account: it is common in different tropical regions finding weed growth in places where there is no competition with main crops (e.g. rural roadsides, at the edges of fields). In this way, rich pollen and nectar resources are available throughout the year, especially when main crop is not in bloom.	We think that this aspect has already been covered basically by the sentence.
Liliana Bravo	2	Land management	33	871	33	878	It might be useful to include data about what percentage of world's food supply of crops dependent on insect pollination are provided by greenhouse systems (e.g. according to FAO- FAOSTAT).	Unfourtunately I could not include such a table due to the lack of suitable information dataset.
Liliana Bravo	2	Land management	35	940	37	1010	About urban management: It might be helpful to include ideas of some studies done in urban areas of the neotropics: Nates-Parra, G., Rodriguez, A. Vélez, D, Baquero, P.(2006). Abejas silvestres en ecosistemas urbanos (Insecta, Hymenoptera, Apoidea): estudio preliminar en la ciudad de Bogotá y sus alrededores. Revista Colombiana de Entomología. 32(1) Title of paper in English: "Wild bees in urban ecosystems - preliminar study in Bogota city and surroundings" Nates-Parra, G.,Rodríguez, C., Vélez, D. (2006). “Abejas sin aguijón (Hymenoptera: Apidae: Meliponini) en cementerios de la cordillera oriental de Colombia” Acta biológica, 11(1): 25-35 Title of paper in English: Stingless bees in cemeteries of eastern mountain range of Colombia"	We have looked at these papers but only the abstracts are in English. We don't speak Spanish so it is difficult for us to include details of these studies in the report but we have added some text to acknowledge studies in neotropical areas and included one of these papers as a reference along with further papers.

Liliana Bravo	2	Land management	37	1013	39	1062	Regarding 2.2.3 Conclusion section: Given that multiple factors influence the adoption of a land-use type, it might be helpful to include alternatives of use that promote agricultural yield and pollination services. It is particularly important in tropical smallholder agricultural systems where the implementation of agroecological alternatives, ecological intensification, and multifunctional sustainable landscapes could be viable options. It might be also beneficial to include contextual information as the following: food production is also related to land ownership. In this regard, according to the World Bank (2007), 90% of farmers worldwide have farms below 2 ha and 80% of hungry people live in developing countries where 50% of farmers are smallholders. It appears that agroecological alternatives may provide a way to achieve both high biodiversity and high yields in tropical smallholder agricultural systems (Perfecto and Vandermeer 2008a; 2008b). Given that chapter presents two subsections (land cover and spatial configuration; land management), it might be useful to include info related to two examples of land-use: land sparing and wildlife friendly farming. Thus, a reader might gain a better understanding of systems that integrate production and conservation on the same land;	The issue of smallholder farmers and their importance in food production is now included in the conclusions.

Liliana Bravo	2	Bee management	76	2244	84	2508	In general terms regarding pollinator management section (2.4.2): It might be useful to take into account that there are no formal management practices for commercial pollination in tropical countries (e.g. Colombia), where most farmers rely on ambient levels of pollination services provided by the local pollinator fauna (i.e. “unmanaged” pollinators). Often in these systems, beekeepers are primarily interested in honey production and not providing pollination services; particularly in the case of honeybees (Apis mellifera) and stingless bees. Practical considerations may therefore be taken into account to promote abundant and species-rich pollinator communities which in turn enhance agricultural yields e.g., by growing crops in close proximity to forest patches, fostering weed growth at the edges of farms, on rural	added a sentence to capture this on line 2308.

Liliana Bravo	2	Bee management	76	2245	78	2313	About the Honeybee management subsection (2.4.2.1): The section places emphasis on negative effects of honeybee movement to new areas. It might be also helpful to include more information about different type of interactions or local bee patterns after honeybee arrival. For instance: According to Roubik (2009): The presence of newly-arrived feral Africanized honey bee Apis mellifera (Apidae) was assessed. Native bee populations were studied for 10-17 years in areas previously with few or no escaped European apiary honey bees (French Guiana, Panama and Yucatan, Mexico). The exotic Africanized honey bees did not produce a negative effect on native bees, including species that were solitary or highly eusocial. However, the native bees shifted their foraging time or floral species. Authors found that when faced with competition by African honey bees the native bees simply switch their feeding to similar trees, shrubs and vines that flower at the same time as their first preferences. A diversity of flowering plants in the rainforests afford native solitary bees alternate feeding choices and they take advantage of them. A principal conclusion is that such competition is silent, in floristically rich habitats, because bees compensate behaviorally for competition. Other factors limit their populations. The study of Brittain et al. (2013) in California is also	Added a sentence to capture this on line 2298.
Liliana Bravo	2	Bee management	81	2414	83	2476	About the Stingless bee management subsection (2.4.2.3):	done

Liliana Bravo	2	Bee management	81	2415	81	2415	It might be beneficial to include additional references of South America, for instance Nates-Parra has studied Meliponini and associated meliponiculture. Suggested citations: Nates-Parra, G. (2004). Abejas Corbiculadas de Colombia [The Corbiculate Bees of Colombia] Bogotá: Universidad Nacional de Colombia. Nates-Parra, G. (2001). "Las abejas sin aguijón (Hymenoptera: Meliponini) de Colombia." Revista Biota Colombiana 2(3): 233 - 248.	added
Liliana Bravo	2	Bee management	84	2510	84	2524	Concerning the Conclusion passage (2.4.3): Despite the fact that section places emphasis on separated management of pollinators, it could be worthwhile to include also a paragraph about the complementarity and interactions between bee species (and other insects) as occurs in many regions with "unmanaged" polinators. i.e. pollinator assemblages with impact on pollination efficiency and effectiveness. In line with this, it might be useful to include recommendations for promoting pollinator friendly habitats.	Yes, you are ritgh about the interacion, however, this section is describing the effect of managment itself on pollinator decline, not the complementarity and interaction of managed and unmanaged specie on pollination effectiveness.
Linda Field	2	Pesticides	41	1128	41	1130	It needs references for these statements	reference added
Linda Field	2	Pesticides	44	1235	44	1235	after ….pestcides) add or synergists	amended
Linda Field	2	Pesticides	49	1404	49	1404	the use of the term 'prophylactic' needs defining and this should perhaps include the fact that it does not mean used unnecessarily, as the need to control some pests can be predicted	deleted prophylactic for clarity and referred to widespread use
Linda Field	2	Pesticides	50	1434	50	1434	at the first mention of 'sublethal' it should be defined	They are already defined in the text as "the effects on individuals that survive exposure", but the sentence has been improved.

Linda Field	2	Pesticides	55	1600	56	1634	Somewhere in this box there should be mention of the fact that not all neonicotinoids are equally toxic to bees. There is a vast difference between say Thiacloprid which is relatively non-toxic to bees and Imidacloprid which is much more toxic	added
Linda Field	2	Pesticides	62	1819	63	1842	This section is about 'veterinary medicines' but many of the chemical are also 'insecticdes/miticides' needs to be clarified	amended
Linda Field	2	Diseases	68	1994	68	1994	In this section on 'honeybee disease and pests' there should be a section on direct effects of Varroa, this seems to be missing and only its role as a virus vector is discussed. It should include mention of control of Varroa by 'grooming' as seen in Apis cerana	Several comments wanted more detail on effects of Varroa; added extra text and references on Varroa to the end of section 2.4.1.1.4 Parastitic mites.
Luisa Carvalheiro	2	ES	7	55	7	66	I think these 2 sections would stay better if merged into a single paragraph	Done

Luisa Carvalheiro	2	ES	8	94	8	95	I don't think there is scientific support for the statement: invasive plants rarely change overall pollinator diversity and abundance. That certainly depends on the scale at which the evaluation is made. If we are talking of large scale evaluations (e.g. country level), the statement is likely true, but if we are talking about finer spatial scales (e.g. a small nature reserve) this is unlikely to be true, specially if the invasive plant is a grass offering little floral resources. I think the impact of invasive plants that do not offer nectar has been little studied, so generalizations should be cautious. But even with plants that do offer nectar there are some examples in literature of local scale impacts on pollinator richness (e.g. Lopezaraiza-Mikel et al. 2007. Ecology Letters, doi: 10.1111/j.1461-0248.2007.01055.x	We understand your point. However, the literature assessed does support the statement made. In the main revised text we state: "There is, however, little evidence from meta-analyses or reviews (Bjerknes et al., 2007; Montero-Castaño and Vilà, 2012; Stout and Morales, 2009), and only very few individual examples (Lopezaraiza-Mikel et al., 2007; Moron et al., 2009; Nienhuis et al., 2009) of alien plant invasions consistently lowering overall pollinator diversity or abundance". So we do acknowledge some notable exceptions the the general pattern. Following your scomment we have now revised the sentence in the executive summary to read: "Invasive alien plants and pollinators rarely change overall pollinator abundance or diversity (although there are several specific examples), but can have direct negative effects on particular native species (established but incomplete)."
Luisa Carvalheiro	2	ES	10	148	10	150	This sentence on effects of environmental regulation for pollinator conservation is a bit lonely. I think it would be good either to expand this topic and talk about other conservation policies, or remove it.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Luisa Carvalheiro	2	Land use	12	234	12	234	Figure 2.2.1 should have also an indirect effect arrow between pollinator diversity and pollinator movement, since inter-specific interactions are known to affect pollinator movement (see Greenleaf and Kremen 2006 cited in this Chapter; Carvalheiro et al. 2011 Ecology letters; cited in this chapter)	Done.
Luisa Carvalheiro	2	Land use	18	441	18	441	replace 'fruit set'by 'crop fruit set'	done

Luisa Carvalheiro	2	Land use	19	452	19	453	as mentioned elsewhere in this Chapter, there are many other possible explanations: e.g., complementary of foraging habits; inter-specific interactions that enhance effectiveness of the abundant pollinators. I suggets to either expand this sentence so that it covers more than one possible explanation, or remove this sentence.	Following this comment we have now modified this sentence and have now included some other possible explanations.
Luisa Carvalheiro	2	Land management	20	489	21	492	this section may be interpreted by the reader as no benefits were found in the tropics. I suggest to replace "was" by "could be" in line 490; and to write the following setence as "Such difference was found for Mediterranean and temperate regions, benefits being less accentuated in the tropics"	Done.
Luisa Carvalheiro	2	Land management	22	523	22	523	I thinks its better to remove 'However"from the start of the paragraph	Done.
Luisa Carvalheiro	2	Land management	22	528	22	528	another example of large organic monoculture in mangoes in South Africa (refs could be Carvalheiro et al. 2010. J. Ap. Ecol. 47 810-820 or Carvalheiro et al. 2012 J. Ap. Ecol. 49, 1373–1383	Reference is added, thank you.
Luisa Carvalheiro	2	Land management	23	570	23	570	This type of inter-specific interactions does not bring a benefit to the pollinator itself, so its better to replace "pollinator species can also facilitate each other" by "pollinator species can also increase the efiiciency of each other"	Done.
Luisa Carvalheiro	2	Land management	28	725	28	725	Lagerlof studied Fabaceae in Sweden, not sunflowers in South Africa	Right, thank you for your note. Citation is replaced to the right sentence.
Luisa Carvalheiro	2	Land management	34	922	34	922	another study showing the same but with wild (rather than planted) plants is Carvalheiro et al. 2011 Ecology Letters	Added.
Luisa Carvalheiro	2	Pesticides	44	1229	44	1229	In South Africa, pesticide use and isolation from natural habitat were associated with declines in flying visitors and in mango production(Carvalheiro et al. 2012 J. Ap. Ecol. 49, 1373–1383), although this effect was not detected in a previous year (Carvalheiro et al. 2010. J. Ap. Ecol. 47 810-820)	references added

Luisa Carvalheiro	2	Invasives	89	2662	89	2662	another indirect effect of predators is that, even when no predation occurs, they can alter pollinators behaviour potentially affecting their efficency (e.g. Dukas 2001, Ecology Letters, vol 4, pp327–333; Dukas and Morse 2003, Oikos, vol 101, pp157–163)	Added this point, and citation to support it.
Luisa Carvalheiro	2	Invasives	90	2705	90	2708	while this might true there is evidence of changes in foraging patterns of native bees, at least in South America (Roubik, Acta biol. Colomb., Vol. 14 N.º 2, 2009 115 - 124; Roubik, Ecology, 61(4), 1980, Pr. 836-845)	Revised: "Alien honey bee populations have become readily integrated into pollinator communities and direct competition for food has sometimes altered native wild bee behaviour and reproductive success in a locale, although these species interactions are highly dynamic (Dohzono and Yokoyama, 2010; Roubik, 1980; Roubik and Wolda, 2001; Thomson, 2004; Traveset and Richardson, 2006). There have been very few reports of invasive alien honey bees through such competition reducing the survival or densities of native wild bees (Kenis et al., 2009; Paini, 2004; Roubik and Wolda, 2001; Yang, 2005) and to date no extinctions recorded (Goulson, 2003; Moritz et al., 2005; Paini, 2004; Traveset and Richardson, 2006). "
Luisa Carvalheiro	2	Climate change	94	2814	94	2814	replace 'food' by 'resources' (so that it can include water, soil nutrients and other resources)	we have removed this part of the senctence
Luisa Carvalheiro	2	Multiple effects	107	3232	107	3232	why the "but"? The first of the sentence does mention threats, and the second part of the sentence is just one example. Maybe it is better to replace "but" by "and"	typo corrected
Luisa Carvalheiro	2	Indirect effects	112	3405	112	3406	This sentence refers to future trends, yet it is based on a study that is 16 years old. It would be good to either use a more recent reference or mention if such predictions are indeed happening	Rephrased and a more recent reference has been added
Madeleine Chagnon	2	Figures	1	4	1	4	2_figures yellow font not readable	Will be worked out by graphic designer

Madeleine Chagnon	2	General	2	title	2	title	Drivers of changes in pollinator species, pollination network ..... ?	Yes, that's the title, actually it is: "Drivers of change of pollinators, pollination networks and pollination services"
Madeleine Chagnon	2	Figures	4	44	4	50	2_figures is seed coating included in these data ? Neonicotinoides seem low	yes
Madeleine Chagnon	2	ES	6	43	6	44	are less well documented (if there are no studies it can not be controversial)	in revision of this statement it now reads: The few available field studies assessing effects of field-realistic exposure, provide conflicting evidence of effects based on the species studied and pesticide usage (established but incomplete)
Madeleine Chagnon	2	ES	6	51	6	53	I do not agree. New studies have demonstrated clearly effects on bumblebees	The revised text reads: "It is currently unresolved how sublethal effects of pesticide exposure recorded for individual insects affects colonies and populations of managed bees and wild pollinators, especially over the longer term." Effects at higher levels of biological organsiation are not proven in the case of sublethal effects, this represents a knowledge gap. We do highlight in the same paragraph a sentence (pertaining to Rundlof et al): "There is evidence from a recent study showing field-scale impacts of neonicotinoids on wild pollinator survival and reproduction (established but incomplete)" to highlight the effect on bumblebee queen production - a colony parameter.
Madeleine Chagnon	2	Figures	6	51	5	55	2_figures only 3 countries. Difficult to get a global picture	This refers to Figure 2.3.2; the examples have been chosen because of the availability of data

Madeleine Chagnon	2	ES	6	54	6	54	there is at lot of evidence (van der Sluis et al., 2014	The revised text reads: "It is currently unresolved how sublethal effects of pesticide exposure recorded for individual insects affects colonies and populations of managed bees and wild pollinators, especially over the longer term." Effects at higher levels of biological organsiation are not proven in the case of sublethal effects, this represents a knowledge gap. Most evidence for sublethal impacts comes from lab/semi-field studies, not true field studies, and mostly is focussed on impacts on individuals. We do highlight in the same paragraph a sentence (pertaining to Rundlof et al): "There is evidence from a recent study showing field-scale impacts of neonicotinoids on wild pollinator survival and reproduction (established but incomplete)" to highlight the effect on bumblebee queen production - a colony parameter.
Madeleine Chagnon	2	Figures	6	56	6	82	2_figures should include water puddles in feilds Samson-Robert et al., 2014	refers to figure 2.3.3; we tried to keep it schematic and as simple as possible, thus we did not go too much into detail
Madeleine Chagnon	2	Figures	10	115	10	149	2_figures Should be on one whole page. Font is small. Interesting data	these are aspects of the final design which will dealt with through the support by a graphic designer
Madeleine Chagnon	2	Figures	10	149	10	149	see wording	these are aspects of the final design which will dealt with through the support by a graphic designer

Madeleine Chagnon	2	Pesticides	39	1079	39	1079	There are numerous scientific papers recently published on this subject; no knowledge gap.	We have added some really up-to-date references on this - and also according to these there are still remaining knowledge gaps. The text now reads: "Despite this high level of scrutiny, some knowledge gaps remain (Blacquière et al. 2012; Godfray et al. 2014; Lundin et al. 2015)"
Madeleine Chagnon	2	Pesticides	45	1255	45	1256	add water puddles; Samon-Robert et al., 2014•DOI: 10.1371/journal.pone.0108443	water added
Madeleine Chagnon	2	Pesticides	46	1289	46	1289	add water puddles; Samon-Robert et al•DOI: 10.1371/journal.pone.0108443	major routes of exposure identified; residues have been detected but this has not been highlighted as a major route of exposure; added to text
Madeleine Chagnon	2	Pesticides	49	1408	49	1408	chronic what ?? chronic exposure ?	amended
Madeleine Chagnon	2	Pesticides	49	1409	50	1413	This is a very long sentence with opposing staments. Difficult to read and understand.	amended
Mahmood-ur-Rahman Ansari	2	ES	7	55	7	60	Name few sub-lethal effects of GMOs on behaviour of honeybees.	This is covered by reference to the Chapter section text, we have to try to minimise detail in the ES.
Mahmood-ur-Rahman Ansari	2	Intro	11	180	11	190	Rapid urbanization and un-controlled industrialization may also be potential drivers in change of pollinators in the developing world.	This is included under land management in 2.2.2
Mahmood-ur-Rahman Ansari	2	Land use	13	254	13	262	Deforestation is a source of loss of natural habitat for honeybees. Lower trend of agro-forestory may also be another source. Increase of agricultural land is no doubt due to deforestation which may also cause migration of pollinators, thus disturbing the local ecosystem.	We do not understand what the reviewer's suggestion is here. This comment appear to us as a summary of what we state in this part of the chapter.
Mahmood-ur-Rahman Ansari	2	Land management	21	516	21	517	The authors should differentiate between the local population of pollinators in isolated organic landscape and the visiting pollinators.	Local is added.

Mahmood-ur-Rahman Ansari	2	Land management	22	540	22	545	Mixed cropping system may also contribute positively towards pollination services as well as its financial benefits to farmers especially in developing world.	Added.
Mahmood-ur-Rahman Ansari	2	Land management	26	664	27	688	The authors should also study the effect of using compost and other organic material and their possible influence on pollinator activities. There are some studies available on the subjetc, e.g. Little at al. 2011; Cardoza et al. 2012 & Little and Cardoza 2011; etc.	Thank you for the suggestion, however to keep the content more focused and condensed, such studies on other inportant ecosystem services may not be included here.
Mahmood-ur-Rahman Ansari	2	Land management	29	770	29	772	The timing of the grazing is very important. Grazing at flowering stage may have strong negative effects on pollination process.	Added.
Mahmood-ur-Rahman Ansari	2	Land management	31	826	31	833	Burning of left overs in wheat and sugarcane fields after harvesting is very common in some Asian countries like Pakistan and India and some others. It may has a disastrous effect on disturbing natural habitats of many insect species. Moreover, fire may have some negative effects on soil quality and texture, etc.	Thank you for the suggestion, but to incorporate this aspect recommendation on a peer-reviewed paper would be needed to cite.
Mahmood-ur-Rahman Ansari	2	Land management	35	939	37	1010	Rapid urbanization without proper planning is a main problem in developing countries. Moreover, it is increasing trend of cutting trees in urban areas, reducing park lands and vegetation. It is causing serious problems to human beings iving in those areas, like sudden increase in temperatures, less availability of water and other climatic issues. The authors need to include this aspect in section 2.2.2.4	We appreciate the point that the reviewer has made, however this section is about the effect of urban land management on pollinators rather than the problems for human beings. If the referee can recommend a reference that links urban planning to pollinators we would be happy to include it.

Mahmood-ur-Rahman Ansari	2	GMO	58	1682	59	1707	Bt crops have genes coding for some toxins which are specific to some insect orders especially lepidoptera. Members of lepidoptera are badly affected by these toxins which may cause ecological disturbance of insect populations. The insects which are non-target to Bt toxins may increase while the target insect population decrese significantly. The authors need to discuss the issue. Moreover, Lepidopteran insects are also involved in pollination process which is badly affected if they are killed by Bt proteins.	We agree with the reviewer that this is important. Indeed, we are already mentioning the points the reviewer mentions in several parts of the section. For instance, we mention that IR-crops could potentially lead to changes in communities in and around fields. Also, we expand on the effect of Bt-toxins on Lepidoptera pollinators.
Mahmood-ur-Rahman Ansari	2	GMO	60	1756	61	1765	Gene escape from transgenic to non-transgenic crop may also lead to have negative effects. On the on hand, It may genetically contaminate the non transgenic crop while on the other hand, it is source of insect ecosystem in the area. Especially in case of cotton, which is often pollinated crop, the ratio of gene escape is very high (please see Ramzan et al. 2014).	based on this comment, the sentence has been now modified.
Mahmood-ur-Rahman Ansari	2	Pesticides	63	1845	63	1852	Due to heavy industrialization, gaseous emission is increasing which is a big source of increasing temperature. This increasing temperature is also affetcting insect populations badly. Effects of increasing temperature on pollinators should also be discussed.	This is discussed in depth in the section dealing with climate change (section 2.6)
Mahmood-ur-Rahman Ansari	2	Invasives	85	2551	91	2739	Please provide few examples of invasive plants, plant pathogens, herbivores, predators, pollinators. May be in the form of a Table.	Best addressed by provision of panel of photos,showing an e.g. of different invasive species. Job for graphic artisit to source images and I can advise on species to use to illustrate.

Mahmood-ur-Rahman Ansari	2	Climate change	93	2785	93	2792	Please describe what is climate change and its key elements.	WE have now included a definitin taken from: IPCC, 2013: Annex III: Glossary [Planton, S. (ed.)]. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
Mahmood-ur-Rahman Ansari	2	Figures	Fig. 2.3.5	92		92	There is no need to write the number 28	But we think it is good to know to how many countries the GMO figures refer to
Mahmood-ur-Rahman Ansari	2	Tables	Table 2.2.2				The Table is confusing. The authors need to create a better correlation between columns. It is hard to understand the relationship of FACTOR and EFFECT.	The table has been now modified and we are confident that the message is clearer now.
Márcia Motta Maués	2	General	0	0	0	0	It was an enormous pleasure to read this Chapter! Well done! Excellent contribution!	Thank you very much - very encouraging
Márcia Motta Maués	2	ES	5	3	5	11	Why is it necessary to repeat (well stablished) & (stablished but incomplete)?	This is part of the four-box model which caputes the uncertainty around the evidence contained in this assessmet. This four box model, now finalised, is presented in the Summary for Policy Makers which fronts the assessment
Márcia Motta Maués	2	ES	6	47	6	47	"with only a few studies on bumble bees and stingless bees" please add stingles bees, as there are some studies about the sublethal impacts of inseticides on these bees too in Brazil	Now reads: Most studies on pollinator sublethal impacts of insecticides have tested a limited range of pesticides, recently focusing on neonicotinoids, and have been carried out using honeybees and bumblebees, with fewer studies on other insect pollinator taxa.

Márcia Motta Maués	2	Land use	13	240	14	288	Maybe you should consider also the patterns in β diversity driven by disturbance in the Amazon Forest, as shown by SOLAR et al 2013. Partitioning diversity across multiple scales and taxa reveals widespread biotic homogenization and divergence in species composition in human modified tropical forests. In: INTECOL 2013, 2013, Londres. INTECOL 2013 ABSTRACT BOOK. Londres: Wiley and SOLAR 2014 (www.sifloresta.ufv.br/.../Tese_Ricardo-Ribeiro-de-Castro-Solar.pdf?...1...). These publications bring information about diversity across multiple scales and taxa reveals widespread biotic homogenization and divergence in species composition in human modified Tropical forests, including Orchid Bees.	The proposed references have been now added.
Márcia Motta Maués	2	Land use	15	3215	18	400	Please consider to include the publications from Mauricio Quesada and colleagues in this topic, e.g. QUESADA et al 2004. Effects of Forest Fragmentation on Pollinator Activity and Consequences for Plant Reproductive Success and Mating Patterns in Bat-pollinated Bombacaceous. BIOTROPICA 36(2):131-138. 2004 (Treeshttp://www.bioone.org/doi/abs/10.1646/Q1571) and BREED et al 2013 Mating patterns and pollinator mobility are critical traits in forest fragmentation genetics . Heredity (2013), 1–7. (https://www.researchgate.net/publication/256425181_Mating_patterns_and_pollinator_mobility_are_critical_traits_in_forest_fragmentation_genetics)	done
Márcia Motta Maués	2	Land management	22	527	22	527	Reference is missing	References are added.
Márcia Motta Maués	2	Land management	22	528	22	528	Reference is missing	Reference is added.

Márcia Motta Maués	2	Land management	24	647	25	662	Reduced Impact Logging in Central Amazon Rainforest change the pollinators species composition of timber trees pollinators (MAUÉS, M.M.; OLIVEIRA, P.E.A.M. & KANASHIRO, M. 2007. Reduced impact logging and its effects on the pollination of Amazonian plants. Pp. 50-51. In: Annals of 9th International Pollination Symposium on Plant-Pollinator Relationships - Diversity in Action. Iowa State University, Ames, Iowa.) Please also check: http://repositorio.unb.br/handle/10482/6479; https://www.researchgate.net/publication/235989744_CONSEQNCIAS_DA_FRAGMENTAO_DO_HABITAT_NA_ECOLOGIA_REPRODUTIVA_DE_ESPCIES_ARBREAS_EM_FLORESTAS_TROPICAIS_COM_NFASE_NA_AMAZNIA	Thank you to highlight these studies. Study by Maues et al. is included.
Márcia Motta Maués	2	Land management	34	921	34	921	Instead of "ameliorate" is it possible to use "mitigate"?	Changed.
mariadoss Selvanayagam	2	ES	6	42	6	46	can we have some sample values	Sorry not in the ES, it is a limitation of the style, there are always clear Chapter section citations to guide the reviewer to the underlying evidence.
mariadoss Selvanayagam	2	ES	7	67	7	67	I think bids should be birds	Text deleted and replaced with other content.
mariadoss Selvanayagam	2	Land management	20	479	20	482	add polyculture farming or cultivation	Done.
mariadoss Selvanayagam	2	Pesticides	41	1120	41	1124	studies related to neonicotinoid in Canada may be added	examples are provided not an exhaustive list
mariadoss Selvanayagam	2	Bee management	76	2253	76	2258	Apis indica may also be included	added Apis indica

Marina Rosales Benites de Franco	2	Land management	26	650	26	650	…..and this have severe impacts on plant composition ecosystem structure.	Revised.
Marina Rosales Benites de Franco	2	Land management	38	1034	38	1034	Creating a more diverse agricultural landscape with ecological corridors through…..	Thank you for the suggestion, but we think that ecological corridors for many people would mean corridors of natural habitat, which would be confusing here. Therefore we included "promote connectivity " instead.
Marina Rosales Benites de Franco	2	Land management	39	1061	39	1061	Therefore, maintenance ecosystem healthy and optimal management at such…..is highly recommended.	Revised.
Marina Rosales Benites de Franco	2	Pesticides	67	1960	67	1970	…pointing to the need of more studies on this topic and use precautionary principle on this matter.	this is a policy decision (Ch 6) not a driver
Mark JF Brown	2	Diseases	67	1982	67	1982	Citation needed here for claim that DWV can move from honey bees to bumblebees	added Furst et al. 2014 reference
Mark JF Brown	2	Diseases	69	2038	69	2039	No citation given, and no information on the impact of Acarapis woodi	added sentence on the effects of tracheal mites and several references added
Mark JF Brown	2	Diseases	70	2057	79	2057	The role of pathogens in driving bumblebee declines is not global, but rather geographically restricted to the Americas	Added.
Mark JF Brown	2	Diseases	71	2095	71	2095	Meeus et al is a review, Singh et al is a weak study - a more rigorous study has just been published and should be cited here	Ref added
Mark JF Brown	2	Diseases	71	2100	71	2100	Again, no acknowledgement of the 2nd species of Crithidia	Sentence and reference added, thanks.
Mark JF Brown	2	Diseases	71	2101	71	2101	Incomplete - no description of impact of this parasite	Added
Mark JF Brown	2	Diseases	71	2102	71	2101	Again, incomplete - no description of impact	Description of impact for C. bombi has just been added before, and for A. bombi, added with the example of south America.
Mark JF Brown	2	Diseases	71	2106	71	2106	Brown et al 2003 is an incorrect reference here as it is about Crithidia, not fungi.	Corrected

Mark JF Brown	2	Diseases	71	2111	72	2115	There is no evidence that the tracheal mite can reduce colony survival and reproduction. It is associated with lethargy in individual bees, which is the Husband and Sinha reference - no experimental analysis of the impacts of this parasite have been conducted	Corrected accordingly.
Mark JF Brown	2	Bee management	81	2404	81	2406	Kraus et al did not show introgression, despite the claims in their paper. They sampled bees in the wild and used population genetics to assign them to commercial or non-commercial populations. Given that we know that commercial bees forage away from greenhouses (as previously cited in this report) and that the proportion of bees assigned to commercial populations declines away from greenhouses, what Kraus et al show is that the further you get away from greenhouses the fewer commercial bees you find. Thus, there is, as yet, no good evidence for genetic introgression between commercial and wild bumblebees	We consider however the wording they use in a peer-reviewed journal in conservation genetics.
Mark JF Brown	2	Tables	Table 2.4.1 p. 2				In rows for Crithidia bombi and Apicystis bombi, Psithyrus is a subgenus of Bombus and so should not be listed and referred to as a separate genus	we have now stated explicitly that Psithyrus is a subgenus
Mark JF Brown	2	Tables	Table 2.4.1 p. 2				Crithidia expoeki missing in list of pathogens/parasites	added; the citation is already in the list: number 17
Martin Dermine	2	Pesticides	40	1112	40	1112	chronic' toxicity should be added to sublethal	subethal effects are not just following chronic exposure they can also occur after a single acute exposure, e.g. Henry et al 2012
Martin Dermine	2	Pesticides	40	1121	40	1121	Here should also be added "depending on training or advisory system of the farmer, depending on cultural use of pesticides.	Heong et al 2014 Heong et al 2013 added

Martin Dermine	2	Pesticides	41	1149	41	1149	Sustainable intensification is a terminology produced by the pesticides industry. We do not consider appropriate that a UN document conveys such terminology. Furthermore, the study that is referenced here, Godfray 2010 is a non-peer reviewed publication, written by scientists that openly have conflicts of interests - receiving money from Bayer - and who do not make original publications on the topic they discuss about.	Godfray et al 2010 is peer reviewed; disgree with comment on impartiality
Martin Dermine	2	Pesticides	43	1210	43	1210	"inappropriate use of pesticides". The word "inappropriate" should be suppressed. This is the kind of wording the pesticides industry uses. Scientific studies show that use of pesticides can be linked to negative environmental consequences. No scientific peer-reviewed study mentions that only "inappropriate use of pesticides" leads to bee decline... The two mentioned studies refer to pesticides exposure, not to appropriate or inappropriate use of pesticides!	definition added for appropriate use see other comments
Martin Dermine	2	Pesticides	44	1243	44	1243	Concerning fig. 2.3.2, it should appear in the figure that the information provided concerns acute toxicity as little is known on chronic and sublethal toxicities and the "non-toxic" wording is not correct as it concerns only acute toxicity	amended to acute hazard
Martin Dermine	2	Pesticides	44	1251	44	1251	In this sentence should be added "physico-chemical" properties of the pesticide.	amended to clarify that list is not inclusive
Martin Dermine	2	Pesticides	45	1255	45	1255	Contaminated water should be added to this paragraph.	water added
Martin Dermine	2	Pesticides	45	1279	45	1281	This last sentence is incomplete. Apenet research project demonstrated that the "appropriate technical measures" here mentioned did not solve entirely the problem, e.g. using deflectors induce a higher dispersal of fine neonicotinoids particles when sawing. So technical measures may induce worst exposure.	techical meaures in Apenet differed to those more recently identified but added no single measure is likely to provide the solution

Martin Dermine	2	Pesticides	48	1353	48	1355	Please indicate the percentage of incidents due to misuse of pesticides as the sentence, as it is written does not permit a reader to realize if it is 5 or 95% of the incidents. Please also indicate what are the other causes.	amended based on avaialble information
Martin Dermine	2	Pesticides	48	1367	48	1367	The EPPO2010 scheme was strongly criticised in EFSA's scientific opinion on the science behond the risk assessment of pesticides on bees. I would thus not mention this scheme as "validated".	the HQ was identified as appropriate by use of the incident data -
Martin Dermine	2	Pesticides	49	1408	49	1408	"chronic…EXPOSURE", exposure missing	amended
Montserrat Vilà	2	Invasives	85	2526	85	2530	The two sentences mean almost the same	Thanks, we have merged and revised these two sentences.
Montserrat Vilà	2	Invasives	85	2559	85	2561	The sentence is difficult to follow	revised sentence structure
Montserrat Vilà	2	Invasives	86	2558			the term "the strenght of the interaction" needs to be defined	Defined in revised text
Montserrat Vilà	2	Invasives	86	2573			Correct the last name throughout the text for: Vilà et al. 2009	Done
Montserrat Vilà	2	Invasives	86	2576			Add: Bartomeus I., J. Bosch y M. Vilà. 2008. High invasive pollen transfer, yet low deposition on native stigmas in a Carpobrotus-invaded community. Annals of Botany 102: 417-424.	Done
Montserrat Vilà	2	Invasives	86	2586			Correct the last names throughout the text for "Montero-Castaño and Vilà"	Corrected
Montserrat Vilà	2	Invasives	86	2596	87	2597	Several terms defining the characteristics of networks could be described in Chapter 1	Passed on your suggestion to the Chapter 1 writing team
Montserrat Vilà	2	Invasives	87	2589			Remove "and function" because function of pollination si not described in the section	Corrected
Montserrat Vilà	2	Invasives	87	2591			Add, "and plant invaders cause rewiring of the plant-pollinator interactions (Bartomeus I., M. Vilà y L. Santamaría. 2008. Contrasting effects of invasive plants in plant-pollinator networks. Oecologia 155: 761-770.)	Added some text and this citation
Montserrat Vilà	2	Invasives	87	2593			Correct the last names throughout the text for "Montero-Castaño and Vilà"	Done
Montserrat Vilà	2	Climate change	104	3133			González-Varo	thanks, done

Montserrat Vilà	2	Figures	Fig 2.3.2				Remove % in y-axis values	Will be done
Montserrat Vilà	2	Figures	Fig 2.7.1				Red arrows missing	Colours were changed to black and white.
Montserrat Vilà	2	Tables	T2.2.1				negative/positive 3.0:1	corrected; thanks
Montserrat Vilà	2	Tables	T2.3.1				Meaning for "If systemic specific exposure/impact assessment"?	If it is not in assessment we should rebut it as it is not backed by evidence, just his opinion.
Montserrat Vilà	2	Tables	T2.4.2				Not clear that a confidence can be low if supported by a study	confidence term deleted and evidence term inserted
Montserrat Vilà	2	Tables	T2.5.1				Vilà	corrected; thanks
Montserrat Vilà	2	Tables	T2.5.1				Add: González-Varo et al.	sorry, we did not know where to put it (comment wasn't specific enough)
Montserrat Vilà	2	General					GENERAL COMMENT: Categories for confidence levels need to be defined	The so-calles 4-box-model will be applied across the assessment and defined for the entire document
Neal Williams	2	ES	5	17	5	17	text discusses the idea of undisturbed soil as important but it is not clear that undisturbed is uniformly best. In dry desert areas and other arid environments soil disturbance is important.	This sentence principally deals with agricultural monoculture systems, however, we have rephrased as: 'such as suitable areas (e.g. undisturbed) of soil' to cover all cases for different species.
Neal Williams	2	ES	6	42	6	54	I find the summary of neonics good and useful; however the singular focus on them here miss directs readers. Other pesticides have in the past and recently been show to have both lethal and sublethal impacts on different bee species. By omitting the point, I worry that other toxins are given a pass.	Neonicotinoids due to their policy and media profile required flagging up. However, in the revision of the sublethal bullet we do try and broaden out, mentioning 'pesticides including insecticides' - to capture effects of fungicides, pyrethoids etc these and their lethal and sublethal effects are well covered in the Chapter section (which is cited here in ES)
Neal Williams	2	Land use	19	452	19	452	This would be a good location to also identify synergies that increase the quality of pollen transfer (e.g., Brittain et al 2013)	Done. Also see answer to point 236

Neal Williams	2	Land management	21	502	21	511	either at 502 or 511 would be a good location to include recent paper by Forrest et al 2015 J Applied Ecology which compared organic and conventionla and found differences in diversity, but not in functional diversity. Take home here that characterstics of agricultural disturbance may not always be mitigated by organic management, depending on the underlying mechanisms affect pollinator populations.	Added, thank you.
Neal Williams	2	Land management	31	819	31	819	word conditioner is jargon to me	Explained.
Neal Williams	2	Land management	32	865	32	865	reword here doesn't make sense	The sentence was revised.
Neal Williams	2	Land management	33	895	34	933	The whole paragraph that follows seems just to give more orchard specific information about what was stated earlier in the chapter. I would combine these ideas together (perhaps with things around page 19)	The section was restructured, the subsection about orchards was mowed after the arable systems, and treated separately from greenhouses.
Neal Williams	2	Land management	34	907	34	909	Two refs to Brittain et al. 2013 These are the same in the references BUT they are actually different studies, both good and important. Need to fix the reference list.	One of the studies is deleted.
Neal Williams	2	Land management	35	951	35	251	Add Williams Winfree ref 2013 Biological Conservation. Native wildflower in woodland patches in urban areas looks at plant reproduction and pollinator communities	We have added this reference.

Neal Williams	2	Diseases	73	2171	76	2242	This whole section is certainly interesting, but seems to be too much to stay on message for the chapter. This is a very large chapter and streamlining would help. Nothin in this section really addresses directly to topic DRIVERS OF CHANGE. The way it is presented it does not speak to existing identified threats to managed bees or wild bees,rather just a list of pathogens, parasites etc. I suggest a careful rewrite in just a couple of paragraphs focusing on identified threats and the sorts of exploration that are needed to really document diseases parasites, etc IMPACTS on these solitary bees.	We are glad you like this section. We tried to keep it brief, yet as informative as possible, because solitary bee managment is a developing industry, with still serious knowledge gaps concerning bee health. We mentioned the known cases of losses caused by some of these agents. However, the lack of information about losses caused by other agents does not exclude their negative impact on bees. Therefore -also based on positive comments received about this section-, that we will keep it with such detail.
Neal Williams	2	Bee management	77	2298			best reference for such competition is Diane Thomson Ecology paper with Bombus 2004.	Added
Neal Williams	2	Invasives	88	2634		2643	Remove this section. It is so speculative and reads as tangential	This section was suggested by an earlier reviewer. While evidence is lacking there is potential, but we make clear it is speculative (which is a confidence rating in this assessment), also a function of this assessment is to identify knowledge gaps. So with greatest respect we will leave this in .
Neal Williams	2	Invasives	89	2661		2671	I would use the compelling work of Hanna et al 2013 (J Applied Ecology) removal of invasive Vespula allowed for recovery of pollination- interesting twist was the positive role of a second exotic invasive (apis mellifera) This richer narrative is valuable to illustrate the complexity of interactions with predators, mutualists, and natives in such interactions.	Very good point, we had already picked up this citation during literature seraches and have followed your good suggestion to use this study as an illustrative example.

Neal Williams	2	Invasives	90	2708	2710	I think to some extent this presentation misrepresents some key points. Apis populations outside their native range almost certainly have negative impacts on native species of bees locally to where they are managed in large numbers. This is to be expected through intense resource competition. See work of DianeThomson Ecology 2004. What is lacking is understanding of the degree or extent of the impact. Certainly as worded the paragraph is correct we don't have evidence for extenctions, etc.	Revised: "Alien honey bee populations have become readily integrated into pollinator communities and direct competition for food has sometimes altered native wild bee behaviour and reproductive success in a locale, although these species interactions are highly dynamic (Dohzono and Yokoyama, 2010; Roubik, 1980; Roubik and Wolda, 2001; Thomson, 2004; Traveset and Richardson, 2006). There have been very few reports of invasive alien honey bees through such competition reducing the survival or densities of native wild bees (Kenis et al., 2009; Paini, 2004; Roubik and Wolda, 2001; Yang, 2005) and to date no extinctions recorded (Goulson, 2003; Moritz et al., 2005; Paini, 2004; Traveset and Richardson, 2006). "
Neal Williams	2	Climate change	96	2873		This is I think overstated with respect to the Burkle study. Mismatch is one possible mechanism- not proven in this study however.	Sentence modified into: "There empirical evidence suggests that climate change over the last 120 years may have resulted in phenological shifts..."
Neal Williams	2	Climate change	96	2882		Missing reference to Bartomeus et al- a very import high profile paper based on a huge data set. This paper has stronger case than what is cited	Bartomeus et al., 2011 included
Neal Williams	2	Bee management		2328		The invasion of terrestris and impacts is also addressed in Chapter 3	Thanks for the hint
Neal Williams	2	General				Somewhere here need to update based on the most recent paper in Science reportingon range shifts in Bombus.	I guess thsi refers to the Kerr et al paper? This is now inlcuded in the chapter in several instances

Nicolas Cesard	2	Pesticides	62	1822	62		(Simenel et al. 2015). or Roué et al. 2015 (for a English version). Simenel R. et al. 2015. La domestication de l'abeille par le territoire : un exemple d'apiculture holiste dans le sud marocain. Techniques et Culture 63, 258-279. Roué, M., Battesti, V., Césard, N. and Simenel, R. 2015. Ethnoecology of pollination and pollinators, Revue d'ethnoécologie 7 (http://ethnoecologie.revues.org/2229)	Simenel et al 2015 added
Nicolas Cesard	2	Diseases	69	2045	69	2046	Vespa velutina has recently spread to Europe from China (not from SE Asia), still according to Villemant. Or write East Asia.	changed to Asia
Nicolas Cesard	2	Bee management	77	2288	77	2288	Garnery 2015, but the paper doesn't appear in the references	added reference
Nicolas Cesard	2	References	155	5407	155	5408	Simenel R. et al. 2015. La domestication de l'abeille par le territoire : un exemple d'apiculture holiste dans le sud marocain. Techniques et Culture 63, 258-279.	Updated, thanks
Paul Egan	2	Pesticides	51	1451	51	1451	Kessler et al. 2015 paper in Nature is another example of a behavioural sub-lethal effect of pesticides	Reference added.
Paul Egan	2	Pesticides	63	1854	63	1854	This section would gain from a single sentence which lists the 'means' by which pollinators are exposed. This information is spread througout the passage, and one important means (hyperaccumulation of pollutants by plants which are subsequently transported to floral rewards), is overlooked.	Done, thank you for the suggestions.
Peter Campbell	2	Pesticides	41	1150	41	1152	indeed a recent publication reported that Azadirachtin an organic approved insecticide showed high toxicity to bumble bees (Barbosa et al. 2015; Lethal and sublethal effects of azadirachtin on the bumble bee Bombus terrestris)	reference added

Peter Campbell	2	Pesticides	55	1587	55	1589	This statement that neonics have been associated with long-term colony losses in EU and US needs to be balanced with some much more recent published evidence to the contrary, eg Cutler et al, 2014 (Clothianidin treated Canola in Canada)and Rundlof et al 2015 (Clothianidin treated Oil Seed Rape in Sweden) which are large scale honeybee monitoring field studies which both reported no effects of a neonic on honeybee colonies and also the most recent EC sponsored EPILOBEE and COLOSS Honeybee monitoring reports, which both report the lowest over-wintering colony losses in Europe prior to the neonic restrictions.	revised text
Peter Campbell	2	Pesticides	56	1616	56	1616	Add the following reference (Staveley et al 2013: Hum Ecol Risk Assess. Feb 2014; 20(2): 566–591) next to Cresswell et all 2013 reference , to support Hills Epidemiology analysis evidence quoted in this sentence	added
Peter Campbell	2	Pesticides	56	1629	56	1631	It should be stated here that most if not all the evidence for sub-lethal effects on foragers comes from either laboratory studies or forced dosing/feeding studies which are not representative of exposure under field use conditions of these products (Godfray et al 2014).	amended
Peter Campbell	2	Pesticides	66	1940	66	1942	It needs to be stated after "good evidence" (line 1940) "from laboratory studies or forced dosing/field studies" since there is very little or no evidence from studies carried out under realistic field conditions.	wording amended
Peter Campbell	2	Diseases	68	2014	68	2015	The impact of varroa (and virus) is rather under-stated here there are many papers (Dainan et al, 2012; Martin et.al, 2012; Guzman-Nova, et al, 2010; Szabo et al 2012 (bumble bees); Charriere & Neumann, 2010; Nazzi et al, 2012; Genersch, 2010; Rosenkranz et al, 2010; van Enngelsdorp et al, 2012; Neumann & Carreck, 2010; Godfrey 2t al , 2014) which all conclude that combination of Varroa + virus is probably one the most major threats facing honeybees.	Several comments wanted more detail on effects of Varroa; added extra text and references on Varroa to the end of section 2.4.1.1.4 Parastitic mites.

Peter Campbell	2	Climate change	96	2888	98	2934	Need to include a new paper (Kerr et al 2015; Climate change impacts on bumblebees converge across continents) recently published in Science which investigates climate change effects on bumble bee populations in US and Europe and concludes effects at the ranges on many species	done, see comment 860 and also number 901
Peter Campbell	2	Multiple effects	106	3189	107	3218	Need again to refer to Kerr et al 2015 (see above commens) since this study is one of the few large scale meta-analysis studies conducted which looked at multiple factors (as described in this section) in bumble bee population ranges over a long timescale in Europe and US was recently published in Science (Kerr et al 2015; Climate change impacts on bumblebees converge across continents) and actually concluded no interaction between Climate Change and Land-use,Total pesticides and Neonicotinoid. So certainly the potential is thre for interaction as you point out but may be you need to separate the "potential" discussion from the "evidence based" facts eg Kerr et al 2015 paper and other papers where relevent.	Strictly speaking this study was not a meta-analysis, but an original data analysis pooling regional datasets. We do now include this recent citation in the revision of the text as an example of one of relatively few studies that attempt to quantify the relative impact of climate versus land-use. Kerr at el produce good evidence for range contraction due to climate changes, information mostly lacking for bumblebees and it is also cited in the climate change section of this assessment. The data used to attribute changes in bee range limits to neonicotinoids and land-use change are at a coarse scale (land use change measurements were available through time from 1900 to 2005 across both Europe and North America at 5'(~10km);annual area of pesticide/imidacloprid application per administrative county 1992-2009). This was doubtless a reflection of the characteristics of the available data and the authors had little option here. However, in our assessment of this paper we consider that it is perhaps unsurprising that there was no detectable effect of pesticides (or to an extent land-use) on range limits. Detection of changes in range limits in response to these management factors would have to be profound (i.e. consistent extinctions) for it to be detected in this large-scale analysis. If land-use change

Peter Campbell	2	Multiple effects	107	3231	109	3282	Again need to refer to Kerr et al 2015 see above comments.	Please see our earlier response to this comment. The Kerr study has, however, been cited in this section where appropriate i.e sentences dealing with shifts in ranges: "recent evidence of climate change impacts on bumblebees suggests there are adaptive limits to the capacity of this pollinator group to track climate change (Kerr et al., 2015; Schweiger et al., 2010)."
Peter Campbell	2	Multiple effects	109	3284	110	3336	Should quote a very recent published review paper on interaction between pesticides and pathogens by Collison et al 2015 ("Interactive effects of pesticide exposure and pathogen infection on bee health – a critical analysis" in Biological Reviews). This is a key review paper which concludes that to date most of the studies which report interactions between pesticides and pathogens to date, and which you list in this section, are conducted in laboratory conditions and therefore show potential mechanisms for interactions. However, it concludes that more field studies are required to better understand the ecological relevence. This review also points out that there is a lot of variability reported in such pathogen infection/pesticide interaction studies such as those reported in this section which could be down to either a lack of standised methodology or to exposure route. Need standardised to elucidate a clearer picture.	Some the points made by this reviewer (e.g. Lack of field study, ecological relevance were already made in the original version or have now been ammended slightly. Where relevant this review has now been cited in support of such points.

Peter Campbell	2	Multiple effects	110	3331	110	3332	This statement that there is emerging evidence that interaction between chemicals and pathogens present a real threat to pollinators is overstating the evidence, particularly in light of the recent Collison et al 2015 review paper (see above comment), which specifically concludes that more research is really needed to better understand the variability & ecological relevence of many of the studies already carried out, particularly under field conditons. This need for further research should be main conclusion of this section.	Indeed the terminal statement of this section was this very point. We have added the suggested review here and elsewhere to this text, where pertinent, and more clearly stated the research needs. We already say that this issue "may represent a threat" and as such it is equivocal.
Pradeep Mehta	2	Land use	20	458	20	458	2-5% for ? Either the crop name should be mentioned or just the reference should come	These are meta-analyses and syntheses, meaning that these values are overall values. It is for this reason that we provide the reference right after the value. This way, the interested reader can acces the detailed information in case of need.
Pradeep Mehta	2	Land management	23	566	23	566	its written between con Is it misspelt or does it mean something?	Refers to conspecific flowers. Revised.
Pradeep Mehta	2	Land management	23	582	23	583	Should be For example rape oilseed not oilseed rape	Changed to canola.
Pradeep Mehta	2	Land management	26	666	26	666	Fertilizer use has increased from the 1960's is mentioned it should be fertilizer use has increased since 1960's and a percentage or quantity per hactare should be mentioned otherwise it looks vague without any figure.	Figure is added.
Pradeep Mehta	2	Land management	26	679	26	679	species among years should be species for years	Done.
Pradeep Mehta	2	Land management	31	821	31	821	Athough though there…… it should be Although there …..	Done.
Pradeep Mehta	2	Pesticides	46	1299	46	1300	Some references should be cited.	lack of data identified therefore reference not relevant
Pradeep Mehta	2	Pesticides	63	1856	63	1857	The statement should be supported by reference/s	done

Pradeep Mehta	2	Diseases	69	2033	69	2033	Reference/s should be cited	added citation
Pradeep Mehta	2	Diseases	72	2117	72	2120	Site location (country)where it has been reported from and reference should be cited.	Sentence modified
Pradeep Mehta	2	Invasives	89	2666	89	2666	A. mellifera should be in italics	This must have been changed during formatting of whole document, fine in my original text and double checked revised text. Formatting will be checked again before print.
Pradeep Mehta	2	Invasives	89	2671	89	2771	Vespa valutina should be in italics	This must have been changed during formatting of whole document, fine in my original text and double checked revised text. Formatting will be checked again before print.
Richard Comont/Michael Usher	2	Land use	12	Fig. 2.2.1 (line 234)	12	234	Whilst this illustration makes the points about the importance of pollinators, the implication from the diagram is that butterflies are the most important (4 butterflies against 2 bees). The illustration should be re-drawn, making it clear that honey and other bees are the most important pollinators.	The goal of this figure was to communicate a concept, and thus butterflies and bees had been used as representatives of different pollinator groups. Because of the conceptual nature of the figure, we had decided to use bees and butterflies as a graphic representation of the ecological category "pollinators". To avoid leading to the type of literal interpretation of the figure that is presented in this comment, we now mention explicitly the conceptual (vs. strict) use of the graphics in this figure.
Richard Comont/Michael Usher	2	Pesticides	50	1420 & Fig 2.3.4	50	1420	this illustration is useful in demonstrating the numbers of incidents in relation to the insecticides being used. However, given the concerns during the last 4 or 5 years about the effects of neonicotinoids, it would be valuable to add these as a third group to be highlighted in the illustration.	There were no incidents involving neonicotinoids between 1985 and 2007 so these cannot be added to the figure.

Richard Comont/Michael Usher	2	Invasives	85	Section 2.5 (2525)	93	2781	for an international review of this nature it would be less confusing for readers if the definitions established in the Convention on Biological Diversity for ‘alien’ and ‘invasive alien’ were to be used (https://www.cbd.int/invasive/terms.shtml). The terms ‘alien’, ‘invasive alien’, and ‘native’ should be included in the glossary (noting that the latter two are defined in relation to pollinators).	Thanks for this comment and link. Another reviewer made a similar request. Accordingly we use the IUCN definition Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (2000). Approved by the IUCN Council which jointly underpins the CBD definitions. So a new paragraph has been inserted into the introduction to this section: ‘Alien species’ are defined as (non-native, non-indigenous, foreign, exotic) species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce (IUCN, 2000). ‘Alien invasive species’ are alien species which become established in natural or semi-natural ecosystems or habitat, and are an agent of change, threatening native biological diversity (IUCN, 2000). Further these definitions will be listed in the assessment glossary as you suggest.
Richard Corlett	2	Land use	17	377	17	377	What is 'overall species abundance'? Species richness? Abundance of all species together?	the expression has been now changed to "species richness"
Richard Corlett	2	Land use	17	381	17	381	What does 'generalists can rewire better' mean?	see response to comment 194
Richard Corlett	2	Pesticides	49	1408	49	1408	What does 'chronic certain insecticides' mean? A typo?	amended

Rodolfo Jaffe Ribbi	2	Land use	12	216	12	224	An estimated 2101 km2 of tropical forest are destroyed every year (Hansen et al. 2013), and the rate of land conversion to agriculture is expected to further increase in response to a growing human population, with major potential negative impacts for native pollinators. Hansen MC et al. (2013) High-Resolution Global Maps of 21st-Century Forest Cover Change Science 342:850-853 doi:10.1126/science.1244693	the reference has been now added.
Rodolfo Jaffe Ribbi	2	Land use	13	248	13	250	Habitat degradation not only affects pollinator communities but also pollinator populations. I believe it is essential to highlight this here, stating something like: “Habitat loss can also reduce pollinator populations, thus making them more prone to loosing genetic variability and experiencing the negative effects related to inbreeding (Allendorf et al. 2012).” Allendorf FW, Luikart GH, Aitken SN (2012) Conservation and the genetics of populations. Wiley. com,	This already appears in the section (at the end of section 2.2.1.2). For that reason, we have now made a short mention to this and refer to the reader to that section.

Rodolfo Jaffe Ribbi	2	Land use	18	394	18	400	You should mention that only a few studies have utilized landscape genetic approaches to quantify land use impacts on wild bee gene flow within temperate regions (Davis et al. 2010; Jha and Kremen 2013b), and no such efforts have been undertaken in the tropics yet. Likewise, I believe the term 'evolutionary implications' is misleading because reductions in population size caused by habitat loss can result in inbreeding depression and a higher extinction risk in the short term. I do not argue that genetic diversity is needed for adaptation to take place, but I don't believe long-term adaptation to land use change is the main focus here. Instead I suggest focusing on Allee Effects, or the fitness reduction associated to smaller population sizes. Davis ES, Murray TE, Fitzpatrick Ú, Brown MJF, Paxton RJ (2010) Landscape effects on extremely fragmented populations of a rare solitary bee, Colletes floralis Mol Ecol 19:4922-4935; Jha S, Kremen C (2013b) Urban land use limits regional bumble bee gene flow Mol Ecol 22:2483–2495	Following this comment, we have now modified the paragraph to also include the idea of Allee effect and mention the knowledge gap on the topic, citing the references proposed by the reviewer. However, we disagree with the fact that evolution implies only long term processes and that adaptation is one of those. Indeed, the latter has been shown to occur very quickly if selection pressure is high enough. For this reason, we have decided to not exclude the mention to "evolutionary implications".
Rodolfo Jaffe Ribbi	2	Land management	36	977	36	978	Urbanization and human land use can also hinder gene flow in bumble bees (Jha and Kremen, 2013; Jha, 2015). Jha, S. & Kremen, C. Urban land use limits regional bumble bee gene flow. Mol. Ecol. 22, 2483–2495 (2013); Jha, S. Contemporary human-altered landscapes and oceanic barriers reduce bumble bee gene flow. Mol. Ecol. 24, 993–1006 (2015).	We have added a sentence about Jha & Kremen 2013.
Rodolfo Jaffe Ribbi	2	Pesticides	43	1219	43	1219	". ."	deleted .
Rodolfo Jaffe Ribbi	2	Pesticides	44	1233	44	1243	Would it be possible to summarize available data on pesticides and their effect on pollinators? Something like Table 2.2.2	see table 2.2.2 and figure on sublethal effects; additional figure added on NNI insecticide sublethal effects
Rodolfo Jaffe Ribbi	2	Pesticides	45	1283	45	1283	Fig. 2.3.3 is not clear. I do not follow the main routes of exposure.	not highlighted by other reviewers and figure is directly from EFSA

Rodolfo Jaffe Ribbi	2	Pesticides	67	1960	67	1970	The order of the conclusions should reflect the order of the arguments in the main text, so GMOs should go before pollutants.	amended
Rodolfo Jaffe Ribbi	2	Diseases	67	1981	67	1982	Include this citation: Furst, M. A., McMahon, D. P., Osborne, J. L., Paxton, R. J. & Brown, M. J. F. Disease associations between honeybees and bumblebees as a threat to wild pollinators. Nature 506, 364–366 (2014).	Reference added Furst et al. 2014
Rodolfo Jaffe Ribbi	2	Diseases	68	1991	68	1991	Two important stingless bee pests are missing from this Table: 1) Phorid flies (Diptera, Phoridae) constitute one of the most devastating pests of stingless bee colonies (Nogueira-Neto, P. 1997. Vida e Criação de Abelhas Indígenas Sem Ferrão). Attracted by the odors emitted by stored pollen, the flies enter colonies and lay hundreds of eggs. These later become voracious larvae that deplete the colony´s food stores, causing a considerable damage and often the total collapse of the colony. 2) Recent work described a parasitic mantisfly infesting colonies of the stingless bee Melipona subnitida (Maia-Silva, C., Hrncir, M., Koedam, D., Machado, R. & Imperatriz-Fonseca, V. 2012. Out with the garbage: the parasitic strategy of the mantisfly Plega hagenella mass-infesting colonies of the eusocial bee Melipona subnitida in northeastern Brazil. Naturwissenschaften 1–5)	added phorid and Mantis flies to Table 2.4.1
Rodolfo Jaffe Ribbi	2	Diseases	72	2123	72	2123	Replace the term 'meliponiculture' with 'stingless bees', since the term has not been defined previously.	corrected, explanantion added

Rodolfo Jaffe Ribbi	2	Diseases	72	2123	72	2128	In this paragraph you should also cite: 1) Nogueira-Neto P. Vida e Criação de Abelhas Indígenas Sem Ferrão. São Paulo: Editora Nogueirapis; 1997. 445 p.; 2) Roubik DW. Ecology and natural history of tropical bees: Cambridge University Press; 1992; and 3) Villanueva-Gutiérrez R, Roubik DW, Colli-Ucán W, Güemez-Ricalde FJ, Buchmann SL. A Critical View of Colony Losses in Managed Mayan Honey-Making Bees (Apidae: Meliponini) in the Heart of Zona Maya. J Kans Entomol Soc. 2013; 86(4):352–62.	Thank you for your suggestion, we have added Noguire-Neto, 1997, but Villanueva-Gutiérrez R et al. 2013, does not describe bee diseases, just losses due to managment - that is a differnt section of our assessment and would fit better there instead of here.
Rodolfo Jaffe Ribbi	2	Diseases	72	2136	72	2136	I don't think there is enough evidence to support a statement such as 'Stingless bees seems to be a poor host for honey bee viruses'	corrected
Rodolfo Jaffe Ribbi	2	Diseases	72	2141	73	2150	The information is repetitive and inaccurate, please revise. Phorid flies (Diptera, Phoridae) should be highlighted here as the most devastating pests of stingless bee colonies (Nogueira-Neto, P. 1997. Vida e Criação de Abelhas Indígenas Sem Ferrão). Attracted by the odors emitted by stored pollen, the flies enter colonies and lay hundreds of eggs. These later become voracious larvae that deplete the colony´s food stores, causing a considerable damage and often the total collapse of the colony. Also, as I mentioned above, recent work described a parasitic mantisfly infesting colonies of the stingless bee Melipona subnitida (Maia-Silva, C., Hrncir, M., Koedam, D., Machado, R. & Imperatriz-Fonseca, V. 2012. Out with the garbage: the parasitic strategy of the mantisfly Plega hagenella mass-infesting colonies of the eusocial bee Melipona subnitida in northeastern Brazil. Naturwissenschaften 1–5)	corrected
Rodolfo Jaffe Ribbi	2	Diseases	73	2147	73	2147	This is incorrect, as ants are not generally considered the most important pests of stingless bees (see comment above).	corrected

Rodolfo Jaffe Ribbi	2	Diseases	73	2152	73	2169	This section is out of place here, as defense mechanisms of honeybees, bumblebees, or solitary bees are not discussed. This is biological knowledge, not a review of the known parasites and pathogens of pollinators. I suggest deleting this paragraph.	done
Rodolfo Jaffe Ribbi	2	Bee management	76	2246	76	2246	Rephrase 'new areas of the world' by 'the introduction of different bee species to areas where they are not native'.	made reccomended change
Rodolfo Jaffe Ribbi	2	Bee management	76	2246	76	2248	This section should be focused on honeybee management as a driver of change, not on migratory beekeeping exclusively. The introducing sentences should thus address a bit of the history of beekeeping, and that the main commercialized products are honey and pollination services, in addition to pollen, wax, propolis, royal jelly, queens, and beekeeping equipment. Then, you could summarize the consequences of beekeeping for wild honeybee populations (conservation, competition, spread of diseases, hybridization) as well as native bee populations (spread of diseases, competition). I believe it is extremely important to stress out that in spite of the negative impacts of beekeeping (such as those discussed below), beekeeping should be regarded as a conservation tool, particularly when practiced with local honeybees. For instance, Jaffé et al. (2010) showed that honeybee populations in Europe are mainly composed of managed bees, since most wild bees have disappeared: Jaffé R, Dietemann V, Allsopp MH, et al (2010) Estimating the density of honeybee colonies across their natural range to fill the gap in pollinator decline censuses. Conserv Biol 24:583–593.	Added text to the first paragraph to capture the role beekeeepers and bees can play as a conservation tool ….line 2249.
Rodolfo Jaffe Ribbi	2	Bee management	76	2259	76	2261	This paragraph is out of place here and should be moved to the section on viral diseases of honeybees.	left in this text as a clear example of how movable frames can be seen as a benefit and without the movable frames the bees can suffer brood diseases which go unchecked.

Rodolfo Jaffe Ribbi	2	Bee management	77	2289	77	2289	You should also mention that the introduction of honeybees subspecies to areas where they are not native can result in introgressive hybridization and the loss of valuable local adaptations (reviewed by De la Rúa et al. 2009): De la Rúa, P., Jaffé, R., Dall'Olio, R., Muñoz, I. & Serrano, J. Biodiversity, conservation and current threats to European honeybees. Apidologie 40, 263–284 (2009).	added refernce to the work of De la Rua et al. 2009
Rodolfo Jaffe Ribbi	2	Bee management	77	2295	77	2295	This problem is described in detail by Quezada-Euán et al. 2001. Please cite: Quezada-Euán, J. J. G., May-Itza, W. D. & González-Acereto, J. A. Meliponiculture in México: problems and perspective for development. Bee World 82, 160–167 (2001).	added Quezada-Euan 2001
Rodolfo Jaffe Ribbi	2	Bee management	77	2298	77	2298	Also cite: Paini, D. R. Impact of the introduced honey bee (Apis mellifera) (Hymenoptera : Apidae) on native bees: A review. Austral Ecol. 29, 399–407 (2004).	added Paini 2004
Rodolfo Jaffe Ribbi	2	Bee management	78	2303	78	2313	This paragraph repeats some of the arguments explained above in more detail, in the sections dealing with habitat loss and fragmentation. I think one aspect that should be highlighted here, is that the the global demand for pollination is growing faster than the stock of managed honeybees (Aizen & Harder, 2009): 21. Aizen MA, Harder LD. The Global Stock of Domesticated Honey Bees Is Growing Slower Than Agricul- tural Demand for Pollination. Curr Biol. 2009; 19(11):915–8.	see addition of Aizen and Harder 2009 in first paragraph
Rodolfo Jaffe Ribbi	2	Bee management	81	2418	81	2418	You should include here two relevant and recent references: 1) Giannini T, Boff S, Cordeiro G, Cartolano Jr E, Veiga A, Imperatriz-Fonseca V, et al. Crop pollinators in Brazil: a review of reported interactions. Apidologie. 2014;online first:1–15; 2) Jaffé, R. et al. Bees for Development: Brazilian Survey Reveals How to Optimize Stingless Beekeeping. PLoS One 10, e0121157 (2015).	Thank you, added

Rodolfo Jaffe Ribbi	2	Bee management	81	2418	81	2419	There is actually little evidence that stingless bees are being introduced outside their natural range, and certainly none of these references shows this (for an example see: Carvalho-Zilse GA, Costa-Pinto MFF, Nunes-Silva CG, Kerr WE (2009) Does beekeeping reduce genetic variability in Melipona scutellaris (Apidae, Meliponini)? Genet Mol Res 8:758–765. doi: 10.4238/vol8-2keer006). I suggest rephrasing this to: 'Stingless bees are an important asset to fulfill the growing agricultural demand for pollination, because they could compensate for...'	corrected acording to suggestion
Rodolfo Jaffe Ribbi	2	Bee management	81	2420	81	2420	Correct the citation of Jaffé et al. 2010.	corrected
Rodolfo Jaffe Ribbi	2	Bee management	81	2421	81	2422	These phrase is out of place here: 'In Japan, a number of species were tested for greenhouse pollination (Amano 2004).' This is the introduction to stingless bee management, not a review of greenhouse pollination by stingless bees (there are examples of this from Brazil and Australia as well). Instead, I suggest replacing it by: 'Across developing countries, stingless beekeeping (also known as meliponiculture), remains essentially informal, technical knowledge is scarce, and management practices lack standardization. Commercialized bee products, including honey, colonies, and in a few cases crop pollination services, are generally unregulated, and demand often exceeds supply. Meliponiculture thus remains a largely under-exploited business (Jaffé et al. 2015).'	corrected

Rodolfo Jaffe Ribbi	2	Bee management	81	2424	82	2430	Meliponiculture has not gained attention in developing countries, it was developed in developing tropical countries, where stingless bees are native. Also, increasing attention in stingless beekeeping has little to do with improving poor households in developing countries: Many wealthy people have become interested in stingless bees, as well as research institutions and development officers. Please reword as this sentence reflects a profound lack of knowledge. I suggest highlighting the potential of stingless beekeeping as a sustainable develoment tool.	this paragraph was deleted as some of the information was doubling after correcting the section according to the reviewrs suggestion
Rodolfo Jaffe Ribbi	2	Bee management	81	2430	82	2430	The updated reference for this is: Giannini T, Boff S, Cordeiro G, Cartolano Jr E, Veiga A, Imperatriz-Fonseca V, et al. Crop pollinators in Brazil: a review of reported interactions. Apidologie. 2014;online first:1–15.	added
Rodolfo Jaffe Ribbi	2	Bee management	82	2431	82	2431	You should not speak about 'Africa' in general. Mention that in most African countries...	corrected
Rodolfo Jaffe Ribbi	2	Bee management	82	2441	82	2441	This is incorrect. In Central and South America the main exploited stingless bee products are honey and colonies. Honey, propolis and wax are often used for medicinal and ritual purposes.	corrected
Rodolfo Jaffe Ribbi	2	Bee management	82	2444	82	2444	Also cite: Jaffé, R. et al. Bees for Development: Brazilian Survey Reveals How to Optimize Stingless Beekeeping. PLoS One 10, e0121157 (2015).	done
Rodolfo Jaffe Ribbi	2	Bee management	82	2446	82	2447	You should give proper credit to Mexican researchers, citing the relevant works: 1) Quezada-Euán J, May-Itza W, González-Acereto J. Meliponiculture in México: problems and perspec- tive for development. Bee World. 2001; 82(4):160–7; 2) González-Acereto J, Quezada-Euán J, Medina-Medina L. New perspectives for stingless beekeeping in the Yucatan: results of an integral program to rescue and promote the activity. J Apic Res. 2006; 45 (4):234–9. 32.	added

Rodolfo Jaffe Ribbi	2	Bee management	82	2452	82	2452	I don't think citing a website is a good idea here. There are many published examples of studies addressing the potential of beekeeping as a development tool. I believe this chapter should be based primarily on such 'hard' evidence (in fact this is the case in all preceding sections).	sentence deleted
Rodolfo Jaffe Ribbi	2	Bee management	82	2457	82	2458	This is incorrect, Nannotrigona testaceicornis is only distributed in Brazil.	spcies name was mistake, corrected
Rodolfo Jaffe Ribbi	2	Bee management	83	2463	83	2464	This sentence is unnecessary here. It is speculative, as environmental risks posed by stingless bee management have, to my knowledge, never been addressed. Also it is misleading as most stingless beekeepers employ native bees. Please delete.	deleted
Rodolfo Jaffe Ribbi	2	Bee management	83	2470	83	2476	These sentences are not accurate, do not follow the previous line of argumentation, and do not constitute a closing sentence for the section. I suggest deleting and replacing them with the text of next comment, which provides a comprehensive review of previous works aiming at optimizing stingless beekeeping.	corrected

Rodolfo Jaffe Ribbi	2	Bee management	83	2470	83	2476	Important efforts have been directed to train beekeepers and standardize management practices [Nogueira-Neto P (1997) Vida e Criação de Abelhas Indígenas Sem Ferrão. São Paulo: Editora Nogueirapis. 445 p.; Villas-Bôas JK (2012) Manual Tecnológico Mel de Abelhas sem Ferrão. Brasilia: Instituto Sociedade, População e Natureza], quantify investment costs and profit perspectives [Lobato T, Venturieri GC (2010) Aspectos econômicos da criação de abelhas indígenas sem ferrão (Apidae: Meliponini) no nordeste paraense. In: Oriental EA, editor. Belém: EMBRAPA Amazônia Oriental], assess honey properties, quality and commercialization routes [Vit P, Pedro SR, Roubik D (2013) Pot-honey: a legacy of stingless bees: Springer.], rear queens artificially [Menezes C, Vollet-Neto A, Fonseca V (2013) An advance in the in vitro rearing of stingless bee queens. Apidologie 44: 491-500.], and diagnose the overall situation of the sector in different regions [Halcroft M, Spooner-Hart R, Haigh A, Heard T, Dollin A (2013) The Australian stingless bee industry: a follow-up survey, one decade on. Journal of Apicultural Research 52: 1-7.; González-Acereto J, Quezada-Euán J, Medina-Medina L (2006) New perspectives for stingless beekeeping in the Yucatan: results of an integral program to rescue and promote the activity. Journal of apicultural research 45: 234-239]. More recently, quantitative efforts have been directed to the optimization of stingless beekeeping. Relying on Brazil-wide surveys, [Jaffé R, Pope N, Carvalho AT, Maia UM, Blochtein B, et al. (2015) Bees for Development: Brazilian Survey Reveals How to Optimize Stingless	corrected, minor changes done to the proposed text

Rodolfo Jaffe Ribbi	2	Bee management	83	2476	83	2477	I suggest to close this section with the following paragraph: 'Stingless beekeeping should be regarded as a prime tool to achieve sustainable development. Keeping bees can help low-income communities earn additional revenues from selling bee products, thus reducing the need to exploit other natural resources and creating incentives to protect natural habitats as food sources and nesting sites for the bees. Moreover, beekeeping contributes to the provision of pollination services, assuring crop yields and helping maintain plant biodiversity in natural ecosystems. Stingless beekeeping could thus help protect the bees, safeguard their pollination services, and contribute with the development of many rural communities. However, more efforts are needed to optimize this activity, turn it more attractive to new entrepreneurs, and increase its value as a tool for sustainable development.'	added with minor changes
Rodolfo Jaffe Ribbi	2	Bee management	84	2520	84	2524	This sentences are completely speculative and misleading. First, stingless bees have been managed for a very long time (dating back to the Mayas of Central America). Second, to my knowledge (and that of the authors as well), there are no studies showing negative environmental impacts of managed solitary or stingless bees. Finally, as mentioned above, we should actually promote management of native local bees, as a mean to preserve them and safeguard their pollination services. Finishing this paragraph with a caution against management thus seems counter-productive.	changed

Rodolfo Jaffe Ribbi	2	Invasives	85	2547	85	2550	This review is missing in Table 2.5.1: Paini DR (2004) Impact of the introduced honey bee (Apis mellifera) (Hymenoptera : Apidae) on native bees: A review. Austral Ecol 29:399–407.	The review was picked up during the original literature search and is now referenced "There have been very few reports of invasive alien honey bees through such competition reducing the survival or densities of native wild bees (Kenis et al., 2009; Paini, 2004; Roubik and Wolda, 2001; Yang, 2005) and to date no extinctions recorded (Goulson, 2003; Moritz et al., 2005; Paini, 2004; Traveset and Richardson, 2006)." at a couple of appropriate points in the text and included in the Table.
Rodolfo Jaffe Ribbi	2	Invasives	90	2707	90	2708	This is a key reference that should be included here: Roubik DW, Wolda H (2001) Do competing honey bees matter? Dynamics and abundance of native bees before and after honey bee invasion. Popul. Ecol. 43:53–62.	Revised: "Alien honey bee populations have become readily integrated into pollinator communities and direct competition for food has sometimes altered native wild bee behaviour and reproductive success in a locale, although these species interactions are highly dynamic (Dohzono and Yokoyama, 2010; Roubik, 1980; Roubik and Wolda, 2001; Thomson, 2004; Traveset and Richardson, 2006). There have been very few reports of invasive alien honey bees through such competition reducing the survival or densities of native wild bees (Kenis et al., 2009; Paini, 2004; Roubik and Wolda, 2001; Yang, 2005) and to date no extinctions recorded (Goulson, 2003; Moritz et al., 2005; Paini, 2004; Traveset and Richardson, 2006). "
Rodolfo Jaffe Ribbi	2	Climate change	97	2905	97	2909	This sentence should be introducing the section on climate change, not here.	Thanks, moved to the front

Rodolfo Jaffe Ribbi	2	Multiple effects	107	3226	107	3229	Include this reference in Table 2.7.1, as an example of another study assessing the joint effects of climate change and land use: Giannini TC, Tambosi LR, Acosta AL, Jaffé R, Saraiva AM, Imperatriz-Fonseca VL MJ (2015) Safeguarding ecosystem services: A methodological framework to buffer the joint effect of habitat configuration and climate change. PLoS One 10:e0129225.	Added to Table - thanks
Rodolfo Jaffe Ribbi	2	Multiple effects	108	3272	108	3273	I suggest including this additional paragraph here: Giannini et al (2015) recently proposed a new methodological framework to assess the joint effects of land use and climate change on the provision of pollination services. Based on the current distribution of the tropical stingless bee Melipona quadrifasciata, and that of the plant species used by the bees to feed and nest, they projected the joint distribution of bees and plants in the future, considering a moderate climate change scenario (following IPPC). They then relied on graph theory, the bee´s flight range, and the current mapping of Atlantic Forest remnants, to infer habitat suitability and quantify local and regional habitat connectivity for 2030, 2050 and 2080. Current and future connectivity maps revealed the most important corridors, which if protected or restored, could facilitate the dispersal and establishment of bees during distribution shifts. Giannini TC, Tambosi LR, Acosta AL, Jaffé R, Saraiva AM, Imperatriz-Fonseca VL MJ (2015) Safeguarding ecosystem services: A methodological framework to buffer the joint effect of habitat configuration and climate change. PLoS One 10:e0129225.	We have not included this precise paragraph as suggested by the reviewer, but we welcomed the suggestion of this reference from Brazil and have accordingly included its citation at several appropriate places in the revised text. Thank you.

Rodolfo Jaffe Ribbi	2	Multiple effects	112	3376	113	3409	I believe this section is out of place here, and certainly not a good concluding one. The impact of habitat degradation due to human population growth has already been stressed out in detail in the preceding sections. Likewise, pesticide regulation has also been discusses in detail in its appropriate section. I do not think this is a place to expand on counter-globalisation arguments, as this will certainly deviate the main focus of this chapter. My suggestion is thus to delete this last section 2.8.	This section is needed, according to the the IPBES conceptual framework and scope for Chapter 2, because it is important to set out how the direct drivers are themselves ultimately driven by indirect drivers. This section was not intended to be a counter-globalisation argument, however, this process does have a role in shaping the effect of direct drivers (eg invasive alien species) on pollinators/pollination. Further this paragrpah has been edited and revised following your and other reviewer comments.
Sandhya Chandrasekharan	2	Intro	11	191	11	195	these should be refected in chapter 6, in terms of what the appropriate policy response ought to be, with specific discussions pertaining to scale (local, national, regional and global)	Thanks; we have now added the following sentence: "Possible responses and options to remediate effects of drivers, incl. tools or instruments are dealt with especially in chapter 6, with specific discussions pertaining to scale (local, national, regional and global)"
Sandhya Chandrasekharan	2	Indirect effects	112	3389	113	3409	very important points and observations. Need to be carried forward and tied up to discussions in chapter 6, rather than hang alone, like it does now	Efforts have been made to ensure links to Chapter 6 but more so in the summary for policymakers (SPM) which fully integrates these messages.
Scott Black	2	Land use	13	246	13	246	Add "Some" in between "cases," and "species"	See our answer to point 151. This suggestion lets us think that the use we do of the term 'habitat' has not been fully considered. We are confident that the inclusion of a definition box in the current revised version of this draft will largely improve its readability
Scott Black	2	Pesticides	39	1069	39	1069	Consider making the example of public health mosquito control more comprehensive. The language could state: "…disease vectors such as mosquitos, e.g. application of larvacides, adulticides and use of treated bednets."	amended to reflect wider role

Scott Black	2	Pesticides	39	1071	39	1072	The issue of controlling nuisance mosquitoes in marshes and swamps is controversial and using it as an example here could cause unnecessary debate. Furthermore, broadspectrum adulticides are used for mosquito control in many areas beyond wetlands. Consider cutting the words "in marshes and swamps."	amended to reflect wider role
Scott Black	2	Pesticides	39	1072	39	1072	I commented on this sentence last time as well. Pesticides can impct pollinators even when used under label directions. 50,000 bumble bees were killed in Oregon, USA in one pesticide event and the pesticides applicator was following label directions. Consider changing sentence as it appears you are saying that only pesticides used inappropriately impact pollinators.	reworded and amended to highlight need for effective risk mitigation http://portlandtribune.com/sl/206414-62081-bumblebee-incidents-result-in-pesticide-violations; new text reads: "Some pesticides, particularly insecticides, can directly affect pollinator abundance and diversity by causing mortality, especially when not used in accordance with effective risk management/mitigation to reduce/remove exposure, for example using only outside the flowering period of crops attractive to bees"; thus it is highlighted that it is not only the off-label use which might impact pollinators

Scott Black	2	Pesticides	40	1112	40	1113	Consider editing the first bullet point regarding areas of debate/challenge. It currently states: "what are the direct and sublethal effects of exposure of pollinator populations to field realistic levels of pesticides under typical conditions..." The challenge/debate might be better represented by stating: "what are the direct sublethal effects on pollinator populations from exposure to pesticides at levels found in the field from legal use." Taking it one step further the challenge is also to understand impact from pesticide use at scale - in other words looking cumulatively. There has been much debate between federal agencies in the US as to whether there are "typical conditions" or a representative set of "field realistic levels" for species assessments. If such levels can be defined, is it even the correct tool to measure risk? At the heart of the question is whether the goal is to determine if the regulatory system is sufficient or whether on-the-ground practices are protective.	text amended
Scott Black	2	Pesticides	41	1126	41	1126	Tonnage alone does not provide a complete answer as to whether insecticide use has decreased. Many of the newer chemistries are effective at smaller amounts. Consider also including data on number of acres/hectares treated. That additional information would provide a more complete picture of use trends. See USGS site for more info https://water.usgs.gov/nawqa/pnsp/usage/maps/	data only available by ai not in a format readily synthesised; note added about challenges

Scott Black	2	Pesticides	42	1164	42	1167	Clearly, there is need for greater understanding of use practices. Still, risk assessments that drives regulation should consider evaluating a range of legal use rates to ensure that the highest legal rate is sufficiently protective. Practices on the ground vary dramatically between growers, and from year to year. This discussion of measuring impact of typical use vs measuring impact of legal uses was discussed by EPA and US wildlife agencies to determine risk assessment protocol for endangered speices evaluation.	noted but risk assessment approaches are covered in Ch 6
Scott Black	2	Pesticides	43	1199	43	1199	The fact that "areas where less than 100 ha were treated have been excluded" raises the question of what % of use is on lands 100 ha or less? In England and Wales average farm size is still 50 hectares or less. Consider clarifying what percent of use is represented or if too cumbersome consider providing some other context on the % of use captured. Also, I wonder if the planting of coated seeds is included in this use data. Consider adding it in (if the data exist) or noting the deficiency.	total usage provided not a single farm so the 100 ha usage relates to entire UK, seed treatments are included within the data
Scott Black	2	Pesticides	45	1255	45	1257	Consider adding a sentence noting that puddles in agricultural fields are also a source of exposure. A study of rainwater puddles in the corn fields of southwest Quebec detected one or more neonicotinoid in all 59 sample. Contamination levels were high enough to cause sublethal effects (Samson-Robert et al. 2014). Samson-Robert, O., G. Labrie, M. Chagnon, and V. Fournier. 2014. Neonicotinoid-Contaminated Puddles of Water Represent a Risk of Intoxication for Honey Bees. PloS one 9, no. 12 (2014): e108443.	detection levels need to be defined in relation to levels of intake required for effect; most water data(as Samson Rober et al) are in ng/L and therefore can be related to the sublethal effects in the figure

Scott Black	2	Pesticides	52	1493	52	1495	It is extremely important to note that the Blacquiere study used seed treatment residue levels as its benchmark. Seed treatment residues are generally much lower than other application methods. It should be clarified in the text that no effects were observed at field realistic dosages from seed treatment.	Good point, included.
Scott Black	2	Pesticides	54	1556	55	1573	Consider adding that synergism was found by combining neonicotinoids. See Patent No. 7,745,375 B2. Andersch et al. 2010.	examples are provided not an exhaustive list
Scott Black	2	Pesticides	56	1604	56	1608	As stated above there have been bee kills (some significant) even when labels were followed. These had nothing with seed treatments. You should not say that "no clear issus have been identified" wjen regilated use has caused large kills.	the Oregon bee kill was an off-label use
Scott Black	2	Pesticides	56	1621	56	1634	To more fully understand both the hazard/toxicity of neonicotinoids (as well as exposure) we need to better understand the neonicotinoid degradates. While there is already some information into the complex breakdown pathways and some of the degradates of concern we can't understand the entire risk profile without asking: "What are the concerns from exposure to neonicotinoid metabolites?	soil, water and plant metabolites are included in risk assessments in Europe; info added; also the following sentence was added: "However, a thorough assessment of the effects of neonicotinoids under realistic field conditions on multiple crops at multiple exposure levels will take a significant period of time, and a large financial investment, to complete."
Scott Black	2	Pesticides	57	1635	57	1642	As data has shown some neonicotinoids to be highly persistent, we should better fill gaps in our knowledge about exposure by asking: "How long will neonicotinoids persist in plants and be available for exposure? Do neonicotinoid levels increase with use from year to year? If so, what exposure concerns does this build up pose?"	highlighted as in subsequent crops growen in the treated fields; also the following sentence was added: "However, a thorough assessment of the effects of neonicotinoids under realistic field conditions on multiple crops at multiple exposure levels will take a significant period of time, and a large financial investment, to complete."

Scott Black	2	Diseases	67	1984	67	1984	Thereare more recent citations that could be put here to include Europe: Murray, T. E., M. F. Coffey, E. Kehoe, and F. G. Horgan. 2013. Pathogen prevalence in commercially reared bumble bees and evidence of spillover in conspecific populations. Biological conservation 159:269–276	added Murray et al. 2013
Scott Black	2	Bee management	77	2778	77	2778	A few recent citations to consider: Fürst, M. A., D. P. McMahon, J. L. Osborne, R. J. Paxton, and M. J. F. Brown. 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. Nature 506:364–366. Manley, R., M. Boots, and L. Wilfert. 2015. REVIEW: Emerging viral disease risk to pollinating insects: ecological, evolutionary and anthropogenic factors. The Journal of applied ecology 52:331–340. Smith, K. M., E. H. Loh, M. K. Rostal, C. M. Zambrana-Torrelio, L. Mendiola, and P. Daszak. 2014. Pathogens, Pests, and Economics: Drivers of Honey Bee Colony Declines and Losses. EcoHealth:1–12. McMahon, D. P., M. A. Fürst, J. Caspar, P. Theodorou, M. J. F. Brown, and R. J. Paxton. 2015. A sting in the spit: widespread cross-infection of multiple RNA viruses across wild and managed bees. The Journal of animal ecology. Available from http://dx.doi.org/10.1111/1365-2656.12345	added Furst et al and Smith et al. 2014
Scott Groom	2	Invasives	90	2708	90	2710	This sentence should also reference the study of Kato and Kawakita (2004) Am J of Bot from New Caledonia	Added

Scott Groom	2	Invasives	91	2737	91	2739	While I understand that supporting literature is limited, I feel this point is particularly important to highlight. We know little of the ecological impacts of introduced solitary and sub-social species, but there is a growing collection of records of established populations with many exhibiting invasive traits. Molecular techniques and online resources have made it much easier to differentiate between species likley introduced and natives, but (as usual) it is their ecology where the largest knowledge gaps are. So while the impact of Apis and Bombus are better studied, this may be a good opportunity to highlight what future research might consider in terms of non-eusocial invasive species.	revised sentence: Certain solitary bee species have been introduced, some possessing similar traits to invasive social bees, but relatively little is known about their impact on the ecology of native pollinators; representing a gap in understanding that could help to forecast future invasions
Scott Groom	2	Invasives	92	2755	92	2760	I'm uncertain of what this combination of sentences is saying exactly. Why would species restricted to islands have the same genetic signature as species that have undergone a bottleneck? In many endemic species of the Pacific there is very high genetic diversity (i.e. Homalictus, Hylaeus), even in species restricted to high elevations. The second sentence is particularly ambiguous, what is the impact of reduced genetic diversity on invasions? Perhaps I am not reading it correctly.	We are here not saying that insular species have the same genetic signature than bottlenecked species, but that these species have low genetic diversity. The historical demographic signature may or not be due to a similar demographic event. However, the fact that species restricted to islands have less genetic diversity than their mainland counterparts is a fact that has been demonstrated multiple times, and although some species can indeed support higher genetic diversity, this is generally much lower than that displayed by the mainland or more widespread sister species (see, for instance Frankham, 1997 Heredity. 78 (3):311-27. and Stuessy et al., 2014 Bot J Linn Soc. 174(3):276-288). We have now modified the sentence to clarify this idea. We have now following this comment clarified the second sentence refered to be this reviewer, shortly explaining the main results of that study.

Scott Groom	2	Climate change	96	2888	96	2888	There are several studies now that document changes in effective population size in resposne to climate change since the last glacial maximum, demonstrating the potential plasticity in certain populations i.e. Raychoudhury et al. 2010 Heredity, López-Uribe et al. 2014 Mol Ecol, Groom et al. 2014 PRSB	Thanks for the hint, we have included two of these citations in the text; the Raychoudhury papers we found did however not deal with climate change
Shalene Jha	2	ES	5	10	5	10	remove 'plant' since otherwise the second half of the sentence seems redundant	After revision this now reads: Land use changes leading to losses in habitat diversity also reduce pollinator dependent wild and cultivated seed and fruit set
Shalene Jha	2	ES	9	123	9	124	climatic? Sentence is not very clear	This typo has been corrected in a full revision of this statement: The change in climatic conditions, especially under mid- and high-end scenarios, exceeds the maximum speed at which several groups of pollinators (e.g. many bumblebees or butterflies) can disperse or migrate (well established). Such species are predicted to find themselves in unfavorable climates and unable to reach areas of potentially suitable habitat (established but incomplete).
Shalene Jha	2	ES	9	132	9	132	change 'genetic to biome' to 'genes to biomes'	Done
Shalene Jha	2	Land use	12	220	12	221	sentence is unclear and could benefit from rewording	Done.
Shalene Jha	2	Land use	14	272	14	274	this sentence gives the impression that nutritional changes in bee bread are the only mechanistic explanation for land-use-mediated pollinator decline -- so it could be reworded	The sentence has been modified accordingly.
Shalene Jha	2	Land use	14	277	14	280	I think this is a pretty strong statement to make off of just one study -- could add 'but see Davis 2010 and Jha & Kremen 2013 (both in Molecular Ecology)' which show that urbanization reduces the gene flow of ground-nesting bees.	The sentence has been now modified to make this sentence less strong. Also, since the comment relates mainly to urban environments, we have now added a mention to this and we sned the reader to the section (2.2.2.4), where we present and expand on this in depth

Shalene Jha	2	Land management	21	520	22	522	This sentence could be moved to the end of the section (line 532) for improved flow	Done.
Shalene Jha	2	Land management	33	871	33	872	this sentence could be cut	Done.
Shalene Jha	2	Land management	33	895	33	895	There is an unexpected jump from greenhouses to orchards	They are treated as separate sections now.
Shalene Jha	2	Land management	33	895	33	895	This paragraph seems a bit disjointed, covering multiple seemingly unrelated topics	Content is reduced.
Shalene Jha	2	Land management	34	917	34	917	could be a new paragraph since a new topic has been initiated	It is a new paragraph.
Shalene Jha	2	Pesticides	39	780	30	782	sentence is unclear and could benefit from rewording	reworded in ES
Shalene Jha	2	Pesticides	39	1083	40	1116	I think these points could be bulleted (the two bullets later in the box are not necessary) for ease of reading, like the following box	formatting will be revised during editing#
Shalene Jha	2	Pesticides	44	1204	43	1230	I think this could be developed more -- what else makes Africa unique? Fewer studies? greater agricultural area, relative to other countries? Longer histroy of human land use?	amended to case study rather than Spotlight
Shalene Jha	2	Pesticides	56	1602	56	1620	I think the earlier portion of this box (where recommendations are described) should be in bullet form	check at formatting stage
Shalene Jha	2	Figures	Figures - 1	4	1	5	Fig.2.2.1 - the yellow text is hard to read, all text is too small	the figure has been modified
Shalene Jha	2	Figures	Figures - 2	10	2	14	Fig.2.2.2 - I think the green rectangles are redundant with the cartoons and could be removed for a cleaner looking figure	The figure has been reworked, and we think that the current version is much more improved. Along with this, we have also reworded the legend, what helps clarify the message.

Shalene Jha	2	Figures	Figures - 3-4	20	3	41	Fig.2.2.3 - this figure is a bit simplistic and could be removed unless it can be enhanced to be more informative. One way to enhance it would be to include a graph showing the flowering season months on the x-axis, and then floral density on the y-axis, and crops and natural areas represented by different lines. Then, in two separate panels, the existing panels could highlight pollinator movement and in the second panel, a 'polyculture farm' could show the process of managed landscapes having more floral resources across the different months.	Following the comment, the figure has been now modified.
Shalene Jha	2	Figures	Figures - 5	40	5	55	Fig.2.3.1 & 2 - remove background gridlines (or make lighter) and capitalize Neonics	Figures will be redesigned for the final version.
Shalene Jha	2	Figures	Figures - 6	56	6	82	Fig.2.3.3 - I think this figure could be simplified and reorganized to save space and for clarity -- I think that it could be rendered in a line drawing instead of photos (the white background on the images make it very hard to interpret and a bit clunky). You could have just one plant with the systemic pesticide and then one plant with the sprayed application and one bee in the middle with arrows pointing to it and from all of the potential sources	Thanks for this comment; we will discuss with the graphic desigenr how to best get this done
Shalene Jha	2	Figures	Figures - 7	84	7	90	Fig.2.3.4 - This figure is very confusing -- what do the circles mean? Description in the legend would help. Also, like Fig. 2.3.1, gridlines could be removed	Thanks for this comment; we will discuss with the graphic desigenr how to best get this done
Shalene Jha	2	Figures	Figures - 8	115	10	148	Fig.2.7.1 - This figure could be imrpoved by removing the borders around the boxes and by making the arrows grey-scaled and instead convey the percent of studies that indicate a positive effect (darker grey) or negative effect (lighter grey) on pollinator abundance. Legend needs to be updated now that colors have been removed.	We tried it without boxes. The figure becomes less clear. We have resigned from colours or shading, as some referees found it confusing, therefore we sticked to the simple version
Shalene Jha	2	Figures	Figures - 9	111	9	114	Fig. 2.6.1 - I know the maps will be redrawn, but I also think the labels on the left hand side could be more clear and perhaps written in bullets or images	Thanks for this comment; we will discuss with the graphic desigenr how to best get this done

Stephan Lorenz	2	Intro	11	191			This is another understanding of indirect drivers than given in the preface what may be confusing in the report. I think what could be meant are 'indirect effects of the drivers'.	We corrected this.
Stephan Lorenz	2	Bee management	76	2267			Suggestion: produce more or other sorts of honey	left as is
Stephan Lorenz	2	Bee management	77	2275			The 'and' may be misleading because pollination beekeeping often means to harvest less honey. Being paid for pollination then serves as financial compensation. Suggestion: ... to be paid for pollination or to maximize and vary honey production.	changed and to or
Stephan Lorenz	2	Indirect effects	112	3376	113	3409	It is a very good point to finally reflect on some influences of indirect drivers as given in the IPBES conceptual framework in the report's preface. From here we can start the discussion with the social sciences and humanities for elaborating the relevant links to the findings of this chapter. To give 'globalisation' and 'human population growth' as major indirect drivers is not really consistent with the following discussion and it is not convincing from a social science perspective. There is no such a thing as globalisation but a variety of globalising processes that may be support or restrain biodiversity and pollination. And human population growth is not per se a problematic driver. Suggestion for the first sentence: Indirect drivers are producing ...	We have also put attention to the fact that globalisation is a process not an endpoint in light of your specific remark and have redrafted accordingly
Stephan Lorenz	2	Indirect effects	112	3379			Suggestion: technological developments, e.g. in transport efficiency	Adopted suggestion
Sven Hanoteaux	2	Land use	16	332	16	33	remove the definition of eveness between brackets : " i.e., a measure of how balanced are species in a given system, in terms of number of individuals". The definition of eveness is given in the glossary	This is an important concept, and for that reason we have now included it in the network concept definition box.

Sven Hanoteaux	2	Land use	19	427	19	429	I'm not sure if the Figure 2.2.3 really adds substantial information. Adding the caption of the figure to the information given in the text page 18 line 411-414 woud make the story clear enough.	We thank the reviewer for the comment. However, this figure was very positively received by other reviewers and co-authors. For that reason, we have now decided to maintain it in the draft.
Sven Hanoteaux	2	Land management	22	527	22	528	Two references are missing	References are added.
Sven Hanoteaux	2	Land management	26	666	26	666	It might be a good idea to add the procentual increase as a number in the text (if given in the reference Richards 2011)	Added and a figure is provided to show fertiliser use in the different continents.
Sven Hanoteaux	2	Land management	26	666	26	666	The reference Richards 2011 is not listed in the literature, I suspect that it should be Richards 2001	Corrected to 2001, thank you.
Sven Hanoteaux	2	Land management	28	729	28	730	I would remove these two lines. If the information that pesticides will be treated in another section is of importance, adding it to the introduction of the section 2.2 would be better.	As we found it important to reffer to pesticides in this section, we would rather keep it.
Sven Hanoteaux	2	Land management	30	780	30	780	Reference missing	Added.
Sven Hanoteaux	2	Pesticides	40	1106	40	1108	May be a good idea to present the HQ in a formula as well	stated as application rate/LD50
Sven Hanoteaux	2	Pesticides	47	1343	47	1343	Change >8500 for more than 8500	amended
Sven Hanoteaux	2	GMO	57	1664	57	1664	Make clear in the legend (or in the caption) of Figure 2.3.5 that developing and industrial refer to the type of countries	The figure and legend have been modified accordingly.
Sven Hanoteaux	2	Climate change	97	2916	97	2916	“see section 2.9” : according to the section numbers, there is no section 2.9, section 2.7 instead?	thanks for this hint, yes, it should be section 2.7
Sven Hanoteaux	2	Climate change	100	3002	100	3004	make the use of the “>” signs consequent througout the text. Use either “more than” or “>”.	done using ">" etc. throughout
Sven Hanoteaux	2	Climate change	100	3008	100	3008	Table 2.6.1 instead of Table 2.8.1	thanks, done
Sven Hanoteaux	2	Climate change	100	3017	100	3017	Indeed, converting this table into a figure would be really a nice improvement on the readibility of the results. I would keep both the figure and the table in the document though.	thanks for encouragement; that's what we will do (see comment 871)

Sven Hanoteaux	2	Climate change	100	3022	101	3044	I would present all the results giving both the number of species and the %. Further,	done
Sven Hanoteaux	2	Climate change	100	3022	100	3022	Only the details of the GRAS-no dispersal scenario are highlighted. Shortly stating why this scenario deserves to be highlighted would be useful (i.e. is this the worse case scenario or the most likely to happen…)	see previous line 3042: it is the most severe scenario
Sven Hanoteaux	2	Climate change	100	3024	100	3025	From Table 2.6.1, I read different % than the one given in the text. If I read this table correctly it should be corrected like this:46% and 30% are at high risk,5% and 24 % are at risk, and only2% and 6% are at low risk. (values in bold are the one I changed).	Thanks a lot for spotting this inconsistency!! We have corrected the values in the text
Sven Hanoteaux	2	Climate change	101	3046	101	3046	Figure 2.6.1: if the figure stays in the document: define AUC in the caption or in the text and remove the definitions of the categories from the figure and place them either in the caption or refer to the text.	done (put in caption)
Sven Hanoteaux	2	Climate change	104	3133	104	3134	Again, there's no section 2.9	thanks, corrected
Tereza Giannini	2	Land use	15	310			Add explanation. Which are these intrinsic characteristics?	see answer to comment 194.
Tereza Giannini	2	Land use	17	388		399	I didn`t understand the idea	We have now modified the section and we are confident that the message is clearer now.
Tereza Giannini	2	Land use	19	457			I think it would be useful to include the maximum distance between natural-agricultural habitats, suggested by Garibaldi et al. 2014 (Frontiers in Ecology and the Environment)	Done
Tereza Giannini	2	Land management	22	535			But see Kleijn et al. 2015 (Nature Communications)	The study by Kleijn et al. 2015 has been already discussed in the Land use section, therefore we would not add it here avoiding repetation within the document.
Tereza Giannini	2	Land management	38	1044			I suggest including ideas discussed by Wratten et al 2012 (Agric, Ecos & Environ)	Included, thank you.

Tereza Giannini	2	Climate change	97	2914			Please include: Gillson L, Dawson TP, Jack S, McGeoch MA. Accommodating climate change contingencies in conservation strategy. TREE 2013	As here we do not deal with conservation issues, we did not include this reference; sorry
Tereza Giannini	2	Climate change	102	3069			I`m not sure if this is the right place, but you should quote Kerr et al Science 10 JULY 2015 • VOL 349 ISSUE 6244	Included here (and elsewhere)
Tereza Giannini	2	Multiple effects	108	3274			Please consider including Giannini et al 2015 PlosOne DOI:10.1371/journal.pone.0129225	This citation has been included here and a few other appropriate places in the revised text. Thank you.
Tereza Giannini	2	Indirect effects	112	3377			I suggest considering that climate change will also affect food prodction, probably conducting to new impacts in land use. See for example Watson JEM. Human Responses to Climate Change will Seriously Impact Biodiversity Conservation: It's Time We Start Planning for Them. Conservation Letters 2014; 7: 1–2.	Text adjusted and reference included
Thomas Brooks	2	ES	10	148	10	148	Change "a shift of" (which sounds like a necessary and passive result) to "companies shifting" (to make clear that this is a result of active decision-making by a particular sector).	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Thomas Brooks	2	Pesticides	45	1255	45	1281	An important new paper on this subject has been published within the last couple of months, showing that bees (both Apis mellifera and Bombus terrestris) disproportionately consume foods treated with neonicotinoid pesticides amd thus cannot control their exposure to neonicotinoids in food (Kessler et al. 2015 Nature 521: 74–76; DOI 10.1038/nature14414).	added in sublethal section

Thomas Brooks	2	Pesticides	51	1469	55	1545	An important new paper on this subject has been published within the last couple of months, adding important evidence to this section in finding "a negative relationship between both colony growth and queen production and the levels of neonicotinoids in the food stores collected by the bees". This "is the first study describing substantial negative impacts of neonicotinoids on colony performance of any bee species with free-flying bees in a field realistic situation where pesticide exposure is provided only as part of normal farming practices". (Goulson 2015 PeerJ 3:e854; DOI 10.7717/peerj.854).	Thanks for highlighting, this reference has been included, with its key finding.
Thomas Brooks	2	Indirect effects	112	3396	112	3396	Change "a shift of" (which sounds like a necessary and passive result) to "companies shifting" (to make clear that this is a result of active decision-making by a particular sector).	Now reads to be clear: Pesticide regulations especially in Europe and the US led to business decisions to shift pesticide sales to alternative markets during the last four decades (Galt 2008).
Thomas Steeger	2	ES	5	11	5	11	if specific sections are to be referenced (e.g., 2.1.1.), then this should be specified to the reader up front and all should should this this format.	The section citation is to ensure it is transparent how the evidence underpinning this assessment is traceable through the report (i.e. from Key messages in Summary for Policy Makers (SPM) > to SPM sections > to Chapter ES> to Chapter sections). This approach is outlined in the Summary for Policy Makers (SPM), which fronts this assessment.
Thomas Steeger	2	ES	5	15	5	17	while monocultures are generally recognized as reducing both the foraging and nesting opportunities, this is generally within the context of addressing animal needs. Some monocultures (e.g., almonds, canola, sunflowers) can provide extensive foraging opportunities; however, the opportunityy can be short-lived.	This is correct we have included in this Exec. Summary paragraph: Certain mass flowering crops provide huge food resources for some pollinators, but only for a short duration (established but incomplete). And this is further discussed in the main Chapter section.
Thomas Steeger	2	ES	5	26	5	26	what are "intensive landscapes"? Do you mean landscapes subject to intensive agricultural practice?	Now reads: especially in landscapes dominated by large fields and more conventional intensive management

Thomas Steeger	2	ES	5	30	5	32	awkward wording; not sure that "abandonment" is the proper term.	Now reads:These landscapes are often threatened by abandonment of farming (cessation of grazing or mowing of grasslands), which has been observed in temperate regions (well established). In this context abandonment is the standard term.
Thomas Steeger	2	ES	6	42	6	42	Insecticides "can" have a brood . . . "	Now reads: Pesticides, particularly insecticides, have been demonstrated to have a broad range of sublethal effects on pollinators in controlled experimental conditions
Thomas Steeger	2	ES	6	44	6	45	". . .synergistic and long-term effects of pesticides and their mixtures are widely underestimated (notional)." It may be more accurate to say that "the potential synergistic and/or long-term effects of pesticides and their mixtures remain largely uncertain."	This paragraph has been heavily revised following many comments, the sentence you originally refered to is now covered by: "It is currently unresolved how sublethal effects of pesticide exposure recorded for individual insects affect colonies and populations of managed bees and wild pollinators, especially over the longer term" and "Debate surrounds what constitute a field realistic exposure, and the potential synergistic and long-term effects of pesticides and their mixtures (unresolved). "
Thomas Steeger	2	ES	6	45	6	54	as noted in the original review comments on this seciton, it is unclear why neonicotinoids are singled out. It is possible that other classess of insecticides as well as a broader range of pesticides may also have effects.	Neonicotinoids due to their policy and media profile required flagging up. However, in the revision of the sublethal bullet we do try and broaden out, mentioning 'pesticides including insecticides' - to capture effects of fungicides, pyrethoids etc these and their lethal and sublethal effects are well covered in the Chapter section (which is cited here in ES)

Thomas Steeger	2	ES	6	51	6	51	"lack of evidence of effects on honey bee colonies" is not entirely accurate. Consider "lack of consistent evidence"	paragrpah heavily revised, now reads: Recent research focusing on neonicotinoid insecticides shows considerable evidence of sublethal effects on bees under controlled conditions (well established). There is evidence from a recent study showing field-scale impacts of neonicotinoids on wild pollinator survival and reproduction (established but incomplete). Evidence, from this and other studies, for effects on managed honey bee colonies is conflicting (unresolved).
Thomas Steeger	2	ES	6	54	6	54	why is "unresolved" italicized?	Because it is a defined rating of the level of evidence and expert agreement, this term is from the four-box model which is detailed in the Summary for Policy makers , which fronts this assessment.
Thomas Steeger	2	ES	7	65	7	67	The state appears speculative and unsupported.	Text deleted and replaced with other content.
Thomas Steeger	2	ES	7	76	7	76	consider: the same risks may exist	Corrected as suggested
Thomas Steeger	2	ES	7	84	7	84	. ..and potentially other wild bees"	Now reads: and also to wild bees (established but incomplete). We think this is fine with the corresponding evidence ranking as there has been some strong recent evidence eg Furst et al Nature suggesting pathogen spillover to wild insects is happening

Thomas Steeger	2	ES	8	91	8	91	"invasive (alien) species"	Throughout this pollination assessment we are focussed on Invasive alien species meaning an alien species occurring outside of its natural range through introduction by humans, which becomes established in ecosystems an is an agent of change, threatening native biodiversity. Thus we need to striclt stick to using invasive and alien together as it is possible for native spp to become invasive.
Thomas Steeger	2	ES	8	92	8	92	replace "invader" with species	Throughout this pollination assessment we are focussed on Invasive alien species meaning an alien species occurring outside of its natural range through introduction by humans, which becomes established in ecosystems an is an agent of change, threatening native biodiversity. Thus we need to striclt stick to using invasive and alien together as it is possible for native spp to become invasive.
Thomas Steeger	2	ES	8	94	8	94	drop alien	Throughout this pollination assessment we are focussed on Invasive alien species meaning an alien species occurring outside of its natural range through introduction by humans, which becomes established in ecosystems an is an agent of change, threatening native biodiversity. Thus we need to striclt stick to using invasive and alien together as it is possible for native spp to become invasive.

Thomas Steeger	2	ES	8	97	8	97	drop alien	Throughout this pollination assessment we are focussed on Invasive alien species meaning an alien species occurring outside of its natural range through introduction by humans, which becomes established in ecosystems an is an agent of change, threatening native biodiversity. Thus we need to striclt stick to using invasive and alien together as it is possible for native spp to become invasive.
Thomas Steeger	2	ES	8	98	8	98	drop alien	Throughout this pollination assessment we are focussed on Invasive alien species meaning an alien species occurring outside of its natural range through introduction by humans, which becomes established in ecosystems an is an agent of change, threatening native biodiversity. Thus we need to striclt stick to using invasive and alien together as it is possible for native spp to become invasive.
Thomas Steeger	2	ES	9	113	9	113	insert: potentially disrupting	Agree and added
Thomas Steeger	2	ES	9	116	9	117	". . .very likely will lead . . ."	Now corrected to read: are very likely to lead to major changes
Thomas Steeger	2	ES	9	120	9	120	consider: "The rate and extent of climate changeacrss the landscape"	Wholly revised, now reads: The change in climatic conditions, especially under mid- and high- end scenarios, exceeds the maximum speed at which several groups of pollinators (e.g. many bumblebees or butterflies) can disperse or migrate (well established).
Thomas Steeger	2	ES	9	122	9	123	". . .keep up with these climiate changes are projected to find . . ."	Revised to follow on from the previous sentence, it now reads: Such species are predicted to find themselves in unfavorable climates and unable to reach areas of potentially suitable habitat (established but incomplete)

Thomas Steeger	2	ES	9	133	9	135	". . .pollinators may pose a potential . . ."	Sentence now revised as : "This variety of threats (often anthropogenic) to pollinators and pollination poses a potential risk to food security, human health and ecosystem function (speculative)". We think is is clear that it is a potential risk and moroever the evidence rating is speculative, so there is no need to now adopt this minor edit.
Thomas Steeger	2	ES	10	148	10	149	Not sure what this sentence is saying.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Thomas Steeger	2	ES	10	149	10	150	Not sure there is less strict environmental "there"-- are they less strict than what? Where is "there"?	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
Thomas Steeger	2	Intro	11	182	11	182	Why are the neonicotinoids highlighted? If you are highlighting the one insecticide, then why not highlight one fungicide? Herbicide?	This is due to the scoping notes provided by IPBES.
Thomas Steeger	2	Intro	11	195	11	195	Wouldn't each of the direct drivers have indirect effects?	We corrected this.
Thomas Steeger	2	Land use	11	197	11	197	Define acronymn UN FAO first time used.	this will be done in the final editing stages
Thomas Steeger	2	Land use	14	272	14	272	replace "ground" with "basis"; also "Experimental studies have demonstrated a potential mechanistic . . ."	done
Thomas Steeger	2	Land use	15	317	15	317	Besides leading to habitat loss and degradates, land use fragmentation alters the area	We do not understand what the reviewer means with this.
Thomas Steeger	2	Land use	16	334	16	334	unclear what is meant by "eveness". Do you mean "the extnet of habitat fragmentation?	we have now added the term "species" in front it. Also, please note that the 'evenness" was defined in the previous line. In the current version, and taking into account comment #1152, we have decided to remove this definition from the text and add it to the definition box
Thomas Steeger	2	Land use	16	339	16	339	not sure what is meant by "conflated under the term 'land use' by the authors".	This has been now clarified.
Thomas Steeger	2	Land use	16	341	16	341	replace "these" with "habitat fragmentation and loss"	done

Thomas Steeger	2	Land use	17	381	17	381	replace "rewire better" with "more rapidly adapt"	This is a network term. In this case, there is no real adaptation from an evolutionary perspective, so we would like to avoid using such a terminology. To clarify this, ther term "rewiring" appears now in the definition box.
Thomas Steeger	2	Land use	17	384	17	384	Is 'connectiveness' a word? How about connectivity?	We think that the reviewer means "connectance". This is a network concept and its definition appears now in the definition box.
Thomas Steeger	2	Land use	17	391	17	392	Is this to say that the preceding section is not based on empirical data?	We have now reworded the sentence to make sure that is states that MOST (not all) data comes from modelling approaches, while some experimental data has been gathered. We explicitly mention some of the studies falling in each category, and the idea of this sentences is to point the little experimental knowledge we currently have on the topic.
Thomas Steeger	2	Land use	19	440	19	440	"Slightly more steeply" is vague terminology. Were the rates of decline (i.e., slopes) significantly different?	We thank the reviewer for pointing this. The sentence has been now reworded to indicate that the slopes weren't significantly different.
Thomas Steeger	2	Land management	21	494	21	494	place period after citation	Done.
Thomas Steeger	2	Land management	21	497	21	497	Are the sites of similar size?	Yes, content is added.
Thomas Steeger	2	Land management	21	498	21	498	Not clear what is meant by "potential of strawberry pollination"	Revised sentence.
Thomas Steeger	2	Land management	22	527	22	527	reference appears to be missing.	Reference is added.
Thomas Steeger	2	Land management	22	528	22	528	reference appears to be missing.	Reference is added.

Thomas Steeger	2	Land management	23	574	23	574	"foraging for either nectar or pollen"	Revised.
Thomas Steeger	2	Land management	25	638	25	638	replace "needed" with "necessary"	Done.
Thomas Steeger	2	Land management	25	639	25	639	". . .had a more substantial positive effect . . ."	Done.
Thomas Steeger	2	Land management	26	649	26	649	define albedo (i.e., fraction of solar energy reflected back from earth)	Done.
Thomas Steeger	2	Land management	26	667	26	667	replace "consumption" with "use"	The sentence is deleted.
Thomas Steeger	2	Land management	26	671	26	671	consider: 200 million tonnes	Done.
Thomas Steeger	2	Land management	26	677	26	677	replace "robust" with "resistant"	Done.
Thomas Steeger	2	Land management	28	729	28	730	recommend deleting section	As we found it important to refer to pesticides in this section, we would rather keep it.
Thomas Steeger	2	Land management	29	746	29	746	replace "haying" with "cutting for silage"	Sentence is deleted.
Thomas Steeger	2	Land management	30	779	30	782	". . .and the loss of leguminous species has been associated with the decline of several species of bumble bees (reference missing) as evidenced by the switch to silage . . ."	Revised.
Thomas Steeger	2	Land management	31	817	31	817	replace "they" with "the researchers"	Done.
Thomas Steeger	2	Land management	31	821	31	821	delete "though" after although. Although there was no evidence of an effect from mowing mortality on local pollinator population dynamics or pollinator services, studies . . ."	Done.

Thomas Steeger	2	Land management	33	874	33	874	"Since then, in China alone there are 2.7 million ha and in South Korea 57 thousand ha of greenhouses."	Revised.
Thomas Steeger	2	Land management	33	890	33	890	"The level of carbon dioxide (CO2) . . ."	Done.
Thomas Steeger	2	Land management	33	891	33	891	The sentence structure is awkward. What is meant by "up to a level activity"? Dp you mean a threshold concentration of CO2 beyond which it is issue for bumble bees?	Yes, it was meant that way. Sentence is revised.
Thomas Steeger	2	Land management	34	910	34	910	replace "pollinator lack" with decreased numbers of pollinators"	Done.
Thomas Steeger	2	Land management	34	914	34	914	". . .farmers tried to . . ."	Done.
Thomas Steeger	2	Land management	34	919	34	919	mechanical means eliminated native flowers	Done.
Thomas Steeger	2	Land management	34	926	34	926	delete last sentence as it is incomplete.	Deleted.
Thomas Steeger	2	Land management	34	931	34	934	awkward sentence structure	Revised sentence.
Thomas Steeger	2	Land management	35	935	35	935	delete "too" from end of sentence.	Done.
Thomas Steeger	2	Land management	35	943	35	943	define "brownfield site'	Land previously used for industrial purposes or some commercial uses. Added.
Thomas Steeger	2	Land management	36	990	36	990	why the focus on neonicotinoids?	these currently under greatest scrutiny globally and were explicitly mentioned in the scoping document
Thomas Steeger	2	Land management	36	991	36	991	substitute "insecticide" for "pesticide"	Done.

Thomas Steeger	2	Land management	38	1047	38	1048	the statement "the lack of sustainability of conventional scale agriculture, however, is very well established". Has this been well established? If so, it should be referenced.	See comm. 468.
Thomas Steeger	2	Pesticides	39	1073	39	1073	delete parenthetical statements	statement is important to highlight example of effective risk mitigation
Thomas Steeger	2	Pesticides	39	1076	39	1076	why the focus on neonicotinoids?	these currently under reatest scrutiny globally
Thomas Steeger	2	Pesticides	39	1076	39	1079	cite references to support statement	references added
Thomas Steeger	2	Pesticides	39	1090	39	1090	ECx would not be the median effect concentration. Do you mean EC50?	amended
Thomas Steeger	2	Pesticides	39	1090	39	1091	"The challenge is to understant the magnitude and duration of adverse effects . . ."	amended
Thomas Steeger	2	Pesticides	40	1104	40	1110	This sentence could be simplified by saying that the risk is typically estimated by examining the ratio of exposure to effects. At a determinate level point estimates of exposure and effects are used; whereas, probabilistic risk estimation methods consider the distribution of exposure and effect endpoints and are better suited to estimating the likelihood and magnitude of an adverse effect.	amended
Thomas Steeger	2	Pesticides	41	1131	41	1131	replace "chlorinated hydrocarbon" with "organochlorines"	amended
Thomas Steeger	2	Pesticides	42	1164	42	1164	by "granularity of pesticide usage data" do you mean "accessibility/availability to pesticide use data"?	amended
Thomas Steeger	2	Pesticides	43	1189	43	1189	". . .allowed in some countries . . .". NOTE: rotenone is not labeled for use on crops in the U.S.	noted
Thomas Steeger	2	Pesticides	43	1202	43	1202	insert comma before data	amended
Thomas Steeger	2	Pesticides	43	1219	43	1219	delete extra period after "production"	deleted
Thomas Steeger	2	Pesticides	44	1221	44	1221	insert period after "concerns"	inserted
Thomas Steeger	2	Pesticides	44	1222	44	1222	replace "were less inhabited" with "had lower numbers of adult bees and were . . ."	amended
Thomas Steeger	2	Pesticides	44	1233	44	1233	". . .for effects on non-target insect . . ."	amended

Thomas Steeger	2	Pesticides	44	1246	44	1246	"Acute hazard . . ."	amended
Thomas Steeger	2	Pesticides	44	1249	44	1249	consider "Risk assessment (which considers exposure and toxicity) . . .than hazard (which may consider toxicity alone)	amended
Thomas Steeger	2	Pesticides	45	1256	45	1256	"contact with drift or overspray . . ."	amended
Thomas Steeger	2	Pesticides	45	1262	45	1262	". . .new classes of systemic insecticides . . ."	amended
Thomas Steeger	2	Pesticides	46	1304	46	1304	delete "and combined"	amended
Thomas Steeger	2	Pesticides	47	1331	47	1331	". . .and are reliant . . ."	amended
Thomas Steeger	2	Pesticides	47	1337	47	1341	the Canadian incident reporting process is not new and in not limited to neonicotinoids. Also, the dust is not from talc/graphite but rather abraded seed coatings during planting.	amended
Thomas Steeger	2	Pesticides	48	1370	48	1370	EPPO hazard quotient threshold of 50	amended
Thomas Steeger	2	Pesticides	48	1370	48	1373	this is a relatively broad statement for pyrethroids; repellency may be limited to specific pyrethroids such as permethrin and not the entire class of pyrethroids.	amended
Thomas Steeger	2	Pesticides	49	1392	49	1392	"generates"	amended
Thomas Steeger	2	Pesticides	49	1393	49	1393	delete "on"	amended
Thomas Steeger	2	Pesticides	49	1406	49	1406	change "evaluation" to "evaluating"	amended
Thomas Steeger	2	Pesticides	49	1407	49	1407	change "contrary" to "conflicting"	amended
Thomas Steeger	2	Pesticides	50	1415	50	1415	spelling "clothianidin"	amended
Thomas Steeger	2	Pesticides	52	1476	52	1476	do you mean "at or above"?	In this paper, it is actually "at or below".
Thomas Steeger	2	Pesticides	55	1577	55	1577	why would one "expect" the toxicity to be additive?	amended
Thomas Steeger	2	Pesticides	55	1588	55	1588	add space between "contribute to"	amended

Thomas Steeger	2	Pesticides	55	1591	55	1591	it's not clear as to what is meant by "adapted limits of detection"	amended
Thomas Steeger	2	Pesticides	55	1593	55	1593	replace "its" with "their"; change "has" to "have"	amended
Thomas Steeger	2	Pesticides	56	1605	56	1605	lethaligy at the individual bee and/or colony level may occur but the level of such mortality may not be deemed as unacceptable when compared against the benefits.	Chapter 6
Thomas Steeger	2	Pesticides	56	1614	56	1614	define Hill's epidemological criteria	see Cresswell reference
Thomas Steeger	2	Pesticides	63	1846	63	1846	by "selen" do you mean "selenium"?	corrected
Thomas Steeger	2	Pesticides	63	1846	63	1846	do you mean "non-chemical"?	yes, corrected
Thomas Steeger	2	Pesticides	63	1848	63	1848	delete "fog e.g." or say "for example"	corrected
Thomas Steeger	2	Pesticides	63	1855	63	1855	not clear how essential and non-essential wer/are determined relative to chemicals	clarified
Thomas Steeger	2	Pesticides	64	1863	64	1863	delete "of"; insert comma after decline	corrected
Thomas Steeger	2	Pesticides	64	1879	64	1879	replace "causing" with "associated with"	corrected
Thomas Steeger	2	Pesticides	67	1960	67	1961	these acronyms have already been defined in this chapter; recommend just using the acronym	amended
Thomas Steeger	2	Pesticides	67	1965	67	1965	the advent of IR crops has result in a general reduction of insecticide use globally.	amended
Thomas Steeger	2	Pesticides	67	1967	67	1967	replace "what" with "which"	amended
Thomas Steeger	2	Diseases	67	1983	67	1983	not sure how either Apis or Varroa is an example of disease	Varroa is considered a disease by OIE as Varroisis
Thomas Steeger	2	Diseases	68	2000	68	2000	define BQCV first time used	done
Thomas Steeger	2	Diseases	68	2009	68	2009	acronym already defined; therefore, just use acronym	OK
Thomas Steeger	2	Diseases	69	2027	69	2028	" . . .has become widespread"	changed
Thomas Steeger	2	Diseases	69	2029	69	2030	italicize Latin name	done

Thomas Steeger	2	Diseases	69	2032	69	2033	italicize Latin name	done
Thomas Steeger	2	Diseases	70	2076	70	2076	". . .are cofactors in the delines of pollinators. . ."	Sentence corrected
Thomas Steeger	2	Diseases	70	2076	70	2076	need to be consistent on how virus names are or are not capitalized	Corrected
Thomas Steeger	2	Diseases	70	2078	70	2078	avoid repeating definitions	Fixed
Thomas Steeger	2	Diseases	71	2086	71	2086	need to discuss (expand upon) how pollen is related to the spread of viruses	Ref to Singh 2010 added and text expanded.
Thomas Steeger	2	Diseases	73	2153	73	2153	". . .against disease and acquire . . ."	corrected
Thomas Steeger	2	Diseases	73	2167	73	2167	". . .colonies could be regarded . . ."	corrected
Thomas Steeger	2	Diseases	74	2187	74	2187	delete "is"; replase "are" with "is"	corrected
Thomas Steeger	2	Diseases	74	2191	74	2191	". . .are found in faeces, or in provisions . . ."	corrected
Thomas Steeger	2	Diseases	74	2197	74	2197	incomplete sentence	corrected
Thomas Steeger	2	Diseases	75	2221	75	2221	Pests or parasites"? Or, Pests and Parasites?	corrected structure and headings
Thomas Steeger	2	Diseases	75	2232	75	2232	italicize Latin names	corrected
Thomas Steeger	2	Bee management	77	2278	77	2278	delete semicolon; place "wax, honey, and propolis" in parentheses.	done
Thomas Steeger	2	Bee management	78	2309	78	2309	insert "This research suggests that if agriculture . . ."	added new text
Thomas Steeger	2	Bee management	78	2321	78	2321	close parentheses after pathogens	Yes
Thomas Steeger	2	Bee management	80	2377	80	2377	insert "(see Chapter 1)" after ornithophilous.	Done
Thomas Steeger	2	Bee management	83	2466	83	2466	change "mean" to "means"	corrected

Thomas Steeger	2	Bee management	83	2468	83	2468	change "sells" to "sales"	corrected
Thomas Steeger	2	Bee management	83	2471	83	2471	replace "in e.g." with "in for example" or with "e.g.," by itself	corrected
Thomas Steeger	2	Bee management	83	2487	83	2487	insert reference to support statement	References for this statement are in the supporting Table 2.4.2
Thomas Steeger	2	Bee management	84	2518	84	2518	delete "rather"	corrected
Thomas Steeger	2	Climate change	94	2812	94	2812	insert hyphen betwee "location-specific"	done
Thomas Steeger	2	Climate change	95	2858	95	2858	change "effect" to "affect"	done, thanks
Thomas Steeger	2	Climate change	95	2860	95	2860	inset "and" between "temperature precipitation"	done, thanks
Thomas Steeger	2	Climate change	95	2869	95	2860	delete "are"	done, thanks
Thomas Steeger	2	Climate change	98	2933	98	2933	insert " . . .Northward shifts, respectively" after 37 km	done
Thomas Steeger	2	Multiple effects	108	3260	108	3260	replace "scopes" with "a potential"	altered
Thomas Steeger	2	Multiple effects	109	3304	109	3304	replace "up-scaled" with "enhanced"	"enhanced" would not be appropriate here, we have reworded to make clear the point: "This implies that the effects of pathogen infection and sub-lethal chronic pesticide exposure observed on the individual worker bee's physiology has the potential to be up-scaled, through worker behavior, to limit the ability of a bee colony to combat pathogen transmission.
Thomas Steeger	2	Multiple effects	110	3317	110	3317	unclear what is meant by "but see". Do you mean that the following reference provides information to the contrary?	Yes - this has been rephrased to be clear: "but see Fauser-Misslin et al., (2013) for an example of queen mortality". This example is elucidated further in the preceding paragraph.

Thomas Steeger	2	Multiple effects	111	3346	111	3346	change "colonies" to "colony"	done
Thomas Steeger	2	Indirect effects	112	3377	112	3377	consider clarify by adding: "the less stringent environmental regulations in those nations where other markets exist."	Thanks, we have added this to the text
Thomas Steeger	2	Indirect effects	112	3398	112	3398	change data "are" generally . . ."	changed
Thomas Steeger	2	Indirect effects	112	3401	112	3401	the concept of a "circle of poison" was not discussed earlier.	We have now added the definition in the text: "The circle of poison describes a situation in which, pesticides banned in industrialized countries continue to be manufactured there and exported to developing countries, are then used in developing countries almost entirely on export crops, and return." (Galt, 2008)
Thomas Steeger	2	Indirect effects	112	3406	112	3406	what is meant by "race to the bottom"?	Rephrased and a more recent reference has been added
UK Government	2	ES	5	3	5	5	Habitat degradation should be explained in clearer terms. A habitat is the home of an individual or group of species. What is meant here is the change in land use or management that results in a shift from natural or semi-natural habitat to one that is urban or agricultural improved, and contains fewer floral resources.	This is clarified now in the revised ES with explicit mention of the loss of resources:"Land use changes which result in greater landscape fragmentation, lower connectivity, or the loss of resources for pollinators, will negatively affect wild pollinator diversity, abundance and network structure (well established), potentially affecting community stability (established but incomplete). " Habitat is now clearly defined in a Box in the Chapter and in the Chapter glossary and more carefully used throughout the assessment.
UK Government	2	ES	7	67	7	67	Typo - "birds"	Text deleted and replaced with other content.

UK Government	2	ES	9	123	9	123	Word missing - "climatic….?" Possibly "envelope"?	This typo has been corrected in a full revision of this statement: The change in climatic conditions, especially under mid- and high-end scenarios, exceeds the maximum speed at which several groups of pollinators (e.g. many bumblebees or butterflies) can disperse or migrate (well established). Such species are predicted to find themselves in unfavorable climates and unable to reach areas of potentially suitable habitat (established but incomplete).
UK Government	2	Land use	13	241	13	247	As Ch2 page 5, lines 3-5: "Habitat degredation" needs to be explained in clearer terms. The reason it is important is that this is a key driver of observed change in composition of pollinator populations. Many pollinator declines are of specialist species, and there is an important research question as to whether these are functionally important outside natural or semi-natural habitats.	this appears now in the definition box
UK Government	2	Land management	22	527	22	528	Two references missing	References are added.
UK Government	2	Land management	23	553	24	589	This whole section has a lot of grammatical errors and needs some editing	The section is revised and restructured to improve clarity..
UK Government	2	Land management	23	567	23	567	It's the stigmas that are blocked, not the stamens	Corrected.
UK Government	2	Land management	23	570	23	570	What is meant by "higher profit for the pollinated plants"?	Revised as "resulting in higher pollination success for the pollinated plants".
UK Government	2	Land management	23	582	23	583	"Oil seed rape" is not a term used much in other parts of the world. Suggest using "canola (oil seed rape)"	Changed to canola.
UK Government	2	Land management	30	780	30	78	Missing reference	Added.

UK Government	2	Land management	33	871	35	937	This whole section has a lot of grammatical errors and needs some editing	Edited.
UK Government	2	Pesticides	44	1247	44	1247	"curcubits" should be "cucurbits"	amended
UK Government	2	Pesticides	48	1366	48	1366	Author is "Yeo-Chang" not "Yeo-Change"	amended
UK Government	2	Pesticides	55	1600	57	1648	There should be some mention of the recent re-analysis of the FERA report by Goulson (2015) - see: https://peerj.com/articles/854/	The paper by Goulson (2015) in PeerJ is now mentioned
UK Government	2	GMO	57	1653	57	1654	This definition is not correct. In most countries, including the EU, the definition of a GMO is broader than the introduction of transgenes.	The sentence has been now reworded to include the FAO definition.

UK Government	2	GMO	58	1683	59	1707	This section would be much improved if it had a more logical structure and didn't conflate issues/ points. Some of the references are inappropriate or misreprensented in the report. Line 1672 in the previous section states that (Bt) proteins are relatively taxon-specific. Therefore, it is reasonable to consider whether pollinators from the same taxonomic Order as the targeted pest species would be affected. Unfortunately, the information provided in lines 1705 to 1707, which relates to this question, is not relevant. Neither paper contains data that show beneficial non-target Lepidoptera are affected by the Bt protein. The 'ambiguous results' referred to in the report refers to a disagreement about pollen movement over longer distances, not toxicity. A separate question is whether non-target organisms from different taxonomic Orders from the target pests are affected at biologically relevant concentrations. It is not clear what research lines 1702 and 1703 are referring to but if its Romirez-Romero et al (2008), this is misleading. Romirez and Romero et al found an effect at the highest concentration of Bt protein tested. This is approximately 500 x higher than found in GM crops (5000ng/g of Bt protein compared to approx 90ng/g present in MON810 and Bt11 maize pollen).	Comment on lines 1705-1707: The sentence has been reworded to clarify what the message was here. Further, we now mention that more research is needed in this aspect. Comment on lines 1702-1703: The concentration for which an effect was found in Ramirez-Romero et al 2008 is close to that of the Bt corn event 176 found in NaturGard(3.029ug/g or 3029ng/g; see Fearing et al, 1997 and http://cera-gmc.org/GmCropDatabaseEvent/176). Although this was stated in the previous version of the draft, this is now written in a more explicit way, and we say that this concentration is close to that displayed by this particular event. Furthermore, we now mention that the lower tested concentrations are similar to those expressed in other transgenic events.
UK Government	2	GMO	58	1696	58	1696	This suggests that there hasn't been testing of coleopteran pollinators, whereas there have been a number of studies involving the lady beetle (Coleomegilla maculata).	The mentioned studies have been now added and the section modified. We thank the reviewer for this comment.

UK Government	2	GMO	59	1723	60	1754	The report notes that studies indicate that the amount of herbicide used with GMHT crops is no greater than with non GM crops. Lines 1746 - 1747 confuse this statement by suggesting that HT crops are particularly linked to regular herbicide treatments. It also suggests that such treatments could be toxic to pollinators. There is no evidence/ discussion to support this statement i.e. why herbicides used with GMHT crops are potentially more toxic than those associated with non-GM crops (the report already establishes that this isn't to do with amounts used). It would be preferable to remove this sentence. There is no explanation in the section that impact will depend on the GM herbicide regime used by farmers/ allowed by regulators (e.g. in accordance with plant pesticide products legislation) and this could vary considerably; noting that GMHT crop systems allow more flexibility than conventional systems. The UK's Farm Scale Evaluations showed that GMHT maize systems supported greater biodiversity than non-GM maize under the particular conditions of the study whereas GMHT oilseed rape and beet systems had comparatively less biodiversity compared with their non-GM counterparts. However, it is important to note that the herbicide regimes used could be altered to generate different results. It is also very important to recognise that differences in biodiversity were greater between different crops than they were between GMHT and non -GM crops of the same species.	In this part of the section, we are talking about possible indirect effects of GM-crops and how much has been shown (or not) on this. We can not ignore that the very technology of HT crops is based on the idea that herbicides are very likely to be applied during hte growing season. From that perspective, mentioning that HT crops are associated with the applicaiton of herbicides does not seem as a very extreme or inaccurate statement, but rather a very obvious one. Further, in order to clarify how herbicide applications could affect pollinators and pollination we explicitly refer to the section in our chapter that extensively presents this (section 2.2.2.1.8). In order to clarify these ideas, we have now reworded these sentences. It is important to note that this section of hte chapter does not deal wiht crop management, and that this topic is addressed in section 2.2.2. For that reason, we have not expanded here into comparing the outcomes of different crop management methods.

UK Government	2	GMO	60	1755	61	1775	'Gene Escape' is a poor title; the terminology is unneccessarily inflammatory given that 'gene flow' is a normal biological mechanism (and the usual term). The whole section is implausible : a transgene would have to be present in a number of individual plants in a wild species to have an impact on 'communities of pollinators' and 'ecological networks'. As discussed in the report, even if there are sexually compatible wild plants in the vicinty of a cultivated crop (e.g. a GM crop), introgression rates are low. The report suggests that gene flow can occur over long distances - but if it happens, it will be a rare event and again, the potential for introgression is likely to be low. The UK's GM Science Report (2003) has a helpful section on geneflow, which provides more detail. Line 1777 refers to herbicide tolerant weeds. There is no evidence to suggest that gene flow has resulted in wild species outside the cultivated area becoming problem weeds due to gene flow from a GM crop. (This contrasts with the evolution of herbicide tolerant weeds in fields resulting from excessive herbicide use).	Following this comment the title of the section has been changed into transgene flow. We disagree with the reviewers on their opinion that this section is implausible. Indeed, when introgression has been tested with molecular methods, it has been identified. Further, any mutation that improves the fitness of the organism is expected to increase in frequence in a population, even if starting at very low frequencies. In the very reduced number of studies investigating this, it has been shown that IR-introgressed wild relatives can have a higher fitness, and thus spread quickly. Although we agree that these are theoretical expectations, we also understand that there is a lack of evidence on this, and thus a knowledge gap to properly evaluate the impact of such a gene flow into pollinators and pollination of crops and wild plants. For these reasons, we have maintained the section, and we have modified it to clarify our message. Related to line 1767, we do refer here to HT weeds formed by introgression. For this reason, the section has been maintained.
UK Government	2	GMO	61	1787	62	1816	The report should refer to Flockhart D.T. et al. (2014) Unravelling the annual cycle in a migratory animal: breeding-season habitat loss drives population declines of monarch butterflies. Journal of Animal Ecology. This adds some weight to the hypothesis that changes in the distribution or abundance of milkweed might, at least, be part of the reason for the purported decline in the adult populations of Monarch butterflies. However, in order to test this hypothesis, significantly more data are required.	done

UK Government	2	Bee management	84	2518	84	2519	This sentence is unclear	corrected
USA government	2	ES	7	66	7	67	… and [may] have effects up the food chain ([biRds] and bats).	Text deleted and replaced with other content.
USA government	2	ES	8	120	8	129	May be worth mentioning here too that even if pollinator species can move, the plants they depend upon may not - they may simply disappear from the narrow altitudinal or latitudinal band they occupy.	Added:There is potential for differences in migration rate or ability to lead to a geographical dislocation of pollinator populations from populations of their historic food plants, which may present problems for pollination service delivery (established but incomplete)
USA government	2	ES	8	123	8	123	… that cannot keep up with their [CLIMATE…?] and are projected to…	This typo has been corrected in a full revision of this statement
USA government	2	ES	9	116		121	What are "low-end"etc. scenarios?	low end scenarios are e.g. the Representative Concentration Pathway 2.6; http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html ; inserted in text now and footnote provided
USA government	2	ES	10	149		150	The less strict environmental regulations countries outside of Europe and US. Reword for clarity.	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
USA government	2	ES	10	149	10	149	Less strict environmental regulations [in these other markets] may lead to…	We have removed this part from the ES due to the reviewer comments and the speculative character of the statement
USA government	2	Intro	11	191	11	191	Has there been any research into the effects of irrigation practices?	Not that we are aware of
USA government	2	Land use	11	199	11	199	Style consistency: spell out abbreviations (like 'UN FAO') the first time they are used in the Chapter/document.	will be addressed at the final editing stage.
USA government	2	Land use	12	220	12	220	…associated [with] a 10% increase in the area…	Done.

USA government	2	Land use	16	332			Additional clarity to word "evenness" would help the readers who are unfamiliar with this concept.	done
USA government	2	Land use	16	344	16	344	I don't believe I've come across any specific statement (yet) indicating that wild/native species of bees (in particular) tend to be solitary (not social) or at best, some are eusocial. This is an important point to make, especially when statements are made throughout the document regarding the responses of or impacts on social species to climate change and other perturbations as being better or worse than that of solitary species. I'm not sure if readers realize the significance of these statements without being of the relative prevalence of these behaviors among different pollinator species/groups.	checking that it appeas in chapter 1
USA government	2	Land use	17	379	17	379	Should the reader know what 'modularity' is - it may need to be defined in a sentence before this sentence about reduced modularitv.	see response to comment 194
USA government	2	Land use	17	381	17	391	Suggest replacing the word 'rewire' with 'adapt'	see response to comment 194
USA government	2	Land use	18	418	18	419	Include scientific names for the 'fruit species' listed here - especially those being mention in this chapter/document for the first time…watermelons (Citrullus lanatus), blueberries (Vaccinium spp.), coffee (already mentioned) and atemoya (Annona × atemoya).	done
USA government	2	Land management	20	482	20	182	The abbreviation 'IPM' is only defined again on Pg.41 line 1146 and actually 'used' on Pg. 113 line 3409. Therefore I suspect it's not necessary to introduce this acronmy here unless you change line 41 line 1146 to just use rather than define the abbreviation and/or it's used throughout the remainder of this document (although it is indeed normally a good practice to redefine abbreviations and acronyms the first time they are used in a chapter even if they are used in other chapters of the same document).	As it is used the first time here within the chapter, we would keep the definitation of the acronym here and use it in the later occurrance.

USA government	2	Land management	21	494	21	494	Period punctuation mark missing after the (Andersson et al. 2013) citation (and 'et al.' is not italicized - IF that is the style this document will eventually use throughout).	Done.
USA government	2	Land management	21	494	21	497	Was the study specifically focused on 'native pollinators' or more likely 'wild pollinators' (which can include a mix of both native and non-native species)?	The reviewer was right, it referred to wild pollinators. Corrected.
USA government	2	Land management	21	498	21	498	Include scientific name for 'strawberry' here.	Done, Fragaria × ananassa is included.
USA government	2	Land management	22	527	22	528	There are a couple of specific reference citations missing.	References are added.
USA government	2	Land management	22	534	25	619	Serious need for editorial review needed for this section in terms of the use of singular and plural words throughout. Numerous places were a singular term is used where a plural term is clearly more appropriate.	The section was checked accordingly.
USA government	2	Land management	22	552	23	553	…in the case of [an] almond orchard studied by…it was found that [honeybees] predominantly [visit] only one cultivar…	Corrected.
USA government	2	Land management	23	555	23	555	If one crop variety providers no or only [a] low amount of nectar…	Changed to "only low amounts of nectar " acc. to comment 311..
USA government	2	Land management	23	564	23	564	Include scientific name (Rubus spp.) after 'raspberry'	Done.
USA government	2	Land management	23	582	23	583	Include scientific name (e.g. Brassica napus) after 'oilseed rape'	Included.
USA government	2	Land management	24	589	24	589	Include scientific name for 'pigeon pea' (e.g. Cajanus cajan ?)	Included.
USA government	2	Land management	26	649	26	649	Tree removal/logging has also been shown to impact hydrology, changing soil chemistry and plant composition etc.	Added.

USA government	2	Land management	26	659	26	659	Insert 'invertebrate' or 'insect' in front of 'pollinators' - the 3 studies referenced only focused on impacts on invertebrate (or insect) pollinators.	Added.
USA government	2	Land management	26	672			Additional citations to the facts "intensive fertiliser application can result in decreased deiversity and dover of the less competitive wild plant species" would be useful in substantiating these facts.	Additional citation is added (Kleijn et al. 2009).
USA government	2	Land management	27	682			Do you mean soil or air temperature and CO2 levels?	Air, added.
USA government	2	Land management	27	707	26	707	Possible first use of/reference to 'GMO' abbreviation - may need to be spelled out in full if this is the first appearance in the document or chapter.	Done.
USA government	2	Land management	29	753	29	753	oak savannas in what country(ies)?	USA, added.
USA government	2	Land management	29	758	29	258	"…and soil compaction by trampling…" (trampling in and of itself does not enrish soil)	Done.
USA government	2	Land management	29				Are impacts of infrastructure habitats (i.e. roads/roadside wildflower plantings, plantings along rights-of-way) on wild pollinator populations covered anywhere? The section 2.2.2.2.2 touches on impacts of roadside mowing practices…	We touched this subject at the mentioned mowing section and concerning the positive effects of field margnins due to increased flower diversity.
USA government	2	Land management	30	283	30	283	Cevennes National Park in what country?	In France, added.
USA government	2	Pesticides	39	1083	40	1116	This box refers only to deterministic risk assessment. Refined risk assessment methodology (field studies, probabilistic ERA) should also be mentioned along with when it is used. Also, the box should reference the section in Chapter 6 that describes ERA in greater detail.	amended and referred to Chapter 6 for further risk assessment details

USA government	2	Pesticides	41	1164			What is meant by "improving the granulatiry of pesticide usage data globally…"An additional thought of how to improve understanding of risks is to obtain data after the application, as in test results for the compounds of interest that may be determined by environmental testing programs, should a country use them.	clarified as local scale data on actual use
USA government	2	Pesticides	48	1367	49	1407	Given the limitations of incident data, be careful about drawing solid conclusions when comparing the HQ and the number of incidents. In addition, how do incident data relate to risk as a function of sublethal response? Incident data clearly reflect mortality, but not clearly sublethal response	reworded
USA government	2	General	Overall		Overall		General style comment: for consistency - choose to separate two authors in a citation either with an '&' or 'and' and use the same style throughout the document.	style will be streamlined al across the assessment report
USA government	2	General	Overall		Overall		As I read this chapter (particular in the first 17 or so pages (things improve after that), I keep getting the urge to insert 'wild/native' in front of the words pollinator and pollinators (and even plants) in a variety of places - to ensure that the reader clearly understands that the statements being made do not (necessarily) pertain to managed, domesticated livestock honeybees.	We have treid to fruther improve this, but in many instances statements refer to both groups of pollinators

USA government	2	General	overall		Overall		When discussing the impacts of habitat fragmentation on pollinators - is there any research worth highlighting that examined the effects of distances between habitat fragments on pollinator dispersal/distribution? I think the references to fragment connectivity approach this concept but I'd be interested to see a statement (if the knowledge exists) specific to e.g. habitat fragments separated by more than X distance of non-habitat tend to have lower or X% pollinator exchange rates in comparison to habitat fragments separated by less than X distance... (e.g. lines 396-397 mentions "lower migration between poorly connected habitats"). Do we yet have any specific metrics for what a 'poorly connected habitat fragment' might be for pollinators in terms of width/length of corridors or gaps?	This has not been much studied for pollinators of wild plants, but a mention to this for crop plants is now made at the end of section 2.2.1.2.2
USA government	2	Tables	Table 2.2.1				If the heading included "species richness response", that would help in understanding what response is being presented. Alternatively, use that term at the start of the legend.	The legend already presents the measure the table refers to. To make this more clear, we have now modified the legend.
V.P. Uniyal	2	Land use	14	297	15	299	Context is not clear, Rephrase the sentence	This part of the paragraph has been reworded.
V.P. Uniyal	2	Land use	19	457	19	457	explain "within at the most 2400"	This has been now clarified.
V.P. Uniyal	2	Land use	20	458	20	460	Consistency has not been adopted providing within-text references, viz, "et al.", "and, &" in the entire document. Adopt uniformity.	will be harmonized later
V.P. Uniyal	2	Land management	25	648	26	662	Effect of logging on pollinator richness and abundance should be elaborated a little more	More content on the effects of logging on pollinators is added.
V.P. Uniyal	2	Pesticides	44	1228	44	1228	Archer et al. should come come before Steward et al.	amended
V.P. Uniyal	2	Diseases	69	2029	69	2030	Honey bee scientific names should be in italics	Done
V.P. Uniyal	2	Diseases	71	2094	71	2094	KBV, IAPV acronyms should be mentioned	Fixed
V.P. Uniyal	2	Diseases	72	2135	72	2135	comma (,) comes after however	corrected
V.P. Uniyal	2	Diseases	73	2175	74	2177	Complete scientific names of bee species	Done

V.P. Uniyal	2	Bee management	78	2315	78	2315	There should be a gap between "bumble" & "bees"; uniformity has not been adapted in many places throughout the document	Style will be uniformized on the final text.
V.P. Uniyal	2	Bee management	78	2329	78	2329	only bumble bee, remove "bee"	Sure
V.P. Uniyal	2	Climate change	99	2996	99	2996	Xylocopa should be in italics	done (guess it was for line 296)
V.P. Uniyal	2	Diseases		2011,2037 ,2042 etc			Maintain uniformity in mentioning honeybee/honey bee throughout the document	Will be done in a final step all across the assessment
V.P. Uniyal	2	General					General comments	Sorry, this comment might be the first line of comment 1000? See there
V.P. Uniyal	2	General					Well-informative document containing all aspects of pollinators have been covered with adequate scientific references. Causes of pollinators decline all over the globe have been pointed out and discussed thoroughly. Appropriate examples conducted through field research on change of pollinators and pollination services have been discussed adequately.	Thank you for this statement, very motivating indeed!
V.P. Uniyal	2	General					Incorporating the example of research on alpine pollinators, status of pollinators in developing countries and issues of electro-magnetic radiation and it's impact on pollinators, especially on bees will certainly enhance the value of the document globally.	Thank you; we have now tried to have more on alpine pollinators included and also have tried to include more examples for developing countries, while for the electro-magnetic radiation we did not succeed in getting hold of scientifically profound references (suggestions would have been helpful here)

V.V. Belavadi	2	Land use	12	216	12	224	12% increase in urban area may actually lead to reduction in agricultural area because there are already restrictions on bringing forest area under agriculture in several countries	Although this statement may be true, we do not have data to show that this is really expected at a global scale. Moreover, most of the strong environmental policies refer to developed countries, whereas most of the urban growth is predicted to occur in developing countries, where such policies are many types lacking or not properly enforced. For these reasons, we have decided to not expand on this in this section.
V.V. Belavadi	2	Land management	22	539	22	540	There is a study on planning bloom sequences in coffee and cardamom plantations for conserving pollinator populations in the non flowering seasons of the target crops	Thank you for the nice suggestion, reference is cited.
V.V. Belavadi	2	Land management	23	565	23	569	Information on the need for growing pollinizer apple varieties in apple orchards may be added	Unfourtunately I could not find a good peer-review publication on that.
V.V. Belavadi	2	GMO	62	1801	62	1801	reduced larve growth rates should be reduced larval growth rates	done
V.V. Belavadi	2	Pesticides	63	1820	63	1820	Selen should it be Selenium	done
V.V. Belavadi	2	Diseases	69	2024	69	2033	Several scientific names are not italicised	corrected
V.V. Belavadi	2	Diseases	69	2029	69	2029	N. cerana should be N. ceranae	Done
V.V. Belavadi	2	Diseases	69	2030	69	2030	A. korchenvikovi should be A. koschenvikovi and italicised	changed
V.V. Belavadi	2	Diseases	74	2197	74	2197	Bacillus thuringiensis to be italicised	corrected
V.V. Belavadi	2	Diseases	75	2222	76	2242	High density of artificial nests for enhancing solitary bee nesting also often leads to heavy parasitisation	ref. added
V.V. Belavadi	2	Diseases	75	2227	75	2227	Mellitobia sp. Should be Melittobia sp.	corrected
V.V. Belavadi	2	Bee management	83	2478	83	2491	The paper by MacIver and Packer (2015) on bee hotels may be quoted here	added

V.V. Belavadi	2	Invasives	89	2666	89	2671	Scientific names of A. mellifera and Vespa velutina to be italicised	This must have been changed during formatting of whole document, fine in my original text and double checked revised text. Formatting will be checked again before print.
Valerie Peters	2	TOC	3	TOC	4	TOC	the subsections agroforestry through weed control management are missing from TOC	Thanks for the hint; we have now corrected this
Valerie Peters	2	Land management	25	620	25	645	The agroforestry section seems underrepresented compared to other sections of land management. I am aware that there is not much literature on agroforestry management for pollinators and pollination services, however agroforestry may perhaps be one of the most important land management systems for pollinator conservation, especially in places where the majority of trees are animal pollinated and pollinators therefore may rely more on floral resources from trees compared to herbaceous wild flowers (tropics vs. temperate). This section could be improved if the tree crop section was added, since there are more similar managment issues between agroforestry systems and tree crops compared to greenhouses and tree crops. The section could also be improved if the extent and great variation of agroforestry systems is acknowledged rather than emphasizing coffee and cacao. Although most studies come from these systems, the many other agroforestry systems should be acknowledged. Extent area of these systems and list of the many types can be found in Willemen, et al. 2013. Taking Tree-based Ecosystem Approaches to Scale: Evidence of drivers and impacts on food security, climate change resilience and carbon sequestration. Ecoagriculture Discussion Paper No. 11. Washington, DC: EcoAgriculture Partners. Management for pollinators and pollination services in agroforests outside of the tropics could also be cited- for example in Canada, Alam et al. (2014) estimated the value of pollinators in one agroforestry system- tree based intercropping- and found that yield and profit could be maximized with the	Willemen 2013 and Alam 2014 has been added. The first part includes now "While a considerable number of papers show the positive effects of plant diversity in agroecosystems for bees and other insect pollinators (see Nicholls and Altieri, 2013, for a review), considerably less attention has been paid to understand the effects of agroforestry for bees and other pollinators. Willemen et al. 2013 revealed a high diversity of Tree-Based Ecosystem Approaches, including trees in croplands, trees in grasslands, forest-based systems, complex multi-strata agroforestry and homegardens. They report positive impacts for food security and climate change, but a very few number of these studies evaluated the impacts of these systems for pollinators.

Valerie Peters	2	Land management	33	895	35	937	This section on tree crops would fit better within the agroforestry section. The agroforestry section could be called 'Agroforestry and tree crops'. Many of the same ecological principles of land management are similar for these similarly structured systems.	Subsection on horticulture systems is mowed to the "Contrasting forms of agricultural management systems" section, separated from greenhouses.
Valerie Peters	2	Land management	37	1013	39	1062	Some paragraphs of the conclusions have lines followed by the clarification of whether the statement is well-established or established but incomplete, etc. while other paragraphs do not. This should be consistent throughout conclusions.	It was finaly generaly decided not to use these terms in the main chapter text through the whole assessment, only in the SPM and ES. Therefore these terms were deleted from the conclusions.
Richard Corlett	General	General	0	0	0	0	This is an excellent SOD. Congratulations to the author team.	Thank you very much!
Thomas Brooks	General	General					Congratulations to everyone involved on this impressive piece of work; the IPBES pollination assessment is shaping up to be a really valuable contribution. I am now comfortable that the assessment builds on and reflects in appropriate ways the various contributions from IUCN on the subject of pollination, notably a) the IUCN SSC Red List of Threatened Species http://www.iucnredlist.org and b) the IUCN CEM/SSC Worldwide Integrated Assessment of the Impact of Systemic Pesticides on Biodiversity and Ecosystems http://link.springer.com/journal/11356/22/1/page/1, and citation to the specific papers therein. It is very important that these citations are retained through to the final publication of the IPBES pollination assessment, reflecting IPBES's mandate to build from existing work. I also make a few suggestions and comments on other points I noticed as appropriate.	Thanks for your very encouraging statement; we have maintained these citations also in the final version.
USA government	General Comment	General					All chapter headings should be placed at the beginning of each heading. For example, Chapter 1, Background, 1.1 should be at the start of line 4. For example, Chapter 2, Line 3 page 5 should have 2.2.1 at the start.	With respect to your statement on chapter 2, the 2.2.1. indicates the tracability for the ES-statment within the overall chapter text (so the statment here is derived from information provided in section 2.2.1)

USA government	General Comment	General					As with many group drafted documents, this draft is in need of a good editorial review, for both grammar and style consistencies. In particular, our reviewers have noted many scientific names are lacking, the need for proper use of italics for scientific names and et al., consistent serial commas and citation notations, and section / heading styles.	Will be done in a final step all across the assessment
USA government	General Comment	General					There are sections of the document which speak directly about trying to convince policy makers of something, or to take some action. Our government scientists do not advocate, but strive to provide unbiased science without directed outcomes. Some more specific comments are made in Chapter 4	Thanks for this, we tried or best not to be policy prescriptive within chapter 2 (but also we are not chapter 4)
USA government	General Comment	General					I was impressed with the scope & depth of the assessment. Although I devoted most of my time to the Preface and the Summary for Policy Makers, I did look at all chapters and I believe that each provides a very useful global scale synthesis. I think that the Assessment will be very useful in framing discussions going forward.	Thank you (at least on behalf of chapter 2)
Sven Hanoteaux		Pesticides	41	1144	41	1144	Give the position in the document where to find the Africa Box (i.e. page 43 of this chapter)	amended