

Name	From Page (start)	From Line	To Page (end)	To Line (end)	Comment	Additional Comments	Author Annotations
Serena Heckler	0	0	0	0	The structure of this chapter is not as clear as it might be. Although the chapter must cover a great deal of ground, by breaking the information up into so many different categories (typology of responses, type of actions, which are themselves often further broken down) the chapter can be hard to follow, can be overly reductionist in its approach with recommendations that can seem to ignore or even contradict recommendations in other sections. It would also help to correlate the recommendations with those from other chapters. As this chapter covers all of the subject areas treated in the report, its approach does not always correlate well with the findings and arguments put forward on the same issue in other chapters.		Thank you for this observation. We have taken the following steps to integrate the chapters better: linking to drivers (chapter 2) in the summary tables;

Serena Heckler	0	0	0	0	<p>This chapter would be improved by some consideration of equity and rights-based approach. Although this chapter is much better than most of the others, it still fails to consider the impacts of the recommendations and findings on equity and human and environmental rights. As the hope is that this chapter will inform policy, it is important that the copious literature on this issue is taken into account. Many of the following references will help in this respect.</p>	<p>Equity and rights based approaches are thoroughly considered in chapter 5. The references you refer to in your comments concern ILK. Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5.</p>
Les Davies	0	0			<p><b>Overarching Comment:</b> A comprehensive draft - however, even just the one chapter is 146 pages - almost a telephone book! Is it clear who the target audience(s) is/are?</p>	<p>Thank you for your comment. Our chapter is expected to be longer than other chapters. We are editing unnecessary text, with a target to lose 3,600 words for the next draft. There was no scoping phase for this assessment to define key audience groups. The report needs to provide relevant information for a very wide range of audience groups, with a special focus on providing policy-relevant messages. The audience groups include governments (various levels and various departments), planners, politicians, researchers and analysts, non-governmental organizations, general public, schools and universities, industries and business, women's groups, indigenous peoples' groups, media.</p>

Les Davies	0	0		An Exective Summary would be useful	This is now provided.
Lennard Pisa	1	0	154	General: the authors know what they are writing about, very extensive, good resource on this matter	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Lennard Pisa	1	0	154	Good document, very readable, native English speakers were clearly involved	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Lennard Pisa	1	0	154	154 pages is long, maybe it is worth weeding out all unnecessary text but there does not seem to be much of that.	Thank you for your comment. Our chapter is expected to be longer than other chapters. We are editing unnecessary text, and aiming to lose 3,600 words for the next draft.
Noa Simon Delso	2	0	2	Following my previous comment, the concept that pollinators are just considered for their pollination servicies is auto-limiting and “narrow-minded” (without no aim to be pejorative to the authors, but to the approach)	The text referred to by this comment in not clear. However, we do not only consider pollinators for their services. Throughout the report the diversity and instrinsic value of wild pollinators is considered. See for example section 6.4.3.1.5 on species-focused conservation actions.
Lennard Pisa	4	0	6	Format of the table of contents and numbering of (sub)sections must match that of the other chapters	This is an editorial issue and will be dealt with centrally when the final draft is produced.
Anne Alix	all	0		This chapter proposes a robust analysis of a very comprehensive review of knowledge on the topic, it is an impressive work, thank you for this.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.

Jerome Casas all 0

there is a serious need to quantify what one understands with the concept of "level of agreement" very much in the same spirit as for the concept of "risk"

Since this draft was produced, IPBES have developed guidance on the treatment of uncertainty, and we are using clearly defined uncertainty terms that distinguish between levels of agreement and evidence. Each individual use in these tables, and summary documents, will be agreed by discussion and consensus among the author teams at the third authors meeting.

Maximilian Weigend 0

This chapter is extremely sophisticated and advanced. There might be some redundancies, but overall a huge variety of data are critically presented and provide deep insights into risks and opportunities, highlighting both the known and the unknown. Maybe, a slightly more concise presentation would be desirable, but the copious tables present allow a fast overview over crucial facts. Maybe the only major shortcoming is the lack of an executive summary, which should be easy enough to provide since all the data are already very well presented onm extenso.

Thanks for this positive comment. We have added an executive summary.

Maria Laura Ruiu	0	If you agree with this circular influence, I suggest to use a figure to represent the connection between the action/response and the risk/opportunities	It is difficult to design an informative figure that shows the complex relationships between responses and opportunities. Instead, we have included Table 6.2.3 which links drivers, risks and relevant section of the responses chapter.
Maria Laura Ruiu	0	An additional column for each table, which refers to the specific policies/places where the responses/actions were established/tested, could facilitate the comprehension, while shortening the text. The same column (or an additional one) could also quote the literature/studies.	Thanks, this is a good idea. We have added section numbers to all summary tables, to lead readers to the relevant text and references.

Teruyoshi Nagamitsu	0	I cannot evaluate each issue in the policy making and executing. In some parts, the authors mentioned scientific evidence, which is redundant with the previous chapters. I would like to suggest to focus on available responses and activities of social, economic, and governmental agents in this chapter.	This comment suggests we structure the chapter by actors. We considered this at the outset, and decided that it was less simple than organising responses by type of response and sector, since many of the responses are for several or all actors, and the actors cut across sectors. For example, Table 6.3.1 describes areas of activity for Government policy makers, as defined by a thorough FAO policy-focused process. As discussed in the text, these areas are a mix of policy sectors and action types, and this would be the same for all actor groups. We disagree that scientific evidence should only appear in previous chapters. This chapter considers evidence relating to the effectiveness of individual responses that is not covered in other chapters.
Timothy Schowalter	0	Overall, this chapter seems to address the appropriate risks for pollinator conservation	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.

Martha Groom		0				Global comment: Insertion of more case studies could be helpful and inspiring in this chapter above all. This is the solutions oriented chapter. It would be useful to solicit some of these boxes that focus attention on specific efforts. If you need more support beyond your authors, I would be happy to compose one on the Pollinator Pathway, for example, or on other cases as needed.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Felix Herzog	1	1	1	1		I'm somewhat disappointed by Chapter 6. It seems to have been done in parallel to the other Chapters. In general, try to achieve a better integration of the findings from preceding chapters.	We have integrated chapter 6 with the other chapters in the following ways: Table 6.2.2 and 6.2.3 draw together information across chapters; paragraphs for each sector (section 6.4) link the responses to relevant drivers and key findings from previous chapters.
Les Davies	7	6				Need to define up-front what is meant by 'responses' - responses from whom and to what?	We have added the following definition at the start of section 6.1: By responses, we mean actions, interventions, policies or strategies designed to support pollinators or mitigate against pollinator decline, carried out at any scale by individuals or organisations.

Les Davies	7	7			We' - who is 'we'? Define	We' refers to the author team for chapter 6. We consider this to be a standard usage and a matter of style. We have used it throughout the chapter and see no need to define it.
Jerome Casas	6	10			Is the MEA not outdated by then ? No other alternative?	The MEA is one of several sources used, the others more recent, as explained in section 6.3. This text is deleted, to avoid implication that we only used the MEA.
Thomas Steeger	6	12	6	15	It's uncertain whether "driving" the observed changes is an appropriate term; rather, "influencing" the observed changes may be more appropriate given that there are multiple factors. Also, when you say "changes in abundance and identify", do you mean "abundance and diversity"?	This text now deleted to reduce word count.
Les Davies	7	13			This' should be 'These' since 'observed changes' is plral	This text now deleted to reduce word count.
Les Davies	7	17			See comment in row 2 (above) re defining what is meant by 'responses' i.e. the 'Introduction needs to step back and provide a greater pre-able.	We have added the following definition at the start of section 6.1: By responses, we mean actions, interventions, policies or strategies designed to support pollinators or mitigate against pollinator decline, carried out at any scale by individuals or organisations. We have very limited space, so we are unable to add any further pre-able.

Les Davies	7	18			evidence'? Evidence for what? Relevant 'information' may be a more appropriate word	Thanks. This has been changed to information.
Les Davies	7	18			Is 'sector' the correct term here? 'Integrated responses' is not a sector.	Agreed. The title of the integrated responses sector has been changed, and the text changed to "Responses that cut across these sectors, such as broad policy initiatives, research, education and knowledge exchange, are presented in section 6.4.6."
Thomas Steeger	6	21	6	21	it's unclear whether specific criteria were identified for evaluating the effectiveness and appropriateness of responses.	We have deleted the word 'appropriate' and clarified our approach with the following text: ...and summarise existing knowledge about whether the response is known to achieve its objectives, with a particular focus on its effects on pollinators or pollination services.
Christoph Görg	7	30	7	33	ILK is also important for agenda setting, in particular for identifying problems or aspects of a problem most relevant for local people and for adequate policy responses	Thank you. The text has been amended as suggested.
Phil Stevenson	7	31	7	31	replace and with comma	Thank you. The text has been amended as suggested.
Thomas Steeger	6	39	6	39	it's unclear how "appropriate policy response" is determined given that it would likely be based on laws of each country.	We have changed 'appropriate' to 'available'.

Phil Stevenson	8	54	8	58	Where does provision of evidence and the review of evidence come in to the process?
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The diagram is intentionally simplified. Use of evidence in policy making is a complex multi-disciplinary area, and diagrams that try to show it are usually messy. As there is no specific research on development or use of evidence in pollinator related policies, we consider it beyond the scope of this pollinators report. However, there was already some text about where evidence should feed in to the policy cycle. We have added two more lines of text and three references as a pointer to this complex field.

Serena  
Heckler

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Participatory, community-based or rights-based ideas and approaches are almost completely absent from figure 1. It gives an idea of government official as actors, with virtually no role for other stakeholders. This is no longer considered to be an effective means of policy-making or, much less, policy implementation. It certainly does not fit with the approach put forward further down in the chapter (particularly section 6.4.f 'integrated responses'). As is suggested in the next comment, it is not reflective of the lived experience of most farmers and smallholders to separate "cultural values", biodiversity and food production. Biocultural approaches to conservation, which are increasingly widespread, offer a more inclusive analytical approach to consider the complexities of NRM (see for instance Sacred Species and Sites: Advances in Biocultural Conservation, ed. Gloria Pungetti, Gonzalo Oviedo and Della Hooke. Published by Cambridge University Press. c! Cambridge University Press 2012.)

We have re-drawn the diagram, showing local stakeholders involved at every stage.

Les Davies	8	55	56	The diagram doesn't appear to cover collection of knowledge - policy formulation needs to be based on some resaearch evidence	The diagram is intentionally simplified. Use of evidence in policy making is a complex multi-disciplinary area, and diagrams that try to show it are usually messy. As there is no specific research on development or use of evidence in pollinator related policies, we consider it beyond the scope of this pollinators report. However, there was already some text about where evidence should feed in to the policy cycle. We have added two more lines of text and three references as a pointer to this complex field.	
Madeleine Chagnon	8	57	8	57	Fig. 1: Strange that this HAS to be initiated by the public. References for this ?	The diagram has been redrawn, without this inference.
Denise Margaret Matias	8	57	8	57	Cite source even if written with permission	The diagram has been redrawn.
Christoph Görg	9	62	9	63	very narrow (and technical) definition of risk that does neither include economic risks (risks accepted for expected gains) nor the cultural perception and the sociological research on risk (M.Douglas et al.)	We have defined our approach to risk more carefully as 'scientific-technical' and explained why we have not considered sociological/psychological approaches to risk.

Thomas Steeger	8	63	8	63	" . . .a risk, both the probability (likelihood) and the magnitude or scale of the impact (adverse effect) must be estimated." While this is a classical definition of risk, deterministic (point estimate-based) approaches (e.g., the EPA risk quotient), is a unitless number and cannot be construed as an estimate of magnitude.	Thanks. We have changed the wording so it does not imply this is the only way to evaluate a risk, just 'one way...'
Phil Stevenson	9	67	9	69	I think this table needs to expand the biodiversity and cultural impacts which seem to be afterthoughts	Following a consultation with all authors, we have expanded the biocultural diversity impacts.
Maria Laura Ruiu	9	67	10	68	Whether it is possible, potential impacts of pollinator decline, and opportunities associated with pollinators and pollination should be also addressed (and synthesized) in relation to policy, scientific and socio-economic levels.	Thank you for this suggestion. We have not amended the text because it is not clear exactly what you propose is missing and you have not provided any supporting evidence.
Christoph Görg	9	67	9	68	Opportunities for enhancing food security for some local people are missing	This is covered in 'Improved or more stable yield in the long term, at lower cost'
Lennard Pisa	9	67	9	67	Considering the info in table 6.2.1, do I need to see any references	Text added: The potential impacts and opportunities listed in Table 6.2.1 have been defined through deliberation and discussion by all the report authors (including chapters 1 to 5).
Lennard Pisa	9	67	9	67	or are all risks and opportunities the conception of the authors?	Text added: The potential impacts and opportunities listed in Table 6.2.1 have been defined through deliberation and discussion by all the report authors (including chapters 1 to 5).

Madeleine Chagnon	table 6.2.1	67		Potential impacts: separate honeybees ( honey crop) from pollinators at large (food crop)	Thanks for this suggestion. I do not fully understand the change you suggest. Honey production, and availability of managed pollinators are clearly separated as specific impacts.
Madeleine Chagnon	table 6.2.1	67	57	increase in pest ... due to restriction is NOT an impact of pollinator decline	Four reviewers disagreed with this impact. We have therefore removed it.
Piotr Medrzycki	9	67	Tab#6. 2.1.	“Increased pest, disease or weed problems due to restrictions on crop protection, leading to lower quantity or visual/nutritional quality of food” - I don't agree with the statement that the restrictions on crop protection lead to lower quality of food. Indeed one of the most important parameters of the food quality is related to the presence of chemical residues, which in this case will be lower, thus improving the quality. Generally I wouldn't see these restriction as a problem. In my opinion the use of agrochemicals should be oriented to an environmentally-friendly system independently from the pollinator decline.	Four reviewers disagreed with this impact. We have therefore removed it.
Scott Black	8	67	table 6.2.1	Under potential impacts of pollinator decline I do not see what increased pest, disease or weed problems due to restrictions on crop protection has to do with this.	Four reviewers disagreed with this impact. We have therefore removed it.

Cynthia Scott-Dupree		67			Tab 6.2.1 Biodiversity - right column should read "Improved conditions and habitats for an increased diversity of pollinator species"		This opportunity is redefined as 'Maintenance of wild pollinator and plant diversity'
Maria Jose Suso	8	68	8	68	<p><b>Table 6.2.1. Impacts</b> Crop pollination deficit leading to inefficiency in breeding strategies for heterosis exploitation in hybrids and particularly in heterotic populations for low-input farming (Palmer et al. 2009 The role of crop/pollinator relationship understanding in breeding for pollinator-friendly legumes varieties; from a breeding perspective. <i>Euphytica</i> 170:35-52)</p> <p><b>Opportunities</b> Change of paradigm in agriculture demands the development of specific and novel improved breeding strategies (evolutionary breeding) in animal-pollinated crops for low-input and organic farming based on the use of intra-specific genetic diversity (within species and within population variation) (SOLIBAM- <a href="http://www.solibam.eu-FP7-KBBE-2009-3">http://www.solibam.eu-FP7-KBBE-2009-3</a>). These breeding strategies, insect-aided outcrossing based, use pollinators as agent of cross-pollination to maintain and increase heterogeneity and heterozygosity in cultivars.</p>	The commercial exploitation of hybrids is known to be directly linked to the ease with which their hybrid seeds could be produced. The efficiency of pollen transfer plays an important role in commercializing the hybrids in different crops. Natural outcrossing is used to develop viable hybrid breeding technology. Good insect pollinator activity is imperative to harvest good hybrid seed yield. Thus, pollinator decline is harmful in some animal-pollinated crops for heterosis breeding because, for instance, the hybrid seed high cost when using hand pollination. (Palmer al. 2011 Male sterility and hybrid production technology. In: Pratap A, Kumar J (eds) <i>Biology and Breeding of Food Legumes</i> , CABI International, Oxford,	The list of impacts and opportunities has been agreed by consultation and careful deliberation by the entire author team. These suggestions did not arise. I have carefully considered them and find them too specific for this high level list. The link between the proposed novel plant breeding strategies and food production/human well-being remains unclear. We have added seeds as a category of product that may be affected by crop pollination deficit, which covers the issue for plant breeding strategies to some extent.

Cynthia Scott- 9 Dupree	68	10	69	Left hand column of TB 6.2.1 - I do not understand what is meant by "other products", please clarify to avoid confusion	Examples now given: '..such as fibre, fuel or seeds'
Cynthia Scott- 9 Dupree	68	10	69	Tab 6.2.1 Right column top - should read "improve or stabilize"	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Cynthia Scott- 9 Dupree	68	10	69	Tab 6.2.1 mid column should read "Reduced honey production"	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Cynthia Scott- 9 Dupree	68	10	69	Tab 6.2.1 right column 'statement about premium for a more sustainable approach to farming - should this be "beekeeping" instead of "farming" ; statement is unclear	Thanks for pointing this out. We have added 'or beekeeping'
Cynthia Scott- 9 Dupree	68	10	69	Tab 6.2.1 - I simply do not understand the statement on "decline in nutritional quality of human diets" - is this overstating the fact	This is now an indirect impact, and more carefully explained
Cynthia Scott- 9 Dupree	68	10	69	Last statement mid column on food production - I believe this final statement on increased diseases and pests etc. is completely misleading - pollinator declines will not cause increased pest pressure in agroecosystems; the measures taken to restrict for example pesticide use directed at protecting pollinators is what will in the end effect pest pressure - this statement needs to be reworded or completely removed	Four reviewers disagreed with this impact. We have therefore removed it.

Noa Simon 9 68 9 69  
Delso

Lack of seeds (pollination is kept for the seed production market). The cultural line of the table could be further developed with some of the ideas previously indicated. Working in my daily life with beekeepers, I continue being surprised about the dynamism of this community. Beekeepers are as dynamic as their bees within their local communities. They teach people about bees, biology, nature and food quality, health... In my opinion, and knowing that a large percentage of beekeepers are elderly people (at least in Europe), the lack of continue being active at this age brings benefits (e.g. In health terms) to them personally and to their families.

The list of impacts and opportunities has been agreed through consultation and careful deliberation by the entire author team. These suggestions did not arise. However, we have added seeds as a category of product that may be affected by crop pollination deficit, in response to this and other comments. You have not provided supporting evidence for the health and well being benefits of beekeeping, so we have not added that.

Serena Heckler	9	68	9	68	In table 6.2.1, ILK and the concerns of indigenous peoples and local communities are excluded. For instance in the first row 'food production', strategies for subsistence (as opposed to financial gain) seem to be absent from this table. Other opportunities to include here are: increased resilience for small-scale agriculturists, hunter-gatherers, pastoralists and other subsistence level peoples. Also could include ecosystems services that support sustainable livelihoods (which can decrease the risk of starvation, malnutrition and displacement and increase equity).	For me, the impact 'lower quantity of food produced', and the opportunities 'improved or more stable yield' and 'more economically sustainable agriculture' ALL cover those growing food for subsistence as much as they cover commercial food markets. We do not see a need to make a distinction here according to the scale of agricultural activity. We have added an indirect impact : Loss of income/livelihoods for growers of pollinator dependent crops, but again, this operates at small and large scales.
Matthew Heard	9	68	9	68	Table 6.2.1 'Opportunities...managemnt' column it seems odd to have an entry that says 'reduce dependence on management' I know what you are trying to say so perhaps re-phrase slightly?	Thanks. Changed to: "Reduced dependence on managed pollinators due to more reliable pollination service delivery by natural ecosystems."
Matthew Heard	9	68	9	68	Table 6.2.1. I would question how long a product premium would last if all systems were managed in this way - premium has typically arisen from niche e.g. organic but this premium soon fades e.g. during financial crisis	Thank you for making this point. It does not seem to require changes to the text.
Matthew Heard	9	68	9	68	Table 6.2.1. Biodiversity section - wild plant extinction - few published studies support this and pollination is only part of plant dynamics - seed/microsite limitation often more important	Thanks for this. The level of probability and impact of these impacts are shown in Table 6.2.2

Matthew Heard	9	68	9	68	Table 6.2.1. Biodiversity section - add 'long range' before disease transfer		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Denise Margaret Matias	9	68	9	68	[1] Food production - I'm not sure if "visual" quality is a major concern of crop pollination deficit since vegetable or fruit produce are not really uniform when it comes to visual quality [2] Cultural values - Include bee hunting not just beekeeping The importance of wild pollinators could be emphasized more		[1] Visual quality (shape, colour, size) of fresh produce is very important to value in westernised food supply chains and known to be affected by pollination. [2] The potential impacts have been redefined, following a consultation process with all authors. Bee hunting and beekeeping are included as distinctive ways of life, cultural practices and traditions.
Nikolay Sobol ev	10	71	10	75	Should be achieved for further assessment	Still not achieved	This assessment has now been completed
Barbara Herren	10	75			<b>This assessment will be conducted during January &amp; February 2015. - it is unfortunate not to have this as part of the review as it might be where we at FAO could provide diverse inputs</b>		This assessment has now been completed. Baraba Herren was invited to take part, but did not complete the first round.
Cynthia Scott-Dupree	10	76	10	81	If this paragraph refers to TAB 6.2.2 then please indicate in paragraph. Paragraph states term "medium probability" while table refers to "moderate probability" - be consistent because it confusing		Thanks. A reference to the Table added to the paragraph and the text corrected.
Cynthia Scott-Dupree	10	83	10	87	states four categories but I read only 3 therefore should be "large, moderate, small and no impact"		This text now deleted to reduce word count.

Noa Simon Delso	10	92	10	93	What is included under inadequate stakeholder consultation? This is unclear. Would lobby by specific stakeholders or conflict of interest being included here? Personally, I consider the issue of "conflict of interest" separated from "inadequate stakeholder consultation" and I think it should be specified separately.	This paragraph reports the content of the IRGC report - readers are referred to that citation for detail of what is meant.
Cynthia Scott- Dupree	10	99	10	99	Is "Schroders" a Inc. or Ltd. I think this company needs to be defined more accurately; most readers don't know what Schroders is so attention to is business is required	Company name specified
Cynthia Scott- Dupree	10	100	10	100	Should read "The report provides an insight...."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	10	103	10	105	The sentence is speculative unless supported by a reference. The reality is that to provide pollination services on a large scale (e.g., California almonds) when bees colonies may be at their weakest, required considerable input. Beekeepers rely on lucrative pollination service fees to survive and to ensure the colonies are receiving the near continuous inputs that commercial beekeeping now appears to require.	The text has been deleted to save space, although it was supported, as it was a direct citation from the Stathers reference.

Madeleine Chagnon	11	103	11	105	.. Is the Stathers paper citation is taken out of context ? See chap 4 lines 249-251		Thanks for this. The Stathers reference is cited to illustrate business perception, rather than presented as evidence of value of pollinators. I think this is clear from the text.
Noa Simon Delso	12	103	12	105	Unfortunately, noone seems to have made a study of the benefits of hobby insect keeping. In my opinion and having a lot of experience in working with hobby beekeepers, the “investments in conservation and establishment of wild habitats” can be benefited by the development of an extended network of well-trained hobby (or not) insect keepers.	Maybe a policy option would also be to favour the development of hobby insect keepers (with training programmes and a network of schools with this purpose). A good example of a successful policy programme is the “Beekeeping Programmes in the EU”, which does not aim to directly support the individuals, but to support the development of the sector as a whole.	The text has been deleted to save space. Options to support beekeepers are discussed in section 6.4.4.
Cynthia Scott-Dupree	11	104	11	104	Should read "establishment of natural habitats"		This text has been deleted to reduce word count.
Cynthia Scott-Dupree	11	105	11	105	Should read "wild/unmanaged pollinators near crops"		This text has been deleted to reduce word count.
Madeleine Chagnon	11	106	11	106	Does the IPBES care about the national and farm level ? Arguments here seem to imply this not important		This text is to illustrate business perception, and does not imply that national and farm level are not important to IPBES.

Barbara Herren	11	109	11	109	opportunities+listed+in+Table+6.2.2 - opportunities not presented in 6.2.2- perhaps you mean 6.2.1?		Yes thanks for this. Changed to Table 6.2.1
Barbara Herren	11	115	11	115	Section+6.4b is not mentioned		We have added section 6.4.2 linked to opportunities for biocultural diversity.
Lennard Pisa	13	127	13	129	Table in next document is not finished, nothing to be reviewed.		This will not be the case in the final report.
Nikolay Sobol	13	127	13	129	Should be achieved for further assessment	Still not achieved	This assessment is now achieved.
ev Les Davies	13	127			Impacts associated with pollinators and pollination - Table #6.2.2 heading needs to define 'impacts' in more detail e.g. 'Economic, environmental and agricultural impacts of ...' And associated with what? Suggest 'Changes in pollinator numbers and pollination services' or similar.		Thanks. We have changed the Table title to specify what the impacts are more carefully.
Lennard Pisa	11	127	12		Table 6.2.2 is in a separate document		No action required.
Lennard Pisa	11	127	12		that is Ok but makes it harder for the reviewer if there is direct referencing to the table in the text.		This will not be the case in the final report.
Lennard Pisa	11	127	12		I go to the next file.		No action required.
Cynthia Scott-Dupree		127			No comment on Tab 6.2.2 - seems fine at this point		No action required.

Phil Stevenson	13	128	129	Decline in Nutrition is difficult to comprehend - is this about the nutritional quality of food or about the amount of food in which case is this this not simply a component of crop yield instability and crop quantity and quality of food? I think this table needs a more in depth focus on non crop issues which are particularly overlooked in most pollinator decline assessments.	This (decline in nutrition) is now an indirect impact, included only in Table 6.2.1, and more carefully explained. Biocultural diversity impacts have been expanded in both Tables 6.2.1 and 6.2.2, following consultation with the entire author team.
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Noa Simon Delso	13	128	13	129	<p>Pollinators provide much more than pollination, biodiversity, crop yield, honey, and the other ecosystem services cited in table #6.2.2. Crop yield can be translated into higher food, but also fiber production (see Lautenbach et al. 2012). Some pollinators in certain regions are an important part of rural development, dynamism and economy (see for example Malasia and their butterfly industry). Honeybees provide maybe the most widely example of contribution to the life in rural (and increasingly urban) areas. Bees in general are a source of inspiration for technological development (see for example Srinivasan MV (2011) Honeybees as a Model for the Study of Visually Guided Flight, Navigation, and Biologically Inspired Robotics.), and a source of other goods with pharmacological (aptherapy), scientific and technological uses (see for example Banskota AH, Tezuka Y, Kadota S (2001) Recent progress in pharmacological research of propolis. <i>Phytother Res</i> 15: 561–571. Or Jull AB, Rodgers A, Walker N (2008) Honey as a topical treatment for wounds. <i>Cochrane Database of Systematic Reviews</i>. Chichester, UK: John Wiley &amp; Sons, Ltd. pp. 1–43.)</p>	I guess this table needs to be made coherent with chapter 5.	<p>The list of impacts and opportunities has been agreed through consultation and careful deliberation by the entire author team. Some of the values of honey bees mentioned here are captured in two biocultural diversity impacts: loss of distinctive ways of life, traditions and cultural practices AND loss of aesthetic value, happiness or well-being. I have added an indirect impact and opportunity relating to the use of pollinators as resources or inspiration for research. Thanks for these references. This aspect will be covered in chapter 5.</p>
Lennard Pisa	14	129			<p>Document continues in another file with section 6.3</p>		<p>This will not be the case in the final report.</p>

Maria Jose Suso	12	131	12	131	Add, cultivars after pesticides	Pollinators respond to differences in discovery, attractiveness and reward floral traits by changing pollinator visit frequency and duration. Discovery, attractiveness and reward floral traits vary between cultivars as has been shown for some crops (Hudewenz et al., 2013; Kobayashi et al. 2010), although differences between crop varieties are still little explored. Thus, cultivar should be regarded as a global change driver in its own right. It is important to understand cultivar effects in pollinator responses.	Thank you for this suggestion. We have chosen not to include it. This text just provides examples, and cultivar effects are not generally considered a main driver of global change, so to add this here would be confusing.
Diane Castle	14	132	14	132	<b>Proposal:</b> Cite more greater selection of examples of drivers/threats <b>Justification:</b> Pesticides are repeatedly cited/exemplified in this Chapter and Chapter 2 -giving a disproportionate emphasis on the contribution of pesticides.		Thanks for this suggestion, but pesticides are a prominent issue and considered one of the main drivers of pollinator decline by the authors of this report. They have a dedicated section in chapter 6. I cannot see a problem with using them as an example driver here.
Cynthia Scott- Dupree	1	146	1	146	Should read "Assessment"		Thank you. This has been corrected.

Cynthia Scott- Dupree	1	153	1	153	What does NEA stand for - please define	This acronym was defined three paragraphs before.
Diane Castle	14	162	14	165	<b>Proposal</b> :Amend text to also include agri-environment schemes, Integrated Pest Management (IPM) and bee disease control. <b>Justification:</b> A more balanced set of examples.	This does seem a balanced set of examples to me. Agri-environment schemes are economic responses, IPM is similar to techniques to reduce the impact of pesticide use. We have added an additional example (bee disease control) as suggested.
Barbara Herren	14	162	14	165	re this paragraph, and type of respnpse: I have real issues with calling this "technological". In an international agriculture arena, that invokes green revolution and technological fixes. In fact all what is described under table 6.4a describes ecological approaches, working with biological systems to optimise interactions- which is far from "technological"	We have changed to use the term 'Technical' to avoid negative connotations. However, not all the responses in Table 6.4.1 are ecological - some involve engineering and plant biotechnology, for example.
Cynthia Scott- Dupree	1	163	1	165	The wording here implies that organic farming and crop rotation are techniques used to restore pollinator habitat - I would like to see the science that supports a statement like this; I may be misinterpreting but if so then the statement needs clarification; I suggest reference to sustainable agricultural and agroforestry practises are important in restoring or maitianing habitat	Thanks for this. We have changed the wording to clarify.

Diane Castle	14	166	14	169	<p><b>Proposal:</b> Include the example of controlling the importation of non-native species (trade in commercial bees) and disease control.</p> <p><b>Justification:</b> A more balanced set of examples</p>		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Maria Jose Suso	13	172	13	172	<p>Add, after pollinator friendly-practices: for pollinator friendly-crops developed by Participatory Plant Breeding and Management (PPBM).</p>	<p>It is increasingly recognized that farmers may implement pollinator-friendly practices but in addition farmers may use pollinator-friendly crops on their farms to increase the occurrence, health and visitation of pollinators. A basic approach, to encourage the synergy between food production and pollination services, was proposed taking into account that flowering crops could be effective determinants of bee diversity and density, the Crop Design System (CDS). In the CDS approach breeders and farmers develop by Participatory Plant Breeding and Management cultivars with enhanced yield and resilience as result of the provision of floral resources within the crop for supporting insect pollinator populations to be used as agents of</p>	Thanks for suggesting this example. It is added to section 6.4.1.1.9

Diane Castle	15	172	15	172	<p><b>Comment:</b> Pesticide taxes are not a good example of an incentive for good practice because (i) strictly speaking higher taxes are being used to discourage a given practice - in this case of buying pesticides and (ii) it is an imprecise tool that can result in bad practice due to less than the recommended amounts/applications being used and in some cases increasing the risk of resistance.</p>	Thank you for this comment. It seems to be an opinion for which you do not provide supporting evidence. We have chosen not to change the text.
Maria Jose Suso	13	175	13	175	<p>A valuable participatory process is Participatory Plant Breeding (PPB)</p> <p>In participatory approaches, farmers are encouraged to take on active roles, help set direction, and take part in decision-making. Participatory approaches focus on meaningful, fair and iterative interaction. More details in Ceccarelli et al. 2009. Plant breeding and farmer participation. FAO, Rome. 671 p.; Ceccarelli, S. 2014 Efficiency of Plant Breeding. Crop Science 55:87-97; SOLIBAM-  <a href="http://www.solibam.eu-FP7-KBBE-2009-3">http://www.solibam.eu-FP7-KBBE-2009-3</a>).</p>	Thanks for suggesting this example. It is added to section 6.4.1.1.9

Serena Heckler	15	180	15	185	<p>The decision to decouple those aspects of indigenous and local knowledge that relate to "communication or transfer of knowledge" (i.e. documenting or sharing indigenous knowledge) from "actions and behaviour" is unsupported and not reflective of the nature of ILK. Are ILK practices consequently split into social/behavioural responses? <u>Suggest rethinking this split as ILK covers both knowledge and social/behavioural responses.</u> ILK also includes technological responses - its holistic nature does not easily break down into these components.</p>	<p>We fully appreciate this point. Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in the following draft, allowing some direct comparison of the different knowledge systems.</p>
Vanda Altarelli	15	187	15	187	<p>This table could easily go into an Annex</p>	<p>Thanks for this comment. The contents of this table, which provide alignment with the FAO work on pollinator policy areas, are really important from a policy perspective. We therefore chose to retain it in the main text.</p>
Noa Simon Delso	15	187	15	188	<p>Where does the change of the agricultural model fit in this table? It is the agricultural model that is pushing for pesticide use, loss of habitat, etc.</p>	<p>This Table reports thematic areas identified in the FAO report cited. Please refer to that report to see where changing the agricultural model fits. In this report, Table 6.4.1, changing the agricultural model is included as several different alternative farming systems (organic, no-till and diversified farming)</p>

Felix Herzog	17	204	17	204	Remove "agro-forestry" from title	is not really addressed	As you will see from the search terms in the Annex, we actively searched for evidence on agro-forestry and pollinators, so it is included.
Lennard Pisa	17	204	21	212	Is this table 6.4a a handy table to have in the main body of text?		Thanks for this suggested. Summary tables were revised and moved to the end of the each subsection
Lennard Pisa	17	204	21	212	The references on type of response and wether it has been applied and/or successful are in the text that comes right after the table.		Thanks for this suggested. Summary tables were revised and moved to the end of the each subsection
Lennard Pisa	17	204	21	212	Maybe the overview table is better at the end of the text so it does not distrub the reader.		Thanks for this suggested. Summary tables were revised and moved to the end of the each subsection
Lennard Pisa	17	204	21	212	But that is up to the editor.		Thanks for this suggested. Summary tables were revised and moved to the end of the each subsection

Felix Herzog	18	205	18	last line of Table	last line of Table REPLACE "Low agreement" by "High agreement"	My understanding from chapter 2 is that there is high agreement that diversified farming systems are beneficial for pollinators. This is linked to the rating as "High confidence" for beneficial effects of IPM practices (p 31 last line of Table). Diversified farming systems and IPM are linked, you cannot rank them "Low" here and "High" there. Intensification and simplification of farming is one of the major threats to pollinators (Chapter 2)	Thank you for making this point. To better communicate the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite
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Piotr Medrzycki	17	205	Tab#6. 4.a	- There is apparently no action reporting high evidence of benefit. This is quite strange. - I guess that "Spraying crops with solutions to attract pollinators" (page 19) addresses food production instead of biodiversity. - I think that at least another action is missing. Similarly to organic farming, also IPM should be discussed.		Thanks for comments. Summary table was revised. Regarding IPM response, it is alerary considering in Section 6.4.2
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Matthew Heard	19	205		Table 6.4a. Reduce crop dependence - don't understand why this is 'low agreement' most of the bulk of our food is produced by crops that have no dependence on pollinators? rephrase to be more specific about reducing reliance of animal pollinated plants on animals through selective breeding etc	Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite
Anne Alix	17	208	208	Table 6.4.a: The table reflect the state of the art on the different actions and propose outlines of the content of the chapter on these actions. However reading the text one somehow misses information about the margin of improvment. As an example, I fully agree with the current medium evidence of the benefit to pollinators of conserving or sowing field margins, provide nesting sources etc, we miss the recommendations appearing in the litterature papers to get these actions to work better. It is sometimes developed further in the text, sometimes not. That would provide more value and support to decision makers. Even a short ref to the proposals of the papers cited would help, in an additional column in the table, for example, entitled possible margin of improvment?	Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite

Anne Alix	17	208	208	<p>About monitoring pollinators on farms I wondered whether the benefit is actually not too indirect to appear in the table. Unless we are speaking about self-assessment by farmers of the benefits of their actions, monitoring is valuable to the development of tools (validation of risk mitigation measures, practices and modelling) the outcome of which are to be further worked out to be transferable to farmers. To me it sounded very indirect as a benefit (which does not of course mean negligible)?</p>	<p>Thank for making this point, but some evidences suggest direct effect in pollinators conservation</p>
Maria Jose Suso	16	209	16 209	<p><b>Table 6.4a</b>, after Organic farming. <b>Response:</b> Breeding strategies developed by Participatory Breeding for pollinator friendly-crops (Crop Design System). <b>Type:</b> Technological. <b>Status:</b> proposed. <b>Opportunities:</b> synergy food production and pollination (Biodiversity, Food production, Cultural values). <b>Evidence:</b> no examples. High level of confidence among plant breeders.</p>	<p>Details in Palmer et al. 2009 The role of crop-pollinator relationships in breeding for pollinator-friendly legumes: from a breeding perspective. Euphytica 170:35-52); Suso et al. 2015. A crop-pollinator inter-play approach to assessing seed production patterns in faba bean under two pollination environments. Euphytica 201:231-251).</p>
					<p>Thanks for suggesting this example. It is added to section 6.4.1.1.9</p>

Maria Jose Suso	17	209	17	209	<p>Response/actions (after reduce dependence on pollinators) A proposed alternative strategy is to combine highly self-fertile genotypes which respond optimally to the presence of pollinators to produce high-yielding cultivars. Thus, the presence of pollinators allows the exploitation of heterosis potential but in absence of pollinators a minimum yield is achieved</p>	<p>(Suso et al. 1996. Reproductive biology of <i>Vicia faba</i> : role of pollination conditions. Field Crops Research 46: 81–91; Nadal et al. 2003. Management of <i>Vicia faba</i> genetic resources: changes associated to the selfing process in the major, equina and minor groups. Genet Resour Crop Evol 50:183–192)</p>	<p>Thanks for suggesting this example. It is added to section 6.4.1.1.9</p>
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Barbara Herren	15	210	21	211	<p>I have a lot of difficulty with this presentation. Keeping in mind that an IPBES assessment promotes itself as a science-knowledge-policy interface; I can totally accept that these judgements, in the evidence column, are scientifically defensible. But as an interface integrating knowledge, and providing guidance to policymakers, they are harsh and not conducive to encouraging policymakers, who need to make decisions with limited evidence. If we can look more closely at the finding, "Medium evidence of benefits to pollinator species but limited for pollination" for many many responses...it is true that we can find benefits to pollinator species, but the research does not then extend to pollination success. But then we have other research including Garibaldi et al 2014 showing the value of wild pollinators, and the new metaanalysis now being undertaken (Garibaldi in submission) that shows the impacts on yields from enhancing pollination services in diverse farming systems. It is surely part of interfacing with policymakers to make a few conjectures, based on evidence, that practices that benefit pollinator species will benefit pollination; a reasoned assessment along these lines would seem much more</p>	<p>Thank for the comment. The Symaries tables and uncertainty terms were revised</p>
David Kleijn	17	210	18	210	<p>In table: sow mass-flowering crops and phenology.What does 'and phenology' mean</p>	<p>Thank you for making this point. It means manage of blooming season</p>

Maria Laura 17 210 21 210  
Ruiu

I see a very strong connection between types of response and impacts/opportunities. This means that, for example, a technological (or legal, economic, social, knowledge) response might produce impacts and opportunities in food production, biodiversity and culture, but also in social, economic, policy and scientific terms. I see a circular relation between types of action and impacts/opportunities.

Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite

Noa Simon 17 210 17 210  
Delso

“conserve of sow field margins within or around crops” can be either very good or very bad for pollinators and pollination if considered isolated from their surroundings. There is no doubt that these margins are very attractive to insects. However, the treatments with pesticides, biocides or veterinary products in the surroundings of these flowering margins (immediate or not) may transform them into insect traps. Some examples: (1) flowering strips in an intensively managed arable land in which several treatments are done along the year (e.g. Drift of spray or contaminated dust, exposure to contaminated food sources in the treated field) or systemic pesticides are employed (e.g. exposure to contaminated guttation is more important in the close vicinity to the treated crop (annex H in EFSA Panel on Plant Protection Products and their Residues (PPR); Scientific Opinion on the science behind the development of a risk assessment of Plant Protection Products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees). EFSA Journal 2012; 10(5): 2668-2752 pp.] ) or exposure to contaminated food resources), or (2) livestock areas with intensive use of veterinary products (e.g. Abamectin has

Thank you for this example but a reference is required

Noa Simon Delso	18	210	18	210	“change irrigation frequency and type”. Maybe another line linked to irrigation could be added – application of pesticides through irrigation (as a way to reduce exposure in comparison with spraying). This practice is well used for example in horticulture.		Thank you for this suggested example but a reference is required
Vanda Altarelli	17	211	21	212	Row 4 Although organic farming has exactly the same attributes that the previous 3 responses, it’s classified as Low agreement whereas the previous 3 were classified as Medium agreement. This is based on the evidence of the study in England (Gabriel and al. 2013) but disregards the result of the meta analysis (Tuck and al, 2014) that indicated that “organic farming had large positive effects on number of species” Suggestion: change classification in table to Medium to Low Agreement. Same for rows 5 (No till farming), row 7 (Diversify Farming System) here the apparent reason for classification to Low is due to the few existing studies hence low agreement does not make sense – perhaps the classification could be Medium to Low		Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite
Felix Herzog	21	211	21	2nd line of Table	2nd line of Table REPLACE "Low agreement" by "High agreement"	Monitoring and evaluating pollination on farms can be done with standard methods (e.g. biobio-indicator.org). I don't see why you rank those "Low"	Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite

Noa Simon Delso	21	212	21	212	<p>A general comment about this section: it is quite remarkable for the reader that all technological responses that involve an important shift of the agricultural model (towards other options ground on lower yields and lower inputs, but more sustainable in time) contain more data questioning their benefits than other responses. As a result, there seem to be low agreement on their benefits. See as an example the content of the flowering strips and that of organic farming. The former (which involve an addition to the current agricultural model without necessarily modifying it), includes only opportunities for pollinators and pollination, but no risks. In the latter, more information is given about the one study apparently not showing biodiversity benefits (which is incorrect if we read the publication) than to a meta-analyses compiling a wide range of studies showing indeed benefits to pollinators and pollination. In politics, creating doubt is often used to divert attention from a clear problem or a valid solution when this problem/solution is inconvenient for the economics of an interest group. See for example Maxim and van der Sluijs (2007) <i>Uncertainty: Cause or effect of stakeholders'</i></p>	Thank for the comment. The paragraph was revised
Jeff Ollerton	19	216			<p>Perhaps worth pointing out that there is limited (perhaps no?) evidence that these strips actually increase pollinator populations in the long term, as opposed to concentrating pollinators in particular areas.</p>	Thank you for your comment, we pointed out in Table 6.4.1

Piotr Medrzycki	21	217	22	248	It should be mentioned that flowering field margins are also one of the exposure routes of bees to agrochemicals when the pesticide cloud drifts from the field.	Thank you for this example but a reference is required
Noa Simon Delso	21	218	22	244	As mentioned before, what I miss in this section is the risk part. Of course flowering strips are an opportunity to increase the presence of pollinators and their potential pollination because living resources (food, shelter, nesting sites, etc) are specifically offered. However, I miss some reference to the risks associated with this practice if not developed in ideal conditions, mainly in the surroundings: (1) Flowering strips have a sense if they are conceived at a landscape level. Ideally, they are wide enough and spread into a connected network. I think it would be interesting to mention somewhere in the text the conditions or principles to be followed in order to establish functional strips for a long-term pollinator benefit. This is important for the development of policies fostering a real pollinator-friendly action in practice. (2) The information included in the text mentions that limited evidence exists about the benefit of pollination in the near crops. In my opinion, important information that needs to be included in this report is; a) what were the agricultural practices carried out within the crops nearby? b) what were the crops planted nearby? As mentioned before, flowering strips	Thank for the comment but we have mention it when we said that heterogeneous landscapes rich in flowers species sowing mass flowering crops can be an alternative practice to enhance wild pollinators

Christopher N Connolly	19	220	19	222	What is the evidence that this might increase the delivery of systemic pesticides to pollinators?		Thanks for pointing this out. Text added: "It is possible that placing flowering resources placed alongside crop fields increases exposure of pollinators to pesticides. This has not been tested (see section 2.2.1 for a discussion of possible exposure routes)."
Maria Jose Suso	19	222	19	222	There is evidence that floral strips surrounding crops modify the level of outcrossing within the cultivar, consequently the genetic structure. Thus, yield and resilience	(Suso et al. 2008 <i>Vicia faba</i> germplasm multiplication - floral traits associated with pollen-mediated gene flow under diverse between-plot isolation strategies. Ann Appl Biol 152:201-208)	Thank you for your suggested. It is added into the text.
Cynthia Scott-Dupree	8	223	8	223	Should read "(Nicholls and Altieri 2013)		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Phil Stevenson		223			Nichols and Altieri is 2012 (also consider later in		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Cynthia Scott-Dupree	8	225	8	225	Should read "65 studies in Europe that focused on the effect..."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	19	225	19	225	"diversity or activity"-- activity in terms of what?		Thanks for making this point. The terms refers to pollinator mobility
Phil Stevenson	21	225			Which Dicks et al 2014 - there are two.		Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Maj Rundlöf	21	225	22	231	In this section it would be very important to mention that what is predominantly in focus in these studies is the attractiveness and/or use of the sown flower strips, not their influence on reproduction or pollinator populations. On the latter subject there is very little evidence base.	Thank you for your comment, we pointed out in Table 6.4a
Phil Stevenson	21	227	21	227	What about the quality of the pollen and nectar. Almost nothing is known about this and much of the evidence is arguably anecdotal. Which species are actually good for bees. Lots of nectar is no good for bumble bees if its all sucrose for example and what about amino acid deficiency in pollen What impacts might this have. And there is little consideration of the importance of secondary plant chemicals.	Thank you for your comment. We checked reference and add this as knowledge gaps
Peter Campbell	22	229	25		it would be good to see some reflection of the role industry is playing in this, e.g. <a href="http://www3.syngenta.com/country/uk/en/about/cr/Pages/OperationPollinator.aspx">http://www3.syngenta.com/country/uk/en/about/cr/Pages/OperationPollinator.aspx</a>	Thank for your comment, but it was edited out of an earlier version of 6.5.6 after the opposite comments.
Thomas Steeger	20	234	20	238	These two sentences refer to "pollination" being improved; however, how was pollination success measured? Fruit/nut set?	Thank for making this point. The pollination success is measured in the studies by fruit/or and seed set
Barbara Herren	22	234	22	234	pollinator's should be pollinators'	Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Martha Groom	22	234	22	235	Clarify if this is because the data on crop pollination and yields are equivocal or because they were not taken. Many studies fail to measure impacts on pollination or yield. I think it is quite critical to be very precise throughout the whole of this narrative in the first instance the degree to which the limit is one of lack of studies, or lack of evidence because that evidence does not show a pattern. The statement "few studies have demonstrated a direct impact of those crop practices on yield" implies the researchers tried to find such a link, but actually in many cases the study did not also evaluate pollination success or yield. So it is vital to word in such a way as to make this distinction clear.	Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite
Phil Stevenson	21	237		237	Chjeck Date for Carvalheiro I think its a 2011 paper	Thank you for making this point but correct reference is: Carvalheiro et al 2012: Journal of Applied Ecology 2012, 49, 1373–1383
Barbara Herren	22	240	22	240	where should be were	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	20	246	20	246	"The long flowering season of the cacti provides . . ."	Thank for your comment. After chapter revision the ILK examples was moved to chapter 5.
Barbara Herren	22	246	22	248	did not understand the significance of this paragraph...	Thanks for your comment. This is a copy editing job that will be carried out at the final draft stage.

Martha Groom	22	246	22	248	This information about the cacti tending is not complete in context, but perhaps typical of what I mean about clarifying when studies have simultaneously evaluated whether actions enhance pollinator abundance or diversity AND pollination or yields of crops. This is not stated here, although pollination or yield may have been evaluated - but very often, this is not the case. This is something that could be emphasized as a gap and pressing need.	Thank for your comment. After chapter revision the ILK examples was moved to chapter 5.
Thomas Steeger	20	251	20	261	While there is discussion about the benefits of increase forage habitat to pollinators (e.g., beneficial insects), little discussion is provided on the potential for these habitats to promote pest insect populations and/or to distract pollination services away from the target crop.	Thank you for making this point. We added cross reference to section <b>6.7 Trade-offs and synergies in decisions about pollination</b>
Peter Campbell	22	251	22	262	There is good data from the US on preserving alkali bee nesting grounds to ensure alfalfa seed production <a href="http://ars.usda.gov/research/publications/publications.htm?seq_no_115=214722">http://ars.usda.gov/research/publications/publications.htm?seq_no_115=214722</a>	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. At this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Denise Margaret Matias	22	251	22	262	This can also include the natural and artificial nesting resources mentioned in Chapter 5 such as the rafters for <i>Apis dorsata</i> or their tree of choice	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately

Barbara Herren	22	257	22	258	there is examples would be better as there are observations that	Thank for this comment but references is required.
Barbara Herren	22	265	22	266	I would question this: that "Mass flowering crops could be managed to bloom in different periods of time at landscape scale." I don't think there is a lot flexibility to manipulate when mass flowering crops bloom; that is the point, they bloom all at one time.	Thank for the comment. It was changed to "some mass-flowering crops when grown in diverse farming systems..."
Cynthia Scott-Dupree	10	270	10	270	Should read "In addition, studies have..."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Hollis Woodard	20	270	20	270	Alaux et al. 2010 is a great paper but definitely not a good reference to support the statement; Roulston and Goodell is a review and much more appropriate (see above comment), there are also some papers by Tasei about bumble bee health and pollen diet variability	Thank for the suggested reference. It was added
Thomas Steeger	21	271	21	271	A possible down side for mass flowering crops is that they may not provide the nutritional diversity needed by bees.	Thank you for your comment. This caveat was add into the text.

Noa Simon Delso	23	271	23	273	I would add again the risk part and not just the opportunity of mass flowering crops. Holzschun et al. 2011 (Expansion of mass-flowering crops leads to transient pollinator dilution and reduced wild plant pollination ) shows that in areas with a lack of pollinators (potentially for example in agricultural areas) the presence of mass flowering crops may lead to pollination competition between these crops and wild plants.	Thank for the comment but we have mention it when we said that heterogeneous landscapes rich in flowers species sowing mass flowering crops can be an alternative practice to enhance wild pollinators
Phil Stevenson	23	272		272	This assumes that the crop species are an appropriate food source (in nutritional terms) and accessible to those wild pollinators. IS there evidence of this?	Thanks for this comment. Yes. There are some evidences based on pollen analyses in feces and brood cells showing the the crops are in some cases appropriate food source to wild pollinators but to better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty.
Serena Heckler	23	275	23	300	Traditional agriculture is not mentioned in this passage. It generally intersects with organic farming, but is not always the same. However, it would be acceptable to incorporate it as a subset, but it should, nevertheless, be mentioned.	Thank for the comment but we have mention it when we said that heterogeneous landscapes rich in flowers species sowing mass flowering crops can be an alternative practice to enhance wild pollinators

Piotr Medrzycki	23	275	23	300	<p>This discussion is biased and seems to be written by an industry-dependent researcher. The reported example makes no sense. It is commonly agreed that in organic farming the yield is often reduced in terms of quantity, compared to conventional farming but its quality is higher (residues). This yield reduction is not due to pollinator deficiency but rather to other factors. Nevertheless this is not the point here, because the discussed issue was not the food production but the biodiversity. Also, it is known that industry-related authors often prove there is no benefit from organic farming to agriculture and environment, but these papers are rare and ignorable since the scientific community agrees on the contrary and there is enough evidence about it. The lines 276 and 282-292 are not suitable for the publication because based on completely wrong interpretation.</p>	<p>Thanks for the comment. The subsection was revised to better communication</p>
Thomas Steeger	21	279	21	279	<p>The statement "likely because of the absence of synthetic insecticide(s)" is speculative.</p>	<p>Thank for making this point. Sentences were deleted</p>

Maj Rundlöf 23 280 23 280

Suggest to cite also Rundlöf et al. (2008) and Kennedy et al. (2013): Rundlöf, M., Nilsson, H., Smith, H.G. 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation* 141:417-426., Kennedy, C.M., Lonsdorf, E., Neel, M.C., Williams, N.M., Ricketts, T.H., Winfree, R., Bommarco, R., Brittain, C., Burley, A.L., Cariveau, D., Carvalheiro, L.G., Chacoff, N.P., Cunningham, S.A., Danforth, B.N., Dudenhöffer, J.-H., Elle, E., Gaines, H.R., Gratton, C., Garibaldi, L.A., Holzschuh, A., Isaacs, R., Javorek, S.K., Jha, S., Klein, A.M., Krewenka, K., Mandelik, Y., Mayfield, M.M., Morandin, L., Neame, L.A., Otieno, M., Park, M., Potts, S.G., Rundlöf, M., Saez, A., Steffan-Dewenter, I., Taki, H., Felipe Viana, B., Veldtman, R., Westphal, C., Wilson, J.K., Greenleaf, S.S. & Kremen, C. 2013. A global quantitative synthesis of local and landscape effects on native bee pollinators in agroecosystems. *Ecology Letters* 16:584-599.

Thank you for suggested references. They were added into the text

Noa Simon 23 282 23 300  
Delso

Gabriel et al. 2013 writes in their results section “  
*Plants, earthworms, bumblebees, butterflies and epigeal arthropods had higher abundance and species densities in organic fields, while solitary bees had similar abundance in both farming systems and slightly higher species densities in organic fields. In contrast, hoverflies had higher abundance and species densities, and farmland birds had higher species densities in conventional fields (Table 1; see Gabriel et al. (2010) for more details on farmland biodiversity). Species density and abundance were closely related for all taxa (Fig. S4, Supporting information).”* So actually, Gabriel et al. Also found a possitive relationship between organic farming and pollinators abundance. I would like to remind that winter cereals DO NOT require pollination and therefore the difference in yield between organic and conventional farming in this study should be grounded on other reasons (variety used, fertilisers used, agricultural practices applied, etc). I do not understand why the authors in this chapter focused on the relationship of pollinator abundance in relationship with cereal yields. Now if we

Thank for the comment. The subsection was rewrite to better comunication the issue

Martha Groom 23 282 23 292

I think this study needs to be more carefully described. Gabriel et al 2013 primarily discuss their findings in terms of yield, but this is misleading. Although the paragraph here does take up this, I think it would be easier to interpret lessons from this study if rather than setting this up as a "not always" departure from other studies, this instead said, "However, Gabriel et al. 2013 found a decrease in the abundance and diversity of some pollinator groups with increasing yield in both organic and non-organic ("conventional") wheat farms. The factors that co-vary with yield ultimately influence this pattern, and could include...." This constrains it a bit more clearly up front, instead of spreading a wider question. While the need to connect this pattern with the covariates that may drive the pattern comes in lines 288-292, I think this needs to be more clearly connected so the readers are connected better with what determines pollinator abundance, etc. Unfortunately, a lot of studies are not taking up the ultimate connections (they are often hard to get at), but this is what is needed to be able to thoroughly evaluate the potential impacts of different agricultural practices. In this case, the analysis does not give

Thanks for the comment. The subsection was revised

Felix Herzog	23	286	23	286	DELETE SENTENCE "Bumblebees, butterflies ... decrease with crop yield"	This sentence can be misunderstood if you have not read the paper. It implies a causal relationship, which is not what Gabriel et al want to say	Thank you for your suggestion. This subsection was rewrite
Thomas Steeger	21	295	21	295	consider replacing "effect size" with "magnitude of the effect"		Thanks for this suggested change of wording. We have amended the text.
Martha Groom	23	297	23	297	Specifically, the land use intensity under discussion is the amount of arable land in cultivation. The specifics matter, as land use intensity could describe MANY land uses. It would be helpful to change the wording to: "...in landscapes with high proportions of cultivated lands." - The point is that if most of the land is in cultivation, the addition of organic practices has a larger impact.		Thanks for the comment. The subsection was revised

Felix Herzog	23	300	23	300	<p>ADD SENTENCE (after "... conducted."): On 205 farms in Europe and Africa, Schneider et al. (2014) found that at farm scale, the diversity of bees and of three other taxa was affected by the presence of non-productive habitats rather than by the farming system (organic or not).</p>	<p>Schneider M.K., Lüscher G. Jeanneret P., Arndorfer M, Ammari Y., Bailey D., Balázs K., Báldi A., Choisis J.-P., Dennis P., Eiter S., Fjellstad W., Fraser M.D., Frank T., Friedel J.K., Garchi S., Geijzendorffer I.R., Gomiero T., Gonzalez Bornay G., Hector A., Jerkovich G., Jongman R.H.G., Kakudidi E., Kainz M., Kovács-Hostyánszki A., Moreno G., Nkwiine C., Opio J., Oschatz M.L., Paoletti M.G., Pointereau P., Pulido F.J., Sarthou J.-P., Siebrecht N., Sommaggio D., Turnbull L.A., Wolfrum S., Herzog F. (2014) Gains to species diversity in organically farmed fields are not propagated at the farm level. <i>Nature Communications</i> 5(4151), doi:10.1038/ncomms5151</p>	<p>Thank you for this suggested reference. It is added into the text.</p>
Hollis Woodard	21	301	21	301	<p>Can also cite this re: tilling: Williams, N. M., Crone, E. E., Minckley, R. L. &amp; Packer, L. Ecological and life-history traits predict bee species responses to environmental disturbances (2010).</p>		<p>Thank for the suggested reference. It was added</p>

Noa Simon Delso	23	302	24	314	The example of no-till in Brazil is a good case study of the benefits of agricultural practice in balance with nature (no-tilling, crop rotation, etc). Have any risk for pollinators or pollination been found in this experience? Have there not been publications of no-tilling practices and consequences in other geographical areas? Or have any of these publications made reference specifically to pollinators? From a formal point of view: why the benefit of this practice is considered to have low agreement among experts? If an expert needs to make a decision based on the information included into the report, I think the decision in this case should have been unanimous (i.e. Increase in production by 10%, possibility for benefits to pollinators, etc). What other information do the experts considered for not agreeing on this point? If there is any, then it should be included into the text so the reader would understand the conclusions of the experts.	Thank you for making this point. To better communication the agreement terms were changed to adequate to a four box model to deal with uncertainty and sentence were rewrite
Hollis Woodard	21	303	21	304	I'd put the % in.. I was curious and did the math myself but will be good to include for readers	Thank you for your comment. This improvement was adopted
Denise Margaret Matias	23	308	23	308	Convert \$1,386.3 million and \$3080.7 million to another counter (e.g. Billion)	Thank for this sugested change. The conversion to billion was made

Thomas Steeger	21	309	21	309	recommend that references rely on published articles rather than websites	Thank you for your comment. The websites will be cited only when the publish article it is not available
Thomas Steeger	21	310	21	311	"This practice may increase opportunities for the particular nesting needs of different pollinating species (Shuler et al. 2005). No-till coupled with the use of cover crops . . ."	Thank for suggested changes of wording. It is an improvement we have adopted
Thomas Steeger	21	311	22	312	this sentence is speculative if there is no direct evidence to support it.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Peter Campbell	24	314	24	314	Shuler et al 2005 showed uimpact of tillage on Osmia bee populations in squash fields	Thank you for the comment. The positive effect of No-Till practices was emphasized
Colin Fontaine	24	314	24	314	Dear authors, I would like to thank you for the impressive work of putting together this amount of knowledge on pollination. I have learned a lot while reading. I hope that you will find some of my comments helpful. Unfortunately they are very few because i went out of time..	Thank you for your comments
Colin Fontaine	24	314	24	314	it seems to me that williams presents some evidence, see Williams et al. (2010). Ecological and life-history traits predict bee species responses to environmental disturbances. Biological Conservation, 143(10), 2280-2291.	Thank for this sugested referece

Thomas Steeger	22	315	22	316	the topic sentence appears to be incomplete	Thank you for the comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Barbara Herren	24	317	24	318	In arid system changing flood irrigation, that may be detrimental for pollinators because of nest flooding, should be "In arid irrigated systems, changing from flood irrigation that may be detrimental for pollinators because of nest flooding"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Hollis Woodard	22	322	22	322	I think it's also important to point out here that floral diversity = more diverse food resources = better health (very generally speaking)	Thank for the comment. The assessment report is mandated to provide policy-relevant information, not policy, recommendation, so we would not be able to make the recommendation suggested but reference is required
Peter Campbell	24	323	24	347	how much of the diversity effects are due to field sizes since this increases nest site availability and alternative resources compared with larger fields; has anyone looked at small fields with less diverse crops?	Thank you for making this point. Yes. Kennedy et al 2014 showed the bee abundance and richness were higher in diversified and organic fields and in landscapes comprising more high-quality habitats; bee richness on conventional fields with low diversity benefited most from high-quality surrounding land cover.

Noa Simon Delso	24	323	24	323	Organic farming is an example of a farming model applying diversify farming systems, crop rotation, and in occasions no-tilling. Maybe it would be interesting to have the view of an agronomist on this chapter. I see there are tools (crop rotation, no-tilling, pesticide use, irrigation, etc) and production systems/approaches (diversified farming (sustainable agriculture system), intensive farming, organic farming, etc.) all mixed in the chapter of Technological responses. Maybe this part would need restructuring.	Thank for making this point. A new paragraph was whritten in section 3 (Typology, 6.3.1 Combining and integrating responses) that covers this comment.
Yann Clough	25	323	25	323	Intercropping cocoa with banana or plantain is correlated with an increase in the density of cacao-pollinating midges, as well as cocoa fruit set, in Ghana (Frimpong et al. 2011 Journal of Pollination Ecology) <a href="http://worldcocoafoundation.org/wp-content/files_mf/frimpong2011.pdf">http://worldcocoafoundation.org/wp-content/files_mf/frimpong2011.pdf</a>	Thank you for the suggested example. It was added

Barbara Herren	24	324	24	347	are a great management tool sounds like advocacy rather than science, suggest " are a effective management tools" ;however I wonder why this section does not reference Miles and Kremen and Ponsio et al., two very important papers on diversity of farming systems and ecosystem services including pollination: Kremen, C., and A. Miles. 2012. Ecosystem services in biologically diversified versus conventional farming systems: benefits, externalities, and trade-offs Ecology and Society 17(4): 40. <a href="http://dx.doi.org/10.5751/ES-05035-170440">http://dx.doi.org/10.5751/ES-05035-170440</a> and <a href="http://rspb.royalsocietypublishing.org/content/282/1799/20141396">http://rspb.royalsocietypublishing.org/content/282/1799/20141396</a>	Thank for the comment. A subsection was added for Diversity farming system
Cynthia Scott-Dupree	11	332	11	332	Should read "Indigenous and local ..."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	22	332	22	335	It's unclear what is meant by "consuming weed seedlings".	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Maria Laura Ruiu	24	332	24	347	See the article "Hybrid knowledge for understanding complex agri-environmental issues: nitrate pollution in Italy". Even though the article is not directly connected with the pollination-related issues, it highlights the importance of considering "hybrid knowledge" (local+scientific knowledge)	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.

Thomas Steeger	22	337	22	340	In stating that the people "do not mention the relationship", it's a little unclear what is to be inferred from this. Is it to say that the don't recognize the benefit in terms of increased yield or that the close proximity of weeds makes it difficult to achieve desired yields? Also, the period should be deleted after the word pollinators	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	22	341	22	343	"Indigenous and local practices from Milpas in Guatemala illustrate the effectiveness of mixed cultivation (beans, corn, chile, zapallo) as a means of reducing pesticide . . ."	Thank for your comment. After chapter revision the ILK examples was moved to chapter 5.
Thomas Steeger	22	345	22	346	inset data associated with reference	Thank for your comment, but we can see connection between the highlighted text and the comment, so we are unable to respond appropriately

Maria Jose 22 347 22 347  
Suso

***Development of specific and novel improved breeding strategies***

Development of specific and novel improved breeding strategies (evolutionary breeding) in animal-pollinated crops for low-input and organic farming based on the use intra-specific genetic diversity (within species and within population variation) (SOLIBAM-<http://www.solibam.eu-FP7-KBBE-2009-3>). These breeding strategies use pollinators as agent of cross-pollination to maintain and increase heterogeneity and heterozygosis in cultivars.

Regarding that pollinators respond to differences in discovery, attractiveness and reward floral traits, a basic approach was proposed taking into account that flowering crops could be effective determinants of bee diversity and density, the Crop Design System (CDS). In the CDS approach breeders and farmers develop by Participatory Plant Breeding cultivars with enhanced yield and resilience as result of the provision of floral resources within the crop for supporting insect pollinator populations to be used as agents of crossings to increase heterozygosity and heterogeneity (Suso MJ, Harder LD, Moreno MT et al (2005) New strategies for increasing heterozygosity in crops: *Vicia faba* mating system as a study case.

Thanks for suggesting this example. It is added to section 6.4.1.1.9

Jeff Ollerton	22	347	23	355	Are these really "pheromones" in the strict sense of the word? Also, are the increased visitation rates long term effects? Because bees and other pollinators learn very quickly and if an attractant is not backed up with a reward they will soon vote with their wings and move to other sources of nectar/pollen.	Thanks you for making this point. It is a honey bee queen mandibular pheromone used for
Thomas Steeger	22	348	22	348	". . . Attract pollinators and/or enhance pollination services . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Noa Simon Delso	24	348	24	348	Have anyone considered the risk to wild-flower pollination in the areas with crops are made more attractive? Furthermore, there is another risk of this practice similar to what I mentioned for flowering strips (i.e. Becoming an insect trap).	Thank for the comment but we have mention it when we said that heterogeneous landscapes rich in flowers species sowing mass flowering crops can be an alternative practice to enhance wild pollinators

Serena Heckler	24	348	24	356	<p><u>In Ponema. (2000). "Atraer, resguardar y proteger a los insectos de la huerta" in La Fertilidad de la Tierra n.7: pp. 18-22, describes ILK related to how to create micro-habitats in orchards in order to host pollinators, protect them and provide them a habitat for their reproduction. The article provides information on some species that should not be used because they are not eaten by any insects (e.g. Thuya), and on the contrary encourages the use of some others (e.g. Cirsium) that are important for the nourishment and reproduction of pollinators. The authors recommend the rehabilitation of ponds, and the use orchards and small forests to create habitat for insects, especially pollinators. Another example is in Sanjuan, Serafín. (2002). "En Defensa de las abejas" in La Fertilidad de la Tierra n.8: pp. 50-54, where the author, a bee-keeper, known in France and Spain as a promoter of the conservation of bees as pollinators, gives recommendations, based on local knowledge, about how to treat bees and farming practices for conserving them. He is critical of modern apicultural practices that contribute to the degeneration of bees.</u></p>	Thank for the example but the space is limited. The ILK examples can be found in Chapter 5
Thomas Steeger	22	349	22	350	<p>"...sprayed with attractants significantly increased bee visitation..." Also, what is the nature of the "attractants" used?</p>	Thanks you for making this point. It is a honey bee queen mandibular pheromone used for

Phil Stevenson	24	349		349	repeated in services	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Peter Campbell	24	350	24	350	Is spraying pheromones really a well known practice or a well researched practice- how much is it used, i.e. which crops, which countries?	Thank you for the comment. More references were added
Anne Alix	25	358	25	367	Just to complete on this topic, the ICPPR working group on pesticides has undertaken a review of monitoring studies published with the aim to propose guidance on monitoring practice in the context of pesticide registration. The work has been presented at the last ICPPR symposium in Ghent in 2014 and is submitted for publication in the Archives of the JKI. The draft may be made available to your group on request.	Thanks for your suggestion but we cannot add additional text to the chapter due to word length restrictions.
Noa Simon Delso	25	358	25	367	Maybe interesting to add the conclusions of the STEP project, subsidised by the EU 7 Framework Programme	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. At this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Thomas Steeger	23	362	23	364	"The projects were conducted over a 5-yr period in Brazil, Argentina . . .	Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Thomas Steeger	23	364	23	365	". . .in a special issue on pollination deficits in the open access journal Pollination Ecology . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Serena Heckler	25	364	25	364	<u>The accepted phrase is "indigenous peoples" not "indigenous groups".</u>	Thank you for you comment. After chapter revision the indigenous people examples were moved to chapter 5
Felix Herzog	25	367	25	367	ADD SENTENCE (after "prepared"): In a recent European collaborative research project, wild bees and bumblebees were tested as part of a biodiversity indicator set at farm scale across Europe and in Ukraine, Tunisia and Uganda. The resulting toolkit is available at <a href="http://www.biobio-indicator.org">www.biobio-indicator.org</a> .	Thank for suggested example. It was added into the text

Barbara Herren	25	367	25	367	<p>a meta!analysis of the data is being prepared; is it possible to mention the results, if they are not addressed in Chapter Three? Summary: Through a network of 30 scientists in developing countries, we created a new global dataset by performing the same field protocol on 354 fields from 22 crop systems in Africa, Asia, and Latin America to quantify the relation between agricultural yield (kg ha-1) and pollination services in landscapes dominated by small- or large-holdings. We found that flower-visitor density increased agronomic yield for contrasted crops, suggesting that pollination deficits are widespread. However, the magnitude of the yield increase with flower-visitor density decreased with bigger field sizes. Impressively, these effects were important in crop systems with high Apis dominance, whereas high diversity (low dominance) compensated the negative effects of increasing field sizes. In small-holdings with low Apis dominance, our model predicts that the enhancement of flower-visitor density in the fields with low values (10th percentile) to the levels of the fields with the greatest values (90th percentile) should close yield gaps on average by 27 - 55 %, depending on the crop</p>	<p>Thank for making this point. This paper is more appropriate in Chapter 3, but should be cross reference in chapter 6, as we are talking here about the feasibility of monitoring pollination deficit, not whether there are deficits.</p>
Hollis Woodard	23	368	23	368	<p>I think it's important to include just how impractical these alternatives are in many (all?) cases</p>	<p>Thank you for your comment, but we can see no connection between the higlighted text and the comment, so we are unable to respond appropriately</p>

Thomas Walter	25	369	25	388	skip this paragraph or at least lines 370-376 and 382-388	It is not scientific. It is more a promotion of a commercial products and of course you can add then all the products which are not dependent on or which replace "natural" pollination.	Thank you for making this point. Sentences in line 369 was deleted
Denise Margaret Matias	25	369	25	376	What is the stand of IPBES on GMOs? This is particularly relevant for this paragraph on reducing "dependence on pollinators"		Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Barbara Herren	25	370	25	376	I would really question referring to this largely untried commercial solution; FAO and other UN bodies would not do so; an alternative is to refer to commercial, patented solutions under development without referring to a particular company or website.		Thank for making this point. Sentences were rewrite
Thomas Steeger	23	371	23	375	This sentences sounds like advertising.		Thank for making this point. Sentences were rewrite
Felix Herzog	25	372	25	376	REMOVE SENTENCE "the company ..."	This is no scientific evidence, everybody can claim something like that ...	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	23	377	23	380	so is this to say that the Chinese growers had to abandon the desired crop?		Thanks for your comment but according to Partap et al in 2012 the cost of labor for manual pollination makes the cultivation of apple unfeasible, the economic point of view

Cynthia Scott-Dupree	12	378	12	381	I think a statement should be added that manual pollination in most countries is cost prohibitive		Thank for the contribution, data from a study case in Brazil was added
Jeff Ollerton	23	381	23	387	Much of this paragraph reads like an advertisement for the device in question. When I checked the source it's clear that most of the wording has been plagiarised from the original, which is at the very least poor scholarship: <a href="https://www.academia.edu/388932/Development_of_a_New_Date_Palm_Pollinator">https://www.academia.edu/388932/Development_of_a_New_Date_Palm_Pollinator</a>		Thank for the comment. The paragraph was revised
Peter Campbell	25	382	25	388	I think dates are wind rather than animal/insect pollinated; they certainly produce no nectar so I'm not sure this paragraph is relevant in this context		Thank for the comment. The paragraph was revised
Felix Herzog	25	382	25	388	REMOVE PARAGRAPH	... OR REVISE. It now reads like an advertisement from a sales brochure .... No scientific evidence	Thank for the comment. The paragraph was revised
Barbara Herren	25	382	25	388	"The dispersing system used is of peripheral dispersion method and is completely different from the previous designs" - not sure why this relevant- we don't know the method nor the previous design. Should be less an advocacy for a tool, as just noting its existence.		Thank for the comment. The paragraph was revised
Thomas Steeger	23	385	23	387	this is an incomplete sentence. Also, was overall yield reduced?		Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately

Maria Jose Suso	23	388	23	388	A proposed alternative strategy is to combine highly self-fertile genotypes which respond optimally to the presence of pollinators to produce high-yielding cultivars. Thus, the presence of pollinators allows the exploitation of heterosis potential but in absence of pollinators a minimum yield is achieved	Suso et al. 1996. Reproductive biology of <i>Vicia faba</i> : role of pollination conditions. Field Crops Research 46: 81–91; Nadal et al. 2003. Management of <i>Vicia faba</i> genetic resources: changes associated to the selfing process in the major, equina and minor groups. Genet Resour Crop Evol 50:183–192)	Thanks for suggesting this example. It is added to section 6.4.1.1.9
Thomas Steeger	23	390	23	392	". . .at the farm level include changes in crop diversity, sowing rate, and crops/cultivars . . ."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Barbara Herren	25	390	26	402	I would have thought- though I do not have ready access- that an initiative on the part of Brazilian farm loan agencies to analyse where crops are being grown with great risks to climate change, to make loans thus in those areas most costly- is the kind of intervention that this chapter might like to mention.		Thank you for your suggestion but It wasn't found any reference regarding this kind of intervention in Brazil
Phil Stevenson	25	393		393	pollinator		Thanks for this suggested change of wording. It is an improvement and we have adopted it
Thomas Steeger	23	394	23	394	". . .can decrease crop vulnerability to climate . . ."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Thomas Steeger	24	400	24	401	this sentence implies that the preceding section has nothing to support whether it is true.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Barbara Herren	26	401	26	402	There is no evidence of the effectiveness or cost of such strategies is increasing resilience or stability of pollination in the context of climate change. (this seems to me like another unilateral statement- quite accurate from a scientific standpoint but not offering a bridge to policymakers who need to take action in lack of evidence)	Thank you for making this point. Sentence was deleted
Thomas Steeger	24	403	24	407	". . .15 years and have associated these losses with a change in the amount an timing of snowfall." If these growers have rented colonies and still have failures, the efficacy of this practice seems uncertain. This paragraph seems very speculative though and recommend deleting it.	Thank you for your comment. Sentece in line 403 was deleted. The ILK examples moved to chapter 5.

Thomas Walter	26 (22)	408	26 (22) 408 ff (931 ff)	<p>add a new paragraph named "Harvesting technique": Frick and Flury (2001) have estimated bee losses due to rotary mowers. Their extrapolations resulted in losses in flowering white clover fields between 9'000 and 24'000 bees per hectare and in 90'000 in the case of phacelia. Mowing without a conditioner reduced the mortality by a factor seven. In order to avoid significant bee losses they recommend to refrain from mowing in periods of increased flight activity. Humbert et al. (2010) have analysed the direct impact on invertebrates of different entire hay harvesting processes. The use of a conditioner reduced the survival rate of orthopterans from 32 % to 18 %. Leaving uncut refuges and delaying mowing mitigate the impact (Humbert et al. 2012, Buri et al. 2012). Even though there is no evidence about the effect of such mortalities on the local population dynamics of the different pollinator or other arthropod species and its impact on pollination services, it might obviously not be neglected.</p>	<p>Citations: Frick R., Fluri P. (2001) Bienenverluste beim Mähen mit Rotationmähdwerken. Agrarforschung 8 (5): 196-201. Humbert J-Y., Ghazoul J., Richner N., Walter T. (2010) Hay harvesting causes high orthopteran mortality. Agriculture, Ecosystems &amp; Environment, 139: 522-527. Humbert J-Y., Ghazoul J., Richner N., Walter T. (2012) Uncut grass refuges mitigate the impact of mechanical meadow harvesting on orthopterans. Biological Conservation 152: 96–101. Buri P., Arlettaz R., Humbert J-Y. (2012) Delaying mowing and leaving uncut refuges boosts orthopterans in extensively managed meadows: Evidence drawn from field-scale experimentation. Agriculture Ecosystems &amp; Environment</p>	<p>Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.</p>
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Scott Black	24	409	24	409	The US Farm Bill should be included in this section. In 2008 pollinators were added as a "primary resource concern" in the farm bill. See: <a href="http://www.xerces.org/wp-content/uploads/2008/11/2008_farm_bill_fact_sheet_xerces_society.pdf">http://www.xerces.org/wp-content/uploads/2008/11/2008_farm_bill_fact_sheet_xerces_society.pdf</a>		Thank you. We now mention the Farm Bill. There is a book in preparation (Pollinators in Agriculture) that would provide a great reference for this, but not sure whether it will be published in time.
Scott Black	24	409	24	409	Also from the FAO: <a href="http://food.berkeley.edu/wp-content/uploads/2014/08/Pollination-Policy_analysisFINAL.pdf">http://food.berkeley.edu/wp-content/uploads/2014/08/Pollination-Policy_analysisFINAL.pdf</a>		Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it
Felix Herzog	26	409	26	409	CONSIDER MENTIONING the "Operation pollinators" by Syngenta <a href="http://www.operationpollinator.com/">http://www.operationpollinator.com/</a>	This is an initiative by a private company which otherwise sells seeds and pesticides. Should be reviewed critically.	Thanks for the comment. It was added.
Maria Laura Ruiu	25	410	25	434	I would strengthen the need for a multi-actor approach (through a participatory process based on a solid stakeholder analysis) in producing policies related to pollination issues.		Thank for the comment. This aspect was highlighted in the text
Thomas Steeger	24	415	24	418	"The initiative in Bhutan to eradicate chemical fertilizers . . .may have a positive impact . . ."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	24	421	24	423	this last sentence seems to contradict the previous sentence. It's unclear what the effort by China represents a good example.		Thank for the comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately

Scott Black	24	425	24	434	Not sure how IPM relates to legal responses. Do some countries legally require it?	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2
Thomas Steeger	24	425	24	425	". . .wide-reaching dialog between stakeholders and institutions that better addresses the needs . . .of interests in Integrated Pest Management (IPM) . . ."	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2
Jeff Ollerton	24	426			IPM needs defining in full at first mention.	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2
David Kleijn	26	426	26	434	This section doesn't seem to be well-placed under the 'legal responses' heading	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2

Noa Simon 26 426 26 434  
Delso

IPM is NOT a legal response, but a technical one. I would ask the authors of this chapter to move this section to the pertinent section in the chapter, to provide a definition of IPM and to discuss about the controversies regarding the application of these principles in real life. IPM is nowadays a set of principles for crop and land management (see as an example the definition of IPM at the EU Sustainable Use Directive of pesticides - Directive 2009/128/EC). However, when translated into practices, these principles may mean no improvement to pollinators, as we see in Italy, for example. I would suggest the authors of this chapter to include as one of the parameters for evaluating the compatibility of an agricultural practice with pollinators and pollination the monitoring of residues of pesticides in pollen and water. If there is a need for references, please look for contamination of water and pollen with pesticides residues. A good review can be found in annex G of the EFSA Scientific opinion on the science behind risk assessment (2012), previously referenced.

The main part of the IPM is in the technical section. We have chosen to keep 817-823, but added “The actual impact on pollinators of such policy implementations needs to be evaluated and monitored as the policy is not necessarily directly aimed at reducing risks for pollinators.” IPM is defined in the glossary.

Barbara Herren	26	426	26	434	This is a very strange reference to IPM, which could be relevant, but not in the way introduced; why does the paragraph begin with " a more and better"- more and better than what, than China recognising pollination as an agricultural input? That is v. strange! both are good. There are many reviews of IPM, few linked to pollination, but the references here (McIntyre) and I think this is the IAASTD report- are not in the references.	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2
Thomas Brooks	26	426	26	434	Another citation here could be Furlan & Kreuzweiser (2015) Environ Sci Pollution Res (open access at <a href="http://link.springer.com/article/10.1007/s11356-014-3628-7">http://link.springer.com/article/10.1007/s11356-014-3628-7</a> ).	This reference is cited in section 6.4.2.3. Thank you.
Vanda Altarelli	26	427	26	427	Explain IPM (Integrated Pest Management)	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2. It is also included and defined in the glossary.

Diane Castle	26	427	26	434	<p><b>Comment:</b> Include the definition of IPM as adopted by the FAO Panel of Experts  “Integrated Pest Control is a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economic injury.”</p> <p><b>Supporting reference:</b> Food and Agriculture Organization. 1975.Rep. FAO Panel of Experts on IntegratedPest Control, 5th, Oct. 15–25, 1974.Rome, Italy: FAO-UN, Meeting Rep.1975/M/2. 41 pp).</p>	This text has been removed from the section. IPM is covered under technical and legal responses in section 6.4.2. It is also included and defined in the glossary.
Diane Castle	26	427	26	434	<p><b>Comment:</b> Add a comment that the advance of IPM to higher levels of integration will rely on the depth of understanding of agroecosystem structure and dynamics but any technological innovation will need to contribute to producers’ economic goals and meets the requisites for acceptance by society.  Supporting reference: Kogan M 1998 Annu. Rev. Entomol. 1998. 43:243–70)</p>	No action This is the core of IPM as defined by Kogan (a pioneer in the area). We refer to these ideas through the other references.
Thomas Steeger	24	428	24	429	<p>“...systems and has also been adopted . . .commercial food processors and retailers around the world.”</p>	Thanks for this suggested change of wording. It is an improvement and we have adopted it

Thomas Steeger	24	429	24	430	"Further research and operational fine tuning of the institutional arrangements for IPM in different field settings is also needed."	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Thomas Steeger	24	433	24	433	What is meant by "positive and negative externalities"?	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Thomas Steeger	24	433	24	433	Must also consider the costs and the scale at which such actions can be readily implemented. It's not clear how IPM can be readily promoted by food processors/retailers though.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately

Scott Black	24	435	24	435	<p>CASE STUDY Xerces/NRCS agricultural pollinator programme – United States This effort was started in 2006 as a pilot project in Yolo County California in partnership with farmers, the University of California-Berkeley, the Xerces Society, Audubon Society and the Center for Land-Based Learning. The Xerces Society has since expanded the programme to all 50 states and various territories. This nationwide collaboration offers practical advice and technical support on habitat restoration and management for pollinators. Since its inception, the programme has worked with farmers and the Natural Resource Conservation Service, a division of the US Department of Agriculture (NRCS), to implement over 165 000 acres of wildflower-rich pollinator habitat. It has trained over 38 000 farmers, gardeners, conservationists, government agency staff, educators and land managers to create, manage and protect pollinator habitats. The programme has also successfully collaborated with dozens of farmers to create pollinator habitat demonstration sites across the United States. Project partners work with farmers across the United States to develop whole-farm pollination conservation and restoration plans</p>	<p>Thank you for the good example. It was added</p>
Thomas Steeger	25	436	25	437	<p>". . . a price premium (i.e., monetary incentive) in exchange . . ."</p>	<p>Thanks for this suggested change of wording. It is an improvement and we have adopted it.</p>

Noa Simon Delso	26	436	28	495	Another economic response is the system proposed in Italy as part of the measures to reduce dependency to neonicotinoid insecticides: insurance schemes. These schemes are explained in Furlan L and Kreuzweiser D (2015) <a href="#">Alternatives to neonicotinoid insecticides for pest control: case studies in agriculture and forestry. Environ Sci Pollut Res.22: 0944-1344.</a> And in Furlan L, Benvegnu' I, Cecchin A, Chiarini F, Fracasso F, Sartori A, Manfredi V, Frigimelica G, Davanzo M, Canzi S, Codato F, Bin O, Nadal V, Giacomel D (2014) <a href="#">Difesa integrata del mais: come applicarla in campo. L'Informatore Agrar 9(Supplemento Difesa delle Colture):11-14</a>	Thank you for suggested example. It was included
Thomas Steeger	25	442	25	442	It's unclear what is meant by "This is a strongly developed action."	Thank for making this point. Sentences were deleted
Thomas Steeger	25	449	25	449	"Effects of AES . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Timothy Schowalter	14	450	14	450	Something is missing at the beginning of the sentence. Meaning not clear	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Thomas Steeger	25	450	25	451	". . . are still largely unknown"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Felix Herzog	27	450	27	450	REPLACE "numbers" by "diversity" ?	Thank you for making this point. It does not seem to require changes to the text.

Barbara Herren	27	450	27	450	Effects on if AES - makes no sense	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	25	451	25	452	By "payment for ecosystem services (PES)", do you mean rental fees on bee colonies?	Thanks for making this point but the answer is not exactly. It means receiving fees to habitats conservation for pollinators
Noa Simon Delso	27	452	27	453	Not payment for damaging ecosystem services could also be envisaged: liaising the eligibility of a subsidy to the good performance of pollinators in a determined area. This would involve that there are more stringent control put in place, which would benefit the enforcement of legal responses. I am not aware if there is any scientific reference for this proposal.	Thanks for your comment. Yes there is. It is "payment by results schemes" mention by De Soen et al 2012 in their article.
Thomas Steeger	25	455	25	455	unpublished work should not be cited.	Thank you for suggested reference. It is added
Thomas Steeger	25	459	25	461	"The Whole-Farm Revenue Protection offers farmers . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Noa Simon Delso	27	464	27	464	Please include in the certification schemes organic agriculture, which is a production system including many practices that are beneficial for pollinators and pollination (as diversified farming, no pesticide use, crop rotation, etc.) and make the link with the technical responses section.	Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Denise Margaret Matias	27	464	27	466	Careful about the recommendation of certification schemes as these may be costly to developing countries (as is the case in some of the indigenous community forestry enterprises supported by NTFP-EP in South and Southeast Asia see <a href="http://www.ntfp.org">www.ntfp.org</a> )	Thank for the comment. It is an improvement and we have adopt it
Thomas Steeger	25	473	25	474	"However, there is no . . .motivation, but they can also weaken. . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	25	474	25	477	this sentence is unclear as the last phrase "rather than paying for services" seems to contradict the sensitivity.	Thank for the contribution we rewrite the sentence to make it clearer
Noa Simon Delso	27	474	27	478	Practical example of this is the system of insurances aiming to diminish neonicotinoids insecticide application developed in Italy (see Furlan and Kreuzweiser, 2015 and Furlan et al. 2014)	Thank you for suggested example. It was included
Thomas Steeger	26	479	26	479	"A recent review examining more effective . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Barbara Herren	28	480	28		but also to establish or reestablish group should be "but alsoestablish or reestablish group"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	26	484	26	486	". . .with conservation groups to identify common goals and to recognize the need to innovate . . ."	Thank for suggested changes of wording. It is an improvement we have adopted
Thomas Steeger	26	486	26	488	This sentence seems unrelated to the paragraph/section on collective stewardship.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.

Serena Heckler	28	490	28	490	<p><u>The idea of "Buen vivir" ("living well"), which has been adopted by the governments of several Latin American countries and is promoted by some indigenous peoples and local communities is a useful perspective for promoting the conservation of pollinators. It does emphasise the economical aspect but in the well-being potential of a life with pollinators compared to a life without them. (Sources: Fatheuer, Thomas. 2011. "Buen Vivir: A brief introduction to Latin America's new concepts for the good life and the rights of nature. Heinrich Böll Foundation. Berlin. 30pp.; Plataforma de Copartes de TDH Alemania. Terres des hommes - Alemania. 2013. "Sumaq Kawsay. Vivir bonito". THD Alemania. 112pp.)</u></p>	Thank for making this point. The chapter 5 will emphasized this aspect mention by you
Thomas Steeger	26	494	26	494	It's unclear what is meant by "socially valuable".	Thank you for making this point. It does not seem to require changes to the text.

Anne Alix 27 497 27 524

Another potential incentive is the implication of farmers in the assessment of the benefits of the measures / practices they implement on pollinators. Some tools have been developed such as a very basic butterfly identification leaflets, that were used by farmers in France to monitor the presence on their land for example. The reliability of these tools (sometimes called parataxonomy) to accurately reflect communities is to be put in perspective compared to proper biological indices, however the spread of such tools among farmers would have an educational benefit and help them being their best advocate about their practices. The reference on the butterfly indicator system may be found here (<http://propage.mnhn.fr/>).

Thanks for this example. There are many citizen science projects involving pollinators around the world. We already describe the breadth of them (6.4.6.3.4) and provide a geographically balanced set of examples in Table 6.4.6.3. In our view, your example would not add anything to the examples already described

I find the assessment very comprehensive . I would only recommend to speak in more details on what could be done in terms of corporate disclosure through various reporting standards (financial, sustainability and integrateing reporting standards) (maybe as part of the social / behaviorial response). This would target both companies using directly pollination services (agri-business) and those with indirect dependencies (retailers). happy to provide more details of interested. This can be a big driver of changes in public / institutional investors / shareholders awareness (dependencies, risks), and business policies and practices. For instance, this topic has been already discussed by the Global Reporting Initiative secretariat => more practical guidance is needed on the how

Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions

Serena Heckler	28	505	28	510	<u>This is an important point and one that seems to be rendered invisible by the diagram that opens the chapter (see comment above), but more can be added here. In the case of indigenous peoples and local communities, strategies for cultural affirmation for recovering traditional practices relevant to their cultures and ecosystems. (Source: Grillo, Eduardo. (1996). "¿Desarrollo o Afirmación Cultural Andina en los Andes?" in Grillo, E. (1996) "Caminos Andinos de Siempre". Lima, PRATEC: pp. 63-93.)</u>	Thank you for the comment. The diagram was changed and considerations regarding indigenous people can be found in chapter 5
Serena Heckler	28	505	28	505	<u>Some grass roots organizations and community level initiatives work to conserve pollinators (e.g. Campesino a Campesino in Mexico, Colectivos de mujeres Cu'oleel caab in Guatemala).</u>	Thank you for the comment. After chapter revision the indigenous people examples were moved to chapter 5
Felix Herzog	28	510	28	510	ADD SENTENCE: In Switzerland, a farmer led initiative has successfully lobbied the government for the introduction of "bee pastures" (sown flower strips) in the national agri-environmental scheme ( <a href="http://www.lobag.ch/LOBAG/Bereiche/Pflanzproduktion/%C3%96lsaatenzuteilung/tabid/92/language/de-CH/Default.aspx">http://www.lobag.ch/LOBAG/Bereiche/Pflanzproduktion/%C3%96lsaatenzuteilung/tabid/92/language/de-CH/Default.aspx</a> )	Thank you for suggested example. It was included
Thomas Steeger	26	519	26	519	With respect to "prohibitions on behavior" are you referring to social or legal prohibitions?	Thank for making this point. Means social

Serena Heckler	28	520	29	524	<u>There are many examples of strategies used by indigenous peoples and local communities in the management of pollinators and their reproductive cycles. These strategies tend to be governed by customary law. (see ILK TF for further references)</u>	Thank you for you comment. After chapter revision the indigenous people examples were moved to chapter 5
Thomas Steeger	27	522	27	523	". . . Including restricting the cutting of trees that flower . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Maria Laura Ruiu	29	526	29	558	I see the issue of knoweldge response as related to two levels of scientific (and policy) action: the first refers to the "co-construction" of knowledge (by involving local actors/bodies); the second to the dissemination strategy (through an "understandable" translation of scientific results).	Thank for the comment. Knowledge responses were cleary described in the Typology section 6.3
Serena Heckler	29	526	29	558	<u>Knowledge exchange should not be unidirectional, but two-way, where ILK is also recognized, considered and shared. This co-production of knowledge has been used in climate change (see for instance <a href="http://www.arcticbrisk.org/">http://www.arcticbrisk.org/</a>) and could be a useful approach for filling gaps in knowledge about pollinators and pollination ecology without excluding indigenous peoples and local communities.</u>	Thank for your comment. The ILK issues is being cover in Chapter 5

Serena Heckler 29 526 29 558

To move away from a top-down, exclusionary model, for many indigenous peoples, local communities and small-scale farmers, the approach should not necessarily be the one of training or capacity building, but of a culturally grounded affirmation and exploration of ILK.  
(Source: Grillo, Eduardo. (1996). "¿Desarrollo o Afirmación Cultural Andina en los Andes?" in Grillo, E. (1996) "Caminos Andinos de Siempre". Lima, PRATEC: pp. 63-93.)

Thank for your comment. The ILK issues is being cover in Chapter 5

Noa Simon Delso	29	527	29	531	<p>[...]training programs for agronomists, agroecologists, <b>biologists, veterinarians</b>, and farmers [...]. Why to include these professions? Because these professionals also play an important role when dealing with pollinators and pollination. Honeybees, for example, are considered food producing animals in Europe and lay under the agricultural and animal health laws. Biologists are often also linked with initiatives dealing with the health of honeybees. Veterinary treatments of livestock may be another danger for pollinators as has been observed in the French Pyninees in 2014, where thousands of honeybee colonies resulted affected in a livestock area by abamectin, active ingredient of products used for the control of intestinal parasites. For information, abamectin has an LD50 of 2 ng/bee. Furthermore, for the control of some diseases in Europe like Bluetongue, a number of measures are envisaged which involved spraying with insecticides buildings and their surroundings or trucks (Council Directive 2000/75/EC). Practitioners should be informed about the consequences of these measures and the need to, either evaluate the efficacy of these measures (which has been questioned</p>	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	27	532	27	532	<p>provide link for the Indigenous Pollinators Network</p>	Thank for the suggested reference. It was added
Vanda Altarelli	29	533	29	533	<p>It should say The Indigenous Pollinators Network promoted by the Indigenous Partnership for Agrobiodiversity and Food Sovereignty</p>	Thank for suggested changes of wording. It is an improvement we have adopted

Barbara Herren	29	546	29	547	"Other farmers were not aware of pollination as a process. (FAO 2008 INITIAL SURVEY OF GOOD POLLINATION PRACTICES).- there is something not right here, FAO did not have a case study in the 2008 document from Kerio Valley in Kenya.	Yes. It is in the Tools for Conservation and Use of Pollination Services Initial SURVEY OF GOOD POLLINATION PRACTICES (2008). The case study is "Papaya on small-holder farms in the Kerio Valley, Kenya: 'Bomas', hedgerows, native plants and conserving male trees" page 10.
Thomas Steeger	27	547	27	550	"in the UK there is a project for training farmers to manage flower strips for pollinators (URL) where increase increased farmer confidence and actual behavior change in choice of seed mixes resulted following training . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	27	552	27	557	Smilar education-based approaches are associates with the Land Grant Unversity sytems in the U.S. where agricultural extension units serve as a means of translating research and the evolving science into farmer/grower and beekeeper practice.	Thank for the suggested reference. It was added
Thomas Steeger	28	562	28	562	". . .and actions to reduce pressures . . ."	The text referred to has been deleted.
Lennard Pisa	29	562	29	562	Section 6.4.b now bluntly starts with table 6.4b	Thanks. We will add an introductory paragraph linking back to material in previous chapters.
Lennard Pisa	29	562	29	562	It would improve the flow of the text if there were a few sentences introducing the chapter section and give way to the table.	Thanks. We will add an introductory paragraph linking back to material in previous chapters.

Lennard Pisa	29	562	29	562	For table 6.4b I have the same comment as for 6.4a, is it good to have it at this location in the text?	We will move the summary Table to the end of each section, so it comes after all the text that it summarises.
Lennard Pisa	29	562	29	562	Again up to the editor	We will move the summary Table to the end of each section, so it comes after all the text that it summarises.
Thomas Steeger	28	563	28	564	". . .one or more risks or opportunities, and is . . ."	OK
Thomas Steeger	28	566	28	566	in the second row of the table, by "indicators based on pesticide use" do you meean "bioindicators"? Otherwise, not sure as to what "indicators" refers.	No action: risk indicators
Thomas Steeger	28	566	28	566	in the third row of the table, what is meant by "risk profiling"?	it's defined in the text
Thomas Steeger	28	566	28	566	in the fourth row "Risk mitigation through agricultural practices that reduce exposure . . ."	Ok
Thomas Steeger	28	566	28	566	in the fifth row "Risk mitigation through technology . . ."	Ok
Thomas Steeger	29	566	29	566	not clear what is meant in the top row, far right column: "pesticides are being developed in general"	Deleted "in general"
Thomas Steeger	29	566	29	566	It's interesting that monitoring studies are rated as low confidence since risk assessors have indicated an interest in develop suitable methods for conducting such efforts as a means of ground-truthing risk assessments rather than having to rely on incident reporting.	The reason for this is that uncertainty is high; technology is not developed or implemented

Thomas Steeger	29	566	29	566	the fourth row proposes possible "retraction" (cancellation/suspension) based on monitoring data; however, the in the preceding row, low confidence was assigned to such data. It is more likely that rather than a cancellation/suspension, regulatory authorities would attempt to first understand why the chemical is resulting in non-target effects when they were not initially anticipated. Once the potential causes are identified, mitigation measures might be imposed (e.g., reduced loading, at bloom restrictions).	True. As it is now, for pollinators, it is experimental research on non-target impacts that drives such decisions , and general monitoring of population trends are used as background information. Removed "monitoring" here. Also, we have added a new section (6.4.2.4.3) the highlights the importance of ecotoxicology research.
Thomas Steeger	29	566	29	566	the fifth row, far left column "phase-out of older chemistries which may be more persistent, bioaccumulative, and/or toxic"	Added "Globally phase out old obsolete chemistries which may be persistent, bioaccumulative, and toxic"
Thomas Steeger	29	566	29	566	the sixth row, far left column ". . .pesticides (including IPM) with respect to pollinators"	OK
Thomas Steeger	30	566	30	566	in the second row, far left column, by "national risk reduction programs" do you mean federal pesticide labels?	No. These are nation-wide broad multi-action programmes
Thomas Steeger	30	566	30	566	in the third row, far left column consider "Provide monetary incentives to promote reduced reliance on chemical control measures"	Ok Changed to "Provide monetary incentives to promote reduced reliance on pesticides"
Thomas Steeger	30	566	30	566	with respect to taxing pesticides, these measures are most likely to be passed on to consumers and therefore, end up as a form of regressive taxation as the poor bear the burden of increased costs.	This is probably true, but that is a secondary consequence we don't consider in this chapter if the assessment

Maria Laura Ruiu	30	567	32	567	As suggested for tables 6.1.2 and 6.4a, I see a wider range of risks and opportunities related to socio- economic, scientific, policy levels. For example, the response related to "Educate and train extension [...]" not only produces effects in terms of "biodiversity and food production", but also in social, economic, and policy terms.	No action. We believe that this is beyond our scope
Barbara Herren	30	567	32	568	see comments above (row 7) about the evidence column	The summary tables have been amended.
Phil Stevenson	32	567		567	Its not clear what the second box response means. IN fact this whole table is rather hard tol grasp. It would help if the headings were more expnatory. Under evidence - if there is evidence shouldn't this be cited? Aren't putting risks and oppourtunties under the same heading misleading or unclear? Some of the language is awkward. eg retract registtration if monitoring and research evidences? Evidence is not a verb!!!! Delet actual in tthis box.	Thanks for this comment. We have amended the summary tables to clarify and included references to relevant text.
Barbara Herren	32	567	32	567	first organism? Do you mean- First pollinating organism	Replaced with species line 575

Piotr Medrzycki	30	567		<p>One more action should be added: "Increase general public knowledge about organic- and IPM-derived food, in order to increase the market request for this food and thus to promote these environmentally-friendly methods of production which will reduce the use of agrochemicals, with a general benefit to all sectors (except the chemical industry)." Similar programs are run in different countries. This is not the same as row 7 (after heading).</p>	<p>Thanks for this suggestion. We have chosen not to include it as a separate action but it is covered to some extent in section 6.4.2.2.8, which is about promoting and supporting alternative, less pesticide-dependent management practices. Information about educating the public specifically on pollinators is in section 6.4.6.3.1.</p>
Scott Black	29	567	Table	<p>One "response" in the table is: "Educate and train extension, farmers, land managers and the public on the risks and <i>safe use</i> of pesticides and pollutants." Consider changing the term "safe use" to "careful use" or "responsible use." EPA generally does not use the term safe as pesticide use is determined through cost benefits and some level of risk is expected and accepted in order to achieve the desired pest control.</p>	<p>Ok changed to responsible here and in one other place in the text</p>
Matthew Heard	31	567		<p>Table 6.4.b. 'Retract registration' section needs to add that this is only advisable IF the replacement is LESS hazardous and viable</p>	<p>No action. Such a decision is also weighed against many other costs and trade-offs such as not being able to cultivate a crop at all in a region that I'm not sure we have space to detail here.</p>

Vanda Altarelli	32	568	32	568	Row 13 Continually evaluate the efficiency of measures... ought to be classified as medium confidence rather than low confidence ; Row 17 (last) Tax pesticides Should be classified as medium confidence rather than low confidence because it has not been evaluated in some countries	No action Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for pollinators
Serena Heckler	31	569	33	626	<u>Research and exploration of traditional techniques to reduce or eliminate the need for pesticides should be developed, at least, in small farms.</u>	No action This is part of an IPM program and development of non-pesticide cropping systems such as organic farming etc. There is no space to detailed here that.
Thomas Steeger	32	569	32		throughout this section, there are generic references to pollinators when the intent is likely be focused on insect pollinators, specifically bees. Also, the term "plant protection product" is used and the document should make clear that this term is synonymous with "pesticide".	True. Added to the first lines: "Throughout this chapter "pollinators" refers to insect pollinators (mainly bees), as the link between pesticides and non-insect pollinators are very little studied or regulated. " (could also be added to the table). Changed all instances of plant protection product to pesticide

Scott Black	30	570	30	580	This is a good section but could be improved if it included the areas where risk assessment can be developed and refined. For example it should raise the fact that current systems lack research into the effects of pesticides to non- <i>Apis</i> bees, juvenile bees, and should better represent the diversity of sublethal effects.	No action. I believe we are doing that as the text stands
Thomas Steeger	30	570	30	572	". . . is an important tool to estimate the risk to pollinators".	Ok
Noa Simon Delso	33	570	33	570	As a recommendation of the chapter, and given the experienced had in the past in Europe with the review and update of the methodology for risk assessment of pesticides on bees, it would be interesting to suggest the need to review the methodologies on a frequently basis in order to see if they are still adequate or not to the pesticides marketed. I do not understand why the EFSA 2013 guidance document on the risk assessment of plant protection products on bees ( <i>Apis mellifera</i> , <i>Bombus</i> spp. and solitary bees); EFSA Journal 2013;11(7):3295, 211 pp., doi:10.2903/j.efsa.2013.3295 is not referenced in this section. This is the most advanced and complete risk assessment methodology of pesticides on bees (not only <i>Apis mellifera</i> ) proposed so far. However, it is not mentioned anywhere in the text.	Citation already added see above. This continuous update is being done in countries with advanced registration. This is clearly mentioned in the text. 598 ff

Thomas Steeger	30	572	30	574	". . .depends on the combination of hazard (toxicity) and the extent of exposure to the compound for pollinators . . .)	Ok
Phil Stevenson		573			combination of hazards - its plural/	No it's a combination of the hazard <i>and</i> the exposure. Added
Thomas Steeger	30	578	30	580	This is a relatively broad statement; field studies may assess indirect effects. Also, the overall assessment may examine both direct and indirect effects as such assessments are typically conducted for multiple taxa and are intended to integrate information across multiple levels of biological organization. It is likely correct that some risk assessment do not make such assessments; however, it is also true that some do.	No action I haven't seen assessments of indirect effects. A published example would be needed to support the statement if it is to be changed
Phil Stevenson		581		581	Need Referces for lethal and subethal methods of toxicological testing	No action. These are referred to in abundance later
Thomas Steeger	30	585	30	585	consider citing USEPA <i>et al.</i> 2014 ( <a href="http://www2.epa.gov/sites/production/files/2014-06/documents/pollinator_risk_assessment_guidance_06_19_14.pdf">http://www2.epa.gov/sites/production/files/2014-06/documents/pollinator_risk_assessment_guidance_06_19_14.pdf</a> ) or Fischer and Moriarty 2014 ( <a href="http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118852524,subjectCd-LSC0.html">http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118852524,subjectCd-LSC0.html</a> ), or EFSA 2013 ( <a href="http://www.efsa.europa.eu/en/efsajournal/pub/3295.htm">http://www.efsa.europa.eu/en/efsajournal/pub/3295.htm</a> )	Efsa cited already, Fischer Moriarty added to list on line 601 and replaces previously cited Fischer & Moriarty 2011 that should be removed from the old refilest
Thomas Steeger	31	589	31	589	consider the reference provided above (line 75)	Ok

Thomas Steeger 31 590 31 596

This paragraph is a little confusing-- typically higher-tier tests examine effects at the colony level and are typically conducted under semi- or full-field conditions. As such, they can examine more realistic exposure conditions and provide a better understanding of potential effects (lethal and sublethal) as the multiple factors capable of impacting the colony are in play.

Ok. Added "on the bees or their colonies under more realistic conditions"

Thomas Steeger	31	590	31	625	<p>As a general comment, the EPPO 170 guidance, the EFES 2013 and the EPA et al. 2014 process specifically evaluates risks to bees. While historically processes may have evaluated hazard as opposed to risk, these processes have evolved to quantify risk to insect pollinators using honey bees as a surrogate. It should be noted though that EFSA 2013 includes guidance on evaluating risks to other non-Apis bees as does the Fischer and Moriarty 2014 document. Risks to other taxa of pollinators (e.g., birds and mammals) have routinely been estimated using surrogate species (e.g., rats for bats and upland game birds/waterfowl for hummingbirds). Whether the surrogate test species used in assessing risks to pollinators are suitable surrogates is a different question; however, it would not be appropriate to imply that risk assessment schemes in general are remiss in their assessment of potential risks to pollinators and more specifically to bees.</p>	<p>No I can't. Added the comment on risks to other taxa of pollinators (e.g., birds and mammals) though. Added "...bee as indicator species (also called surrogate species) for pollinators (Alix and Lewis 2010, Anonymous 2010) and risks to other taxa of pollinators have routinely used rats for bats and upland game birds or waterfowl for pollinating birds such as hummingbirds"</p>
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Piotr Medrzycki	33	590			This information is a bit obsolete. In fact, in “European Food Safety Authority, 2013. EFSA Guidance Document on the risk assessment of plant protection products on bees ( <i>Apis mellifera</i> , <i>Bombus</i> spp. and solitary bees); EFSA Journal 2013;11(7):3295, 211 pp., doi:10.2903/j.efsa.2013.3295”, it is foreseen to test pesticides on HB, BB and SB both on adults and larvae, analysing also sublethal effects and chronic intoxication. This GD will become mandatory in EU hopefully in 2015 and should be mentioned here. This extremely important document is not reported in the references.	Reference added
Thomas Steeger	31	591	31	591	". . .combination of toxicity and exposure in detemining the likelihood of adverse effects on survival as well as sublethal effects in bees."	Ok “The second more advanced (higher Tier), and also more expensive, approach is to assess the combination of toxicity and exposure under more realistic conditions in determining the likelihood on survival and sublethal effects in bees or their colonies.”
Peter Campbell	33	591	33	592	This paragraph makes it sound like a separate risk assessment approach , it is a continuation of the risk assessment depending on the results of the first tier and the higher tier studies represent more realistic exposure	Ok Changed to “... and also more expensive, approach is triggered by the outcome of the first tier and assesses”

Noa Simon Delso	33	591	33	591	More advance in which terms? Higher tier tests are not more advance, but the allow to evaluate different things of a pesticide.	Removed “more advanced”
Noa Simon Delso	33	591	33	597	Only a few number (n=3) of toxicology testing methods are nowadays internationally ring-tested and standardised (OECD 213, 214 and 75). Despite of the standardisation of some of these methods for toxicity testing (e.g. OECD 213 and 214) toxicological endpoints may vary largely in bees difficulting risk assessment by including uncertainty (e.g. LD50 from 3.4 ng to 600 ng of imidacloprid per bee (EFSA 2012 Scientific opinion). Furthermore, EFSA 2012 have extensively evidenced the limitations for the development of proper pesticide risk assessment of semi-field and field protocols so far developed and recommended (EPPO standards, Anonymous 2010). Therefore, it is questionable that semi-field and field protocols are “well developed and tested techniques”. Apart from these limitations, there is the limitation of the risk assessment approach, in which only one pesticide use of one crop is tested. Once pesticides are authorised, they coexiste with other molecules in the environment and/or the surfaces in which a pesticide molecule may be applied can be far larger than those used for the regulatory testing. Risk assessment nowadays lacks the landscape perspective and in most of the cases	Agree. Removed 'well developed and tested'. Changed text and added refs for the first part of the comment but not the latter half on combined effects and which the members are. I would need documentation to make these statements

Phil Stevenson		591		597	Is there some need to recognise here the potential validity of new tests that test combinations of pesticides with other stressors as the interactive effects of stressors are likely to lead to much greater effects (Vandergem et al. 2013)	Ok " It has been suggested that tests need to be developed of exposure and hazards of combinations of pesticides, also combined with other stressors (Vandergem et al. 2013)."
Martha Groom	33	592	33	592	Should not just limit to bees, but for all pollinators. E.g., change wording to: "...lethal and sublethal effects on bees and other pollinators."	Ok
Anne Alix	33	595	33	597	The EPPO also has published standardized methods for testing in 2003 and 2010, which are in use in Europe and NA: EPPO 170 ( <a href="http://pp1.eppo.int/getnorme.php?id=257">http://pp1.eppo.int/getnorme.php?id=257</a> ) and EPPO 230 ( <a href="http://pp1.eppo.int/getnorme.php?id=247">http://pp1.eppo.int/getnorme.php?id=247</a> )	Added refs
Thomas Steeger	31	597	31	599	"There is on-going research to support the development of tools for assessing risks to pollinators, including studies for assessing sublethal effects on honey bees as well as other surrogate test species	Ok
Noa Simon Delso	33	602	33	603	Currently chronic toxicity is being ring-testing and validating for <b>adult and larvae</b> <i>Apis mellifera</i> .	No action I have no ref for this. This is also mentioned in 588

Thomas Steeger	31	604	31	605	<p>It's not really the large number of chemicals in use that limits the development/adoption of a global risk assessment process but rather the willingness of governments to collaborate. This is in part driven by differing levels of resources to support such collaborations as well as differences in the legal structure (policies and law) of the countries. However, it's unclear whether this sentence may also be referring to cumulative risk assessments rather than chemical by chemical risk assessments. The challenge in evaluating chemicals cumulatively is where markedly different modes of action may be present and the relative frequency and quantity of the compounds differ dramatically.</p>	<p>Agree. Removed "Due to the large number of chemicals in use worldwide,"</p>
Peter Campbell	33	605	33	605	<p>it is not the number of chemicals per se that is the issue in undertaking a global risk assessment but the ability to adapt the risk assessment to cover all uses in terms of crops, rates and application methods and timing</p>	<p>Agree. Removed "Due to the large number of chemicals in use worldwide,"</p>

Thomas Steeger	31	606	31	608	<p>Presumably by "risk ranking" you are referring to "comparative risk assessments". The difficulty is that deterministic (point estimate-based) risk assessments have risk estimates that are unitless numbers which do not lend themselves to meaningful comparisons of scale. For example, the US risk quotient (RQ) is unitless and it cannot be assumed that an RQ of 4 represents twice the risk as an RQ of 2.</p>	No action We are talking about risk ranking in a specific context. I agree that it may be difficult to compare risk rankings, but this is not what we intend here.
Cynthia Scott-Dupree	20	609	20	609	I see that "et al." with a period is used here but elsewhere in this file no period is used -please choose and be consistent	Thanks for your comment. It is a matter of style, and will need to be coherent across the entire report. This is a copy editing job that will be carried out at the final draft stage.
Diane Castle	33	609	33	609	<p><b>Proposal:</b> Amend text from ".....or inform <u>precautionary</u> approach" to " or inform a <u>risk management</u> approach"</p> <p><b>Rationale:</b> Replace Precautionary approach as it has various definitions/interpretations in the regulatory context.</p>	Ok
Thomas Steeger	31	610	31	610	"Environmental Impact Quotient" has not been discussed previously this chapter; it mentioned, it should be discussed/characterized.	Ok removed

Thomas Steeger	31	611	31	613	If this is referring to comparative risk assessments or assessing risks of environmental mixtures, the limited number of tools for doing so may reflect the recognition of challenges in addressing the uncertainties associated with such assessments. No description is provided of the Environmental Risk Index (ERI); therefore, it is difficult to understand the underlying assumptions used in the tool.	We are very restricted on space. Detail of the Environmental Risk Index is available in the cited reference.
Barbara Herren	33	619	33	619	on which species that provide pollination should be on which species provide pollination	Ok
Thomas Steeger	31	621	31	623	". . .for education and to identify land management practices that may reduce exposure."	Ok
Thomas Steeger	31	624	31	625	the last sentence seems parenthetical and out of place-- recommend deleting.	Removed the last sentence

Noa Simon Delso	33	624	33	626	<p>And what about the information from the Netherlands? Knowing the pesticide residue found in water in the Netherlands (see <a href="http://81.93.58.66/bma_nieuw/begin.html">http://81.93.58.66/bma_nieuw/begin.html</a>), it is hard to believe that wild pollinator populations are not affected. Two correlation studies (van Dijk et al 2013 Macro-invertebrate decline in surface water polluted with imidacloprid and Hallman et al. 2014 Declines in insectivorous birds are associated with high neonicotinoid concentrations) found reduced populations of insects and insectivorous birds in areas highly polluted with insecticides. Often, high content of pesticide residue in Dutch waters is found in areas of large production of greenhouses and flowers. Maybe tomato production in the Netherlands is not highly impacted by lack of pollination, as one could envisage considering the trends of insects and insectivorous birds shown by correlation studies, because, it does not depend on pollinators living in the environment (bumble bee colonies are placed and replaced inside the greenhouses for polination purposes).</p>	No action. This is an impact that fits better for chapter 2. Also, it does not immediately related to pollinators
Peter Campbell	33	626	33	626	<p>it should be made clear this was due to applications during flowering</p>	No action Yes, this was the reason, but I have removed the detailed results
Peter Campbell	33	628	33	630	<p>there are also changes which can be made to the timing of pesticide applications in relation to flowering</p>	No action. This is part of “cultivation practices”

Anne Alix	34	631	33	632	A compilation of the implementation of drift mitigation measures in the EU has recently been prepared by the MAgPIE workshop. The proceedings are in preparation and will be published in 2015. We may share on request.	This would be great. I have looked for publications and outcomes of MAgPIE, but haven't found any.
Noa Simon Delso	34	631	34	635	Please, include here the technology developed as well for the reduction of dissemination of contaminated dust when using pneumatic sowing machines (deflectors). Data show that the use of deflectors reduce considerably the dust released in the environment (annex J in EFSA 2012 Scientific opinion, Girolami et al 2011 Aerial powdering of bees inside mobile cages and the extend of the neonicotinoid cloud surrounding corn drillers. Journal of Applied Entomology. and Marzaro et al. 2011 Lethal aerial powdering of honey bees with neonicotinoidi from fragments of maize seed coat. Bulletin of Insectology, 64, 118-125., CRA-API, 2009. "Effects of coated maize seed on honey bees". Report based on results obtained from the first year of activity of the APENET project. 30 pp. <a href="http://www.reterurale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/5%252Ff%252Fc%252FD.5d70d88c74b5011d07e8/P/BLOB%3AID%3D4600">http://www.reterurale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/5%252Ff%252Fc%252FD.5d70d88c74b5011d07e8/P/BLOB%3AID%3D4600</a> , CRA-API, 2010. "Effects of coated maize seed on honey bees". Report based on results obtained from the second year (2010) activity of the APENET project. 100 pp. Available from	I make this statement at 640 citing the EFSA 2013 review. Mazaro et al do not test effects of deflectors but do test impacts (something for chapter 2). Girolami does test two alternative drill equipments without any improvement in survival. I added this reference. Added also the apenet reference

Thomas Steeger	32	632	32	632	consider replacing "gives" with "produces" or "generates"		Ok
Thomas Steeger	32	636	32	638	At issue, is reduced crop area/yield.		Not sure what this refers to
Felix Herzog	34	637	34	637	DELETE SENTENCE: "However, since the buffer ..."	This is a never ending story, adding buffer to buffer. Has been tested in Germany for example with hedgerows. Very low acceptance by farmers.	No action. Not sure why I should delete the sentence
Noa Simon Delso	34	637	34	639	There is nowadays and increasing tendency in the regulatory framework to transform areas originally considered buffer zones into flowering strips. The risks and opportunities of these areas have been previously discussed		Not sure what the problem is and hence what to do here
Thomas Steeger	32	639	32	639	"Planting of pesticide-treated seeds can result in pesticide-contaminated dusts particularly in large pneumatic planters (Krupke et al 2012; Taparro et al. 2010). Dust captured through . . .and thereby risk from pesticides which have high acute toxicity to bees (EFSA 2013)."		Ok

Noa Simon Delso	34	640	34	642	<p>This sentence is written in a misleading way inducing the reader to think that the problem of dust is solved by the use of improve coating and air recycling deflectors. This is NOT what the EFSA 2013 says and it is not what science shows (see Girolami et al. 2011 and Marzaro et al. 2011). Risk is reduced, yes, but not eliminated, reason why the EFSA continues to consider this source of exposure risky in acute terms (see table 8 in EFSA 2013). Other studies have shown the contamination with dust of the wild flowers in the field surroundings at toxicological relevant concentrations (e.g. Greatti et al. 2006 Presence of the a.i. imidacloprid on vegetation near corn fields sown with Gaucho dressed seeds. Bull Insectol 59: 99–103 and Krupke et al. 2012 Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields. PLoS ONE 7(1): e29268. doi:10.1371/journal.pone.0029268)</p>	Ok added “has been shown to reduce, but not eliminate, exposure”
Peter Campbell	34	642	34	644	<p>There is a published monitoring data from French Regualtory Authorities (Afssa – request no. 2009-SA-0253 – Results of Cruiser monitoring programme)that reported no dust related incidents from thiamethoxam treated maize drilling. Showing that the dust deflector technology and regulated dust limits applied in French were a successfull risk mitigation measure.</p>	Could unfortunately not find this reference

Piotr Medrzycki	34	642			It might also be interesting to cite the report of the Italian national research project APENET (available from <a href="http://www.reterurale.it/apenet">http://www.reterurale.it/apenet</a> ) aimed to investigate on the colony decline causes. In the report from 2011 the drift of pesticide dust escaped from the drilling machine was studied in relationship to the different modifications of the machinery. The drift studies are also described in the 2010 and 2009 reports.	Have cited apenet
Thomas Steeger	32	644	32	646	"Recommendatoin to reduce exposure during sowing of treated seed with pneumatic planters have been developed, e.g., avoid planting in windy conditions. However, there is a knowledge gap . . ."	Ok

Piotr Medrzycki	34	646	<p>It is true that there is a big knowledge gap but anyway it would be interesting to report the papers which treat this issue. In the APENET reports the exposure in different conditions and at different distances was deeply studied. Regarding the effects of the escaped dust, the APENET 2011 report describes the trials of the assessment of the impact of the dust cloud on flying bees. These data are also published in many journals by Girolami, Tapparo and others. Moreover a recent paper of Fabio SGOLASTRA, Teresa RENZI, Stefano DRAGHETTI, Piotr MEDRZYCKI, Marco LODESANI, Stefano MAINI, Claudio PORRINI “Effects of neonicotinoid dust from maize seed-dressing on honey bees”; Bulletin of Insectology 65 (2): 273-280, 2012 ISSN 1721-8861 describes the study aimed to investigate the effects on the dust escaped during sowing and deposited on the vegetation on honey bee health.</p>	<p>I have made some changes and added references in this direction. The interested reader need to go to these references for more detail. EFSA 2013 reviews the current state of the art and many references can be found here. There is not enough space to flesh that out in the assessment</p>		
Noa Simon Delso	34	647	34	647	<p>Suggestion to be added to the sentence: because these measurements where not included for risk assessment.</p>	<p>No action That this is not included in risk assessments is not the reason for the knowledge gap. There is quite an active research going on. However, one could suggest that dust drift would be included in a risk assessment regulatory process</p>

Noa Simon Delso	34	648	34	654	Girolami et al. 2012 (Aerial powdering of bees inside mobile cages and the extent of neonicotinoid cloud surrounding corn drillers) and Marzaro et al. 2011 propose methodologies to evaluate (following real exposure) the impact of drift in field conditions. Please consider to include them in the text.	Added "The efficiency in terms of actual reduced impacts on pollinator individuals in the field remains scarce (e.g. Girolami et al 2013) and even less is known for communities of pollinator (but see Brittain et al 2010)."
Thomas Steeger	32	651	32	652	"At this time, there are no data on the extent to which drift reduction technologies have been implemented globally."	added "There are no data on the extent to which drift reduction technologies have been implemented globally. "
Thomas Steeger	32	654	32	654	". . . is to develop new pesticides with low . . ."	ok
Thomas Steeger	32	656	32	656	Should mention that neonicotinoids were introduced to limit risk to non-target organisms as the chemicals have a relatively low toxicity profile for some pollinators ( <i>e.g.</i> , mammals and birds) and the chemicals' systemicity was intended to focus exposure on target pests, <i>i.e.</i> , sucking insects.	Thanks for the comment. This paragraph is about the development of new pesticides, rather than the history of existing technologies.
Cynthia Scott- Dupree	21	657	21	657	Should read "very few new pesticides are being developed and introduced...."	ok

Anne Alix	34	657	34	657	<p>To complete on pesticides (having worked for 12 years in the registration area for the Ministry of Agriculture in France and since for Dow AgroSciences as risk manager) it may be worth mentioning that their development and selection includes screening of their toxicological and ecotoxicological pattern, and honey bee testing is part of it. Some pahse 2 screening tests even include tunnel tests on honey bees, when triggered by the results of laboratory testing. Usually selectivity is a criteria in chosing the better candidates. It does not imply that all the products that will be developed will display no toxicity to bees - and some insecticides do - however if that is the case it relates to a broader activity spectrum necessary to target a pest/group of pests. To my knowledge no insecticide has been developed to specifically target hymenoptera and a few of insecticides can control them. Crop Life International or the European Crop Protection Agency could gather some summary/more details on the development process of a pesticide, if not do not hesitate to come back to me.</p>	<p>Thank you for the informative comment. Unfortunately we don't have space for such detail in the assessment</p>
Piotr Medrzycki	34	657			<p>I don't agree that this is a limiting factor for this option. The explanation that newly developed pesticides are few doesn't justify the fact that they are principally extremely toxic (e.g. neonicotinoids).</p>	<p>Deleted 'which limits this option'.</p>

Thomas Steeger	32	658	32	660	"Potential risks from exposure of pollinators to pesticides can be reduced by developing/encouraging use practices sometimes referred to . . .".	Ok
Les Davies	34	658			This section could mention Australia's 'BeeConnected' initiative - <a href="http://www.croplife.org.au/beeconnected">www.croplife.org.au/beeconnected</a>	Croplife is already cited
Thomas Steeger	32	661	32	661	Some readers may not be familiar with the term "extension"	Changed to advice to pesticide users
Thomas Steeger	32	662	32	664	These services and sources of information may be provided by federal and local government organizations, universities, commodity groups and/or agricultural manufacturers/distributors."	Added
Noa Simon Delso	34	663	34	666	Have the authors of the chapter found any indication about the percentage of communication and stewardship done to farmers by each of these providers (state vs companies)? This information would be interesting to be included in the report.	Unfortunately not. That would be very interesting. It surely varies greatly among countries
Peter Campbell	34	665	34	665	the label "recommendations" are legally enforceable in a number of countries and are not solely recommendations	Yes, and this is mentioned further down under labelling
Christopher N Connolly	32	666	33	682	Are these recommendations likely to be followed when external spraying services are used?	I do not know to what extent, but I believe they generally at least know about and perhaps follow the recommendations. Documentation would be needed.

Thomas Steeger	32	666	32	670	". . .internationally, but general recommendations include the following. First, avoid applying the pesticide when the pollinators are actively foraging in the treatment area, e.g., do not apply insecticides when crops/weekd are in flower . . ."	Ok
Thomas Steeger	32	666	32	666	The OECD has developed a compendium of risk mitigation measures on their Clearspace website.	I could not find this reference
Noa Simon Delso	34	667	34	671	This recommendation does not take into account the physic chemical characteristics of pesticides, for example systemicity of molecules or pesticide products (incl. Adjuvants). As a result, maybe acute effects can be avoided, but exposure to the pesticide is not avoided in the long-run. Furthermore, this recommendation avoids only contact of pollinator during flight, but not with nesting sites or different stages of immature stages that may have developmental phases of their cyclein the field.	No action For sure these recommendations are not eliminating risks. We are talking about ways that risks are currently reduced. We never state that the are thereby eliminated.

Martha Groom	34	667	35	683	<p>Another example from Public Health work could help expand the frame for this section. Could add sentence as follows: In public health efforts to reduce mosquito populations, impacts on pollinators have been minimized through timing and mode of application (e.g., dinotefuran in Morocco: Khallaayoune et al. 2013). [Reference: Khallaayoune, K., Qualls, W.A., Revay, E.E., Allan, S.A., Arheart, K.L., Kravchenko, V.D., Zue, R-D., Schlein, Y., Beier, J.C., Muller, G.C. 2013. Attractive toxic sugar baits: control of mosquitoes with the low-risk active ingredient dinotefuran and potential impacts on nontarget organisms in Morocco. Environmental Entomology 42(5):1040-1045.]</p>	Thanks. Added
Cynthia Scott-Dupree	21	668	21	668	Should read "when the pollinators are actively.."	Ok
Thomas Steeger	32	671	32	671	need to define "shortest residual toxicity".	Replaced with "that lose their toxicity the fastest"
Noa Simon Delso	34	672	34	673	<p>It is recommended not to make tank mixing of <b>specific</b> pesticides. Synergistic toxicity is a very unknown subject. As a result it would be best to recommend the tank mixing of <b>all</b> pesticides. For more information about interactions between pesticides with different modes of action please see section 6.5 in EFSA 2012, scientific opinion.</p>	Replaced with "to avoid tank mixing of pesticides as risks from most combined compounds are largely unknown (see Chapter 2)"

Thomas Steeger	33	673	33	674	". . .and to follow the label which may also include information on best management practices . . .	Ok
Thomas Steeger	33	674	33	676	actually, some BMPs recommend applying when temperatures are low since bees would not likely be foraging at the reduced temperatures.	Would like to add “, but can sometimes also be suggested to be applied at such conditions if bee activity is then low”. But would need a reference for that.
Anne Alix	35	674	35	674	In MagPIE our review of risk mitigation measures to reduce exposure of bees in fields lead us to review of the benefits vs costs to pollinators of removing flowers in fields before treatments. Based on the data we had we concluded that benefits were not that evident and did not recommend this measure. This is in our draft proceedings which we may happily share on request.	I would very much like to read that. Please send it to us at occasion
Barbara Herren	35	675	35	675	yet, it should also be mentioned, that weeds are often extremely important resources for pollinators. FAO is just producing a publication on this topic.	No supporting evidence provided, although it sounds like this reference would be more appropriate for chapter 2.

Noa Simon Delso	35	676	35	677	<p>Toxicity of compounds is unpredictable depending on temperature. Some compounds are more toxic at higher temperatures and some others at lower. Please see MEDRZYCKI, P; GIFFARD, H; AUPINEL, P; BELZUNCES, L P; CHAUZAT, M-P; CLAËN, C; COLIN, M E; DUPONT, T; GIROLAMI, V; JOHNSON, R; LECONTE, Y; LÜCKMANN, J; MARZARO, M; PISTORIUS, J; PORRINI, C; SCHUR, A; SGOLASTRA, F; SIMON DELSO, N; VAN DER STEEN, J J M; WALLNER, K; ALAUX, C; BIRON, D G; BLOT, N; BOGO, G; BRUNET, J-L; DELBAC, F; DIOGON, M; EL ALAOU, H; PROVOST, B; TOSI, S; VIDAU, C (2013) Standard methods for toxicology research in <i>Apis mellifera</i>. In V Dietemann; J D Ellis; P Neumann (Eds) The COLOSS BEEBOOK, Volume I: standard methods for <i>Apis mellifera</i> research. Journal of Apicultural Research 52(4): <a href="http://dx.doi.org/10.3896/IBRA.1.52.4.14">http://dx.doi.org/10.3896/IBRA.1.52.4.14</a> - p.9</p>	<p>Reference added with statement: However, the toxicity can increase or decrease with temperature depending on compound (Medrzycki et al 2013).</p>
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Thomas Steeger	33	679	33	680	"Other actions include communicating with near-by beekeepers . . .". However, it may be worth noting that beekeepers in the US have expressed concern regarding this option since weather or hive conditions may limit the extent to which colonies can be moved and/or covered for extended periods of time. Some beekeepers believe that any expectation of notifying beekeepers of impending applications implies that mitigation is on the shoulders of beekeepers rather than the grower/applicator.	I agree that this should be the case, but is there any documentation I can refer to?
Noa Simon Delso	35	679	35	679	Please define "calm weather" in parametric terms (temperature, wind speed, rainfall, etc.) otherwise it is too subjective.	replaced with "at calm wind conditions"

Noa Simon Delso	35	680	35	683	<p>Communication is always positive, however risk mitigation measures should aim to reduce exposure to pesticides in the environment. Informing beekeepers in the area is not going to reduce the release of pesticide into the environment. The utmost, it may avoid complaints due to colony losses. However, this measure creates an aberrant situation from a sociological point of view. In this case, beekeepers are considered the responsible of the poisoning of their bees in case they did not do anything following the communication on spraying. Furthermore, this kind of measures do not resolve the problem for wild pollinators who will be anyway exposed to the pesticides given that they do not speak, nor read the signs placed in the field.</p>	<p>Added “Obviously this measure will possibly protect honey bees only and not other pollinators.”</p>
Piotr Medrzycki	35	683			<p>Add at the end: “Obviously this measure will eventually serve to protect honey bees only and not the other pollinators.”</p>	<p>Added “Obviously this measure will possibly protect honey bees but not other pollinators.”</p>

Serena Heckler	35	684	35	699	<p><u>Consider for this section the current strategies applied by local and indigenous farmers in order to reduce or avoid the use of pesticides. In general, indigenous peoples do not use pesticides for the cultivation of their own food. They use pesticides however, for the cultivation of commercial crops (for e.g. in the Andean communities in Patacancha, Cusco in Peru, where traditional organic farming is prevalent).</u></p>	<p>This is interesting, but is there any documentation I can base that on?</p>
Noa Simon Delso	35	685	35	686	<p>Please, include as well organic farming. Organic farming is, in terms of pesticide use, the best alternative for pollinators. It is incredible that the authors of this chapter did not even consider it. Please include information on this alternative.</p>	<p>I agree added to 685: “A key response is efforts that lead to complete avoidance or decreased use of pesticides in cropping systems. Developing and implementing cropping systems that entails low or no use of pesticides, such as organic farming, has documented positive effects on pollinators (Chapter 2). A major effort in conventional farming has been to decrease pesticide use through the adoption of integrated pest management (IPM). “</p>

Peter Campbell	35	687	35	700	a key aspect of IPM is monitoring pest/disease levels and only applying pesticides when they reach threshold levels for damage	Added “decreased and more efficient and targeted use” and “the need to use pesticides and to only apply pesticides when they are needed, i.e. when other measures are insufficient and pest abundances have reached the damage threshold “. I do agree that thresholds etc is what IPM has become to be much about. However, in its original definition the main emphasis was much more about using a toolbox of measures (integrated with socioeconomy) to control pest damage, where chemistry is not at all primary. This has largely been washed out. In fact, the introduction of thresholds etc can increased pesticide use in a situation where farmers usually don't apply much pesticides.
Thomas Steeger	33	690	33	690	However, encouraging the develop of pollinator-attractive habitat at field margins can attract pollinators into close proximity with application areas and may also complete with pollinators service needs of the target crop.	Added “discussed in section 6.4a; measures that have to be balanced against the risk of attracting pollinators to or near areas treated with pesticides”

Noa Simon 35 692 35 699  
Delso

There are more examples coming from Italy in which the reduction of pesticide use has been well evidence to positively impact pollinators. Information on the subject can be found in the results in CRA-API, 2009. "Effects of coated maize seed on honey bees". Report based on results obtained from the first year of activity of the APENET project. 30 pp.  
<http://www.reterurale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/5%252Ff%252Fc%252FD.5d70d88c74b5011d07e8/P/BLOB%3AID%3D4600>

We agree that the sentence is poorly formulated. There are many studies on impacts, but not many on how entire pesticide regimes in cropping systems affect entire pollinator communities. I have deleted this paragraph.

Piotr Medrzycki	35	693	35	699	<p>Again, there is a misunderstanding. The comments should regard the relationship between crop management and environmental health (like pollinator diversity) and not crop yield in terms of quantity. In any case the first sentence is not true. There are hundreds of studies regarding pollinator diversity in agricultural areas (maybe with less exotic crops) managed in different ways (conventional, IPM, organic). The example of cacao is somewhat bizarre. This is not an essential crop for human survival. I suggest to provide different examples. Generally, it is commonly agreed that reducing use of pesticides leads to the improvement of the environmental health and thus pollinator diversity and fitness. This issue should be stressed instead of questioning its usefulness.</p>	<p>I agree that the example awkward. I deleted the paragraph. Yes, there are especially many conv-organic comparisons. The problem is that these compare cropping systems that differ in many more aspects than the pesticide use. Also, I have had trouble finding examples that specifically addresses pesticide use effects on pollinators. Hence, this example. I would appreciate any suggestions for references that target pesticide use and pollinators. I would say that some commonly agree that reduced pesticide use improves the environment. Others, however, think that the registration, risk assessments and control of use are enough to assure avoidance of impacts on non-target organisms. I need to base such a statement on evidence.</p>
Thomas Steeger	33	694	33	694	delete "groups of"	Ok
Thomas Steeger	33	695	33	698	<p>this doesn't provide much supporting evidence that the reduced loading is effective; however, mathematically, a reduction in exposure or toxicity will have to reduce risk.</p>	<p>I agree, deleted the paragraph. Your statement is correct and I added "A reduction in exposure and toxicity of pesticides will reduce risks pollinators." to the first para in this section</p>

Peter Campbell	35	698	35	698	this is a key issue as substituting a pesticide needs to take account of its efficacy, application timing and frequency and effects on other compartments	Paragraph deleted
Thomas Steeger	33	702	33	702	" . . . a pesticide before use is a primary level and regulatory policy tool to potentially limit use of bee-toxic pesticides and implement pollinator-safe use practices."	Ok
Cynthia Scott-Dupree	22	703	22	705	THs a a misrepresentation of fact - registration of pesticides before use may in small part be focused on reducing pollinator impact but I suspect that the primary focus is on human health and other environmental impacts	Added. "The requirement to register a pesticide before use is a primary level and regulatory policy tool that in many countries has as one aim to limit use of bee-toxic pesticides and implement pollinator-safe use of pesticides."
Phil Stevenson		703		703	pesticide	Changed to the pesticide
Peter Campbell	35	705	35	705	the term used should be product not compound (a compound is a single chemical, a product is associated with a use and can contain one or more chemicals(active ingredients))	Changed to "Pesticide products"
Noa Simon Delso	35	707	35	708	The FAO has started this work	Very interesting, please provide references
Phil Stevenson		711		711	a not an - infact I suggest this section looked over very carefully for typos.	Ok
Phil Stevenson		713		713	in many (most) developig countries its impossible to find out which pesticides are actually registered for use.	Interesting, please provide reference for that
Thomas Steeger	34	721	34	721	replace "here" with "in West African countries"	Ok

Thomas Steeger	34	723	34	723	". . .are reported as unregistered and therefore . . ."	Ok
Thomas Steeger	34	724	34	725	". . .regulation and monitoring of pesticide use in Thailand."	Ok
Noa Simon Delso	35	728	35		The risk assessment scheme is in the EU the most complete one in world nowadays with the proposal of guidance document done by the EFSA in 2013.	No action. I believe we refer to this in the text.
Thomas Steeger	34	730	34	731	"..and allows for further restrictions of us should negative impacts..."	Ok
Peter Campbell	36	732	36	732	this is not a new procedure it has existed at the national level for a number of years, .e.g the use of the wildlife Indicent Scheme in the UK to monitor issues and inform suspensions of registrations	Agree. The last sentences doesn't refer to the new registration procedures under development. Moved the sentence on 726 last.
Noa Simon Delso	36	732			EC 2009 – What reference is this? I recommend the authors to read and include the following legal references: Regulation (EU) 1107/2009, Directive 21/2010/EU, Commission Regulation (EU) 283/2013 and Commission Regulation (EU) 284/2013.	Yes, refers to 1107/2009 <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:309:0001:0050:EN:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:309:0001:0050:EN:PDF</a>
Thomas Steeger	34	734	34	735	"The label provides directions for use . . .and is considered an important tool to limit potential risk to non-target plants and animals (including humans)."	Ok "The label provides instruction for use of the pesticide and is considered an important tool to limit risk to non-target organisms and humans. Labelling is a regulatory action that is generally part of the pesticide registration."
Phil Stevenson		734		734	Labelling almost always in English - which not everyone can read - and infact not everyone can read.	Good point. Is there any documentation?

Thomas Steeger	34	736	34	737	". . .not include directions directly related to protecting pollinators, but many . . .clear warnings about the potential negative impacts (hazards) . . "	Ok
Noa Simon Delso	36	740	36	746	It would be interesting to know the real enforcement of labeling. In what percentage do farmers follow the recommendations done in the label? Any figures available that could be added to the report?	That is a very interesting question. I have not found any such study.
Thomas Steeger	34	742	34	742	". . .for enforcing mandatory label mitigation measures and restrictions . . .	Ok
Thomas Steeger	34	743	34	745	However, many countries have monitoring programs or incident reporting programs that provide dat which can be used to gauge whether labels are suffcient.	Yes there is incidence monitoring (mentioned in another place) but have they linked that to labelling? If so, please provide a reference

Scott Black	34	746	34	751	This section should point out how many pesticide users are not required to have a license even when using pesticides in the line of work. In the United States there are both Restricted Use and General Use pesticides. Many employees of farms, nurseries, and landscaping companies use general use pesticides and as such are not required to have a license. The majority of neonicotinoid products are general use products, even those intended for commercial use. Pesticide licensing is complicated and there are exceptions but it became evident during discussions of the Oregon Task Force on Pollinator Health that the employees of farms and nurseries were legally using commercial neonicotinoid pesticides without licenses. I point this out because a large number of applicators would miss out on the proposed training.	Added “ Many pesticide appliers (including professionals) are not required to receive formal training for using a pesticide (e.g. General use pesticides in the US <a href="http://www.epa.gov/pesticides/safety/applicators/restrict.htm">http://www.epa.gov/pesticides/safety/applicators/restrict.htm</a> ).”
Thomas Steeger	34	747	34	747	". .. Require a license (certification) for a person . . .that is issued after completion of a formal training course."	ok
Scott Black	34	750	34	750	as noted above "safe use" seems the incorrect term.	Changed to responsible use
Thomas Steeger	34	750	37	750	". ..disseminate inforamtion on the safe use . . .of the effectivenss of and/or compliance with such measures was found."	ok

Thomas Steeger	35	756	35	757	". . .the use of chemicals meeting certain criteria in terms of persistence, bioaccumulation, and toxicity; this list currently . . ."		Ok
Felix Herzog	37	759	37	775	REVISE PARAGRAPH and include an explicit recommendation to maintain (or abandon) the moratorium	Stakeholders will expect scientists to express an opinion on this.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested. Also, this EU decision will already have been made by the time this report is approved by the IPBES plenary in February 2016.
Thomas Steeger	35	762	35	763	"Certain uses of specific neonicotinoids have also been restricted . . ."		Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Barbara Herren	37	763	37	765	mention of moratorium in Oregon is out of place, between two sentences referring to the EU ban.		Ok. Moved last. Added Nigel's comment
Thomas Steeger	35	765	35	768	". . .precautionary because of the uncertainties regarding potential risk to . . .from neonicotinoid seed treatments. Available studies could not resolve the question of whether . . ."		Rewrote The decision was precautionary, because uncertainties in the estimated large-scale risks to wild pollinators and honey bees colonies from neonicotinoid seed treatments in the field (Godfray et al. 2014).” Deleted following sentence

Noa Simon Delso	37	766	37	775	<p>The way the text is written is misleading and inducing to think that the Commission went over its duty. Several points to be risen here: (1) The problem of neonicotinoids does not come from their application as seed treatment alone (which involves dust production), but from the systemicity and other parameters like persistency, water solubility, broad expectrum of action and high toxicity; (2) The suspension decision was not just based on the gaps found in the risk assessment, as invites to think the text with reference to (Godfray et al. 2014), but on the sum of gaps in risk assessment and a number of exposure routes with high risks to bees (1. EFSA. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance clothianidin. EFSA Journal. 2013;11: 3068 [55 pp.]. doi:doi:10.2903/j.efsa.2013.3068.</p> <p>2. EFSA. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance imidacloprid. EFSA Journal. 2013;11: 1–55.</p> <p>3. EFSA. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance thiamethoxan. EFSA Journal. 2013;11: 3067 [68 pp.].</p>	<p>In response to 1 and 2 : “The decision was based on identified uncertainties and knowledge gaps in the estimated risks to wild pollinators and honey bees colonies from neonicotinoid use (EFSA 2013b,EFSA 2013c,EFSA 2013d, EFSA 2013e, Godfray et al. 2014).” I hope I have responded sufficiently to the comments in my changes to the text. The mode of action and transport is too much detail for this report. The yield is a good point, but I believe that one year of data is not yet enough to assert this.</p>
Christopher N Connolly	35	772	35	774	<p>New evidence (Moffat C et al 2015).</p>	<p>Thanks for your suggestion. The paper has been cited in a table of sublethal effects in chapter 2.</p>

Christopher N Connolly	35	772	35	774	What about residual levels of neonicotinoids and replacement pesticide effects?	the potential for long term accumulation of neonicotinoids' is mentioned. The uncertainty about replacement pesticides is covered in the Godfray reference cited.
Peter Campbell	36	774	36	774	there is no monitoring in place to determine whether there are any effects of the moratorium on pollinators!	There are several also large studies that have started in 2013-2014 in several countries (eg Netherlands UK). I found no overview of what initiatives are happening.
Peter Campbell	37	774	37	775	Published over-wintering honeybee colony loss data from COLOSS during winter of 2013/14 reported the "The overall proportion of colonies lost was 9%, the lowest since the international working group started collecting data in 2007" and when neonics were still being used ie prior to ban. Whilst in 2014 in France the lowest ever reported honey yields were reported and this was after the ban which came into France 1 year earlier than the European ban.	That is promising, but we need more data to ascertain an effect
Piotr Medrzycki	37	774	37	775	It might be added that after the Italian moratorium of the use of neonicotinoids and fipronil for seed dressing of maize, the number of annual bee poisoning incidents reported nationally during sowing decreased from 185 to 3 (the latter ones caused by illegal use of dressed seeds from the old stock) (APENET report 2009)	Good point. I had trouble finding the referred result though. Was there a restriction of use in 2009?

Scott Black	35	776	35	778	I agree with this point but it should be added that alone it is not sufficient as there are pollinator declines, and pesticide incidents, in countries with advanced registration procedures.		No action. I agree with your statement, and we are not contradicting this as it stands
Thomas Steeger	35	776	35	782	Such standards are expensive and require considerable data to support . Registrants in developing countries may be unwilling to support data compensation.		Added “Such standards are expensive and require considerable data to support also for the government that need to fund staff to handle registrations and assess risks. Sufficient experience, technical skills and specializations may lacking.”
Les Davies	37	777			Risk to pollinators is' - surely 'Risks to pollinators are'		Ok
Peter Campbell	37	784	37	784	I think the reference here is to regulatory risk assessments rather than studies which are already submitted to several countries when they accept OECD protocols. The risk assessment is closely linked to the use, which varies by crop, pest and local agronomy. Therefore the risk assessment needs to be conducted according to local conditions and cannot for example be extrapolated from Western Europe to Asia		Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested. We have cited this section specifically in row 1 of Table 6.4.2.
Felix Herzog	37	784	37	797	INCLUDE the recommendation for international risk assessment as a specific line in the Table at the beginning of Chapter 6.4b	This recommendation makes a lot of sense and should have better visibility	No action It's implied in “raise registration standards globally”

Piotr Medrzycki	37	784	37	785	This already happens for studies carried out following OECD TG in GLP because of the MAD (Mutual Acceptance of Data) agreement.	Added reference
Les Davies	37	784			Companies only conduct one set of 'registration studies' and use these studies to support registration in different countries	Interesting but we cannot add this without supporting evidence.
Thomas Steeger	35	788	35	789	"For example, in 1994, thirteen countries in West Africa developed a joint registration process for pesticides to support enhance control of pesticide trade."	Ok
Phil Stevenson		789		791	Something wrong with sentence.	Corrected
Phil Stevenson		792		795	I think this is a rather optimistic representation of the state of affairs in these countries. Most countries in these area have very weak regulation even now and its difficult to find out what is or what isnt registered.	For sure they still have problems and there are studies showing exactly what you say that are cited in this chapter. But here we are referring to actions done in terms of coordination in different parts of the world.
Thomas Steeger	35	794	35	794	". ..common registration process."	Ok
Les Davies	37	798			Section could mention OECD Global Joint Reviews (GJRs)	Added
Thomas Steeger	36	806	36	806	It should be noted that compounds can have high toxicity, but still have relatively low risk if expsoure is sufficiently low.	added ..and/or low exposure
Thomas Steeger	36	816	36	819	". . .knowledge response, but a willingness to provide resources that . . .research, extension and practices."	ok

Cynthia Scott- Dupree	25	817	25	817	Should read "Promoting reduced pesticide (e.g. IPM) or non-chemical pest management (e.g. organic farming) practises...."	Agree. This paragraph now includes IPM and organic farming as examples.
Noa Simon Delso	38	817			The fact that authors do not consider organic farming as a valid alternative to support pollinators and pollination reveals interesting information about the approach taken in this report. Please include organic farming systems together with IPM.	Agree. This paragraph now includes IPM and organic farming as examples. Have retained the original text "reduced pesticide or non-chemical pest management practices" which includes organic farming. Note that many organic farming systems allow pesticides.
Thomas Brooks	38	817	38	823	Another citation here could be Furlan & Kreuzweiser (2015) Environ Sci Pollution Res (open access at <a href="http://link.springer.com/article/10.1007/s11356-014-3628-7">http://link.springer.com/article/10.1007/s11356-014-3628-7</a> ).	Thanks for the reference. It's a bit narrow in this context as it revolves around neonicotinoids
Cynthia Scott- Dupree	25	818	25	818	Should read "only on a..."	Ok
Thomas Steeger	36	821	36	822	Was the IPM plan discussed in this sentence actually implemented in 2014?	No you're right it has not yet been implemented in many countries. I removed implemented
Noa Simon Delso	38	821			Same as before, please include organic farming systems or principles as an alternative.	Added "In addition, it entails enacting agricultural policies that promote agricultural methods that reduce pesticide use and adopt IPM strategies or low- or no-pesticide use crop production systems (e.g. organic farming) as alternatives. "

Noa Simon 38 822 38 823  
Delso

In Europe there is the so-called Sustainable Use of pesticides Directive (Directive 2009/128/EC) which avogues for the implementation of IPM principles. The problem we face nowadays is the translation in practical terms of IPM so the shift of the agricultural model involves a main improvement of the situation observed in the field.

I think the IPM action plan is part or a result of that directive. I agree that it remains to be seen how strong these initiatives will be in the field

Anne Alix	38	824	38	829	In this section I missed some text replacing benefits and protection of pollinators into the context of environmental protection, particularly in the context of decision making on pesticides. I fully agree that registration shall include a thorough risk assessment to pollinators. But decision making then needs to discuss the outcome of this risk assessment in context, considering the possibilities to modify the application pattern of the pesticide, to mitigate the risks and to eventually consider the alternatives. Particularly some alternative methods are not deprived of effects (if you substitute a herbicide with mechanical mowing you probably impact more weed species than chemically, with maybe more impact on pollinators. Another example is soil solarization, which has non selective effects on soil organisms for long periods of time). In the end of the day what we want is to protect pollinators and the other components of the environment and including this element of discussion in the chapter would provide insight on the elements on which decision making need to rely in order to make the fairest one. This is why the gradation in decision making in pesticide registration includes risk mitigation	Thanks for these points. We discuss decision support tools, including a crop protection example, in section 6.5.12. To make the link with this section, we have added the following "See section 6.5.12 for an example of a decision support tool designed to help farmers and advisers choose crop protection products with lower toxicity to pollinators" to section 6.4.2.4.2.
Thomas Steeger	36	825	36	826	"Available evidence on the efficacy of these acitons provides . . .complex picture of the effects of reducing agrichemical impacts on wildlife . . ."	Ok
Thomas Steeger	36	827	36	828	". . .was unanimously characterized as beneficial . . ."	Ok

Thomas Steeger	36	831	36	832	". . .gaps remain with respect to introducing such policies . . ."	Ok
Thomas Steeger	36	835	36	836	unclear what is meant by "optimise the economy"--- do you mean maximize profits?	Added Maximize profits
Barbara Herren	38	837	38	837	There is no overview of the implementation of such policies globally - ? Why would there be a global overview when such taxes have been applied only in a few (?) European countries....I understand that the authors want to point out gaps in evidence, but the phrasing makes it sound somehow worse than it is. For a policy maker, it might be helpful to say for how long this has been applied thus to understand if it is a well accepted measure or in the early stages of implementation	Agree Deleted the two last sentences
Thomas Steeger	37	841	37	842	this gets at exposure but not effects, i.e., impacts.	Replaced impacts with risks in the first sentence
Thomas Steeger	37	845	37	846	". . .there is some evidence that pesticide use restrictions have . . ."	Ok
Thomas Steeger	37	847	37	849	Unclear what is meant by "risk indicators" however, this may be due to the phasing-out of older more toxic chemistries.	Perhaps this should go into the glossary?
Thomas Steeger	37	851	37	853	". . .apples and pears, for instance, where pest pressure may be higher . . ."	Replaced with Reduced risks were largely due to removal of specific chemicals from the market, but were not consistent across crops as the risk score increased for, for instance, cider apples and pears (Cross 2013).

Scott Black	37	854	37	857	<p>As with points above, it is important to explore both the benefits of proposed solutions as well as note the weaknesses. In the case of incident monitoring there would be value in raising concerns with existing monitoring systems. For example, under the U.S. Federal Insecticide Fungicide Rodenticide Act 6(a)2 incident reporting there are no requirements for reporting bee kills beyond the very limited “aggregate reporting” that applies to category (v), the “Other non-target organisms.” The registrants do not need to specify what type of organism was affected, only that it was an “other non-target.”</p>	<p>Thanks for your comment. It is not clear what changes to the text are proposed, since these two paragraphs clearly describe benefits and weaknesses of this approach. The last line is about the problem of implying causality from such data.</p>
Thomas Steeger	37	854	37	857	<p>It's difficult to document incidents for native wild bees since losses go unnoticed (Oregon bumble bees being an exception)</p>	<p>Agree but they don't go unnoticed if they are monitored (which they are currently not)</p>

Noa Simon Delso	39	859	39	871	Please include in the text the review of contamination of beekeeping matrices carried out both by the EFSA 2012, scientific opinion (annex G), and that carried out by Bonmatin et al. 2015 Environmental fate and exposure; neonicotinoids and fipronil. Environ Sci Pollut Res. 2014; 1–33. doi:10.1007/s11356-014-3332-7. Considering the results summarised by these reviews, maybe a direct cause effect relationship can not be defined between pesticide exposure and honey bee colony damage (mainly because of a lack of information on observations of the survival in the long run of honeybee colonies), but I think there can be a common agreement that our environment is far from being “clean”, and that pollinators, in this case represented by honeybees, are breathing air, drinking water and eating foodstuffs that are contaminated.	I don't see how these papers are linked to the specific issue of monitoring as a response. They do however fit in Chapter 2
Phil Stevenson		867		871	How important is it that the toxic effects of neonics are significant at concentrtrions of around 1ppb in nectar so detecting this in samples of bees once consumed using even the most current equipment is challenging and almost impossible.	I agree. removed this sentence
Thomas Steeger	37	870	37	870	consider replacing "put in question" with "uncertain"	Ok

Thomas Steeger	37	872	37	877	". . .correct use of pesticides by following the label instructions and to adopt risk reduction practices. Many such programs exist around the world (see Technological and Legal Responses about). Farmer education has also been shown to result in effective implementation of IPM measures . . ."	Ok
Barbara Herren	39	873	39	876	long run on and slightly incomprehensible sentence	Corrected
Thomas Steeger	38	882	38	883	". . .personnel can serve as effective means of promoting pollinator friendly . . and avoid unnecessary pollinator exposure to pesticides as exemplified . . ."	Ok
Thomas Steeger	38	886	38	888	It is unclear whether this is a statement of fact or an opinion. If it is the former, then a reference should be provided to support the statement.	Correct. It's a statement of a very unexplored area where lots of pesticides are used. Perhaps move to knowledge gaps?
Thomas Walter	40	889	40	889ff	Farm advisory services in Switzerland created a fact sheet "Harvesting technique and species richness in meadows" to promote arthropod friendly harvesting practices and they offer training courses for farmers.	Not added.
Maria Laura Ruiu	40	890	40	893	I suggest to include the paragraph "heavy metals and other pollutants" within the "monitoring and evaluations" paragraph	I don't see the point in that. There is no such monitoring, and even less research

Barbara Herren	40	891	40	893	There was publication in the last two years on effects of Chernobyl on pollination- it is referred to in the 2014 International Pollinator Initiative report to the CBD, UNEP/CBD/COP/12/INF/37 available at <a href="http://www.cbd.int/doc/?meeting=cop-12">http://www.cbd.int/doc/?meeting=cop-12</a> ; maybe this is not the right chapter for this but it would seem deserving of a mention under "other pollutants"	Perhaps for chapter 2 on impacts?
Martha Groom	40	893	40	893	Make connection to heavy metals by changing sentence to "heavy metals and other pollutants".	Ok
Maria Laura Ruiu	40	894	40	932	I suggest to include the paragraph "Genetically modified organisms" within the "legal responses" paragraph	Thanks you for your suggestion. We don't see how this would improve the text. We suggest we keep the original chapter structure
Thomas Steeger	38	914	38	914	"Possible changes in the toxicological model. . ."	OK

Noa Simon Delso	914	<p>One piece of information lacking in the risk assessment of GM plants on bees is the indirect impact on pollinators, for example on the availability food resources. This is the example of Round Up Soy, which is an herbicide resistant plant. Argentina represents a practical case study and should serve as an example of what is NOT to be reproduced elsewhere. Hectares of soy with nothing else for pollinators to feed from. A green dessert some people have named. Furthermore, as always happens in biology when one does not use wisely the chemical tools available, resistance have appeared needing a higher dose of herbicide to achieve the same results. By the way, this effect has also appeared due to the preventive use of neonicotinoids in certain species (see review Simon-Delso et al. 2015 Systemic insecticides (neonicotinoids and fipronil): trends, uses, mode of action and metabolites. Environmental Science and Pollution Research. 2015;22: 5–34. doi:10.1007/s11356-014-3470-y</p>	<p>Thanks. We have added the following text: " Indirect effects through the food chain and those generated by loss of flowers in response to herbicide use, are not considered in the risk assessments for insect resistant or herbicide tolerant GM crops (see section 2.2.2.1 for assessment of these effects)."</p>			
Thomas Steeger	38	918	38	920	<p>The issue is whether suitable protocols exist for testing non-Apis species. It might be informative to first demonstrate whether <i>A. mellifera</i> is not an appropriate surrogate.</p>	<p>Good point. There is an active development in this direction for pesticides risk assessment as had previously been mentioned (line 598). We can make a reference to 6.4b.1</p>

Thomas Steeger	39	927	39	929	". . .species such as those used as biological control agents . . . However, onl A. mellifera, with few exceptions, . . ."	OK
Thomas Steeger	39	929	39	931	Aren't birds and mammals generally considered in the ERA as oppsed to hummingbirds and bats specifically?	Yes,in general, birds and mammals are considered in the ERA. However, for birds, quail (partridge) have been used as a surrogate species, and for mammals, mice is the model. We have amended the text to make this point clearer.
Peter Campbell	41	930	41	930	is there evidence of differing reposnses between wild bees and honeybees? How will the other species requiring assessment be identified	We have clarified the text on surrogate species and what is known about risks from GMOs.
Maria Laura Ruiu	42	940	42	940	Is it Chapter 6.4c or 6.5c?	Problem corrected, 6.4c
Lennard Pisa	42	940	42	941	Maybe a few introduction sentences before the table 6.4c would increase readability	Thank you for the sugggestion, two sentences added
Lennard Pisa	42	940	42	941	But that is a subjective matter I guess	I think this is in fact part of the comment addressed above.
Maria Laura Ruiu	42	947	43	947	see comments for tables 6.1.2 and 6.4a	The summary tables have been amended.
Barbara Herren	42	947	43	948	see comments above (row 7) about the evidence column	The summary tables have been amended.

Serena Heckler	43	947	43	947	<u>The bringing together of "biodiversity" and "cultural" in the penultimate row of this table highlights the artificiality of this division for many smallholders, indigenous peoples and local communities. Again, a biocultural approach to conservation can be useful here.</u>	Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in the forthcoming draft allowing direct comparison of the different knowledge systems.
Nicolas Cesard	43	947	43	948	I think it is too narrow. I would say Maintain cultural or patrimonial areas that support pollinators	I have changed the text to broaden the language, it now reads "Maintain sacred and other culturally protected areas that support pollinators."
Phil Stevenson		947		947	Re managing invasive species - what about invasive plant species that are established but provide a good food source for pollinators?	Limited space prevents us from discussing the impact of invasive plants that support pollinators. For this reason, the wording is careful to point out that we are only referring to invaders that have a negative effect.
Phil Stevenson		947		947	Any thoughts on actually using evidence to show which species are actually good for bees - based on their nutritional value or other factors - not just nectar quantity	I think this comment is linked to the one above. See that response.

Scott Black	40	947	Table 6.4c	Response: Targeted Conservation of specific pollinator species.... Only a few examples. There are dozens of examples of targeted conservation for butterfly species in the US, Europe and Africa. Also some from Mexico, India and SE asia.	Thank you for pointing this out. It is true that the original draft paid too little attention to successful butterfly conservation. The text now includes the following " Butterflies have also been a target group for species focused conservation actions (New et al 1995) with a number of successful projects (e.g. Thomas et al 2009) including ex-situ (Schultz , Russell, Wynn 2008). Although they have had a high profile in species conservation, relative to other insects, butterflies are considered to be minor pollinators relative to other insect groups, especially bees (chapter 1 of this assessment).
Scott Black	41	947	Table 6.4c	Establish protected areas or improve quality....difficult to determine role of legislation... The the US the role of legislation is well documented in protected area designation at the federal, state and local level. The Wilderness Act was passed by congress and allows for areas to be set aside. Local efforts have passed legislation to protect open space. I assume this is the same in Europe so it is not difficult to determine the role...	I have changed the word "role" to "impact" to make the point more clear. We do know what the intended role of legislation is, but it is hard to demonstrate that outcomes would have been different in the absence of that legislation.

Jerome Casas	table 6.5c and following	947			The key used to rank the different lines is unclear. An approach using confidence level (from high to low) would make reading much easier	The language used to define confidence has been revised so that it is consistent with the codified instructions to authors across the whole assessment
Matthew Heard		947			Table 6.5.c Check for consistency between confidence in tables e.g. high confidence in this table over restoring habitat patches contrasts with medium in 6.4.a	Table 6.4a does not present an assessment of the effectiveness of habitat patches, so there is no inconsistency.
Vanda Altarelli	43	950	44	990	It would be interesting to also include recent REDD+ initiatives undergoing in many countries. Since in many places there is on-going monitoring, including community based ones, one could easily introduce the monitoring of pollinators increase in REDD + initiatives as a co-benefit of reforestation/forest preservation	Although REDD+ could have a positive impact on conservation, we could find no data regarding its impact on pollinators or pollination.
Phil Stevenson		963		963	yes provided those additional resources are actually known to provide a food resource - based on knowledge of the nutritional quality	To clarify I have added the word "appropriate"
Maria Laura Ruiu	44	966	44	966	Again is "section 6.5a" or 6.4a?	corrected.
Thomas Steeger	42	968	42	968	By "density" do you mean "abundance"?	Although "density" is strictly correct, abundance is a more widely understood concept. The word has been changed.

Serena Heckler	44	969	44	973	<u>Forest management in the Mayan Yucatán Peninsula is a good example of diverse management that promotes the conservation of pollinators and biodiversity in general.</u> (Source: Estrada Lugo, Erin I. J. et al. (2011). "El Rancho Maya" in "Cultivar el territorio Maya. Conocimiento y organización social en el uso de la selva." Bello Baltazar, Eduardo and Estrada Lugo, Erin I. J. (Comps.) Universidad Iberoamericana, México: pp. 67-9)	Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft, allowing direct comparison of the different knowledge systems
Thomas Walter	23	978	23	978	replace treats by threats	The word "treats" does not appear on or near line 978.

Natalia Escobedo	43	991	44	1006	<p>(I already mentioned this work in my observations for chapter 2). Recently we carried on a modest study in a highly heterogeneous mosaic of agricultural area, forest remains and urbanized land of Guatemalan highlands. We addressed landscape configuration, not distance from natural areas, since we were working with a composition of rather small landscape elements. Our results suggest that even small patches of natural vegetation seem to be sustaining wild bee diversity. Even when very little land use planning has been made in the area, the forest remains usually are mountain tops (that are communal forests managed by local municipalities) and gullies that are not very suitable for agriculture. I'm including this observation just in case this variation to what was addressed in the cited studies has not been reviewed yet.</p>	<p>See Escobedo et al., 2014. <a href="http://www.digi.usac.edu.gt/ojsrevistas/index.php/cytes/article/view/1/30">http://www.digi.usac.edu.gt/ojsrevistas/index.php/cytes/article/view/1/30</a></p>	<p>Thank you. This observation is consistent with one of the main messages from this section, now included in the executive summary, ie that small landscape elements can play a significant role in supporting pollinators.</p>
Maria Jose Suso	42	994	42	994	<p>Please, supply details on how LEGATO is managing this approach and the work-package should be specified</p>	<p>There is not sufficient room in the text to include information on the design of the LEGATO project, but the URL is provided in case readers want to delve deeper.</p>	

Serena Heckler	44	1000	44	1003	<u>It could be added the existence of small landscape features configurations in the example of the "rancho Maya", <i>Milpa Maya</i> and the Andean <i>Chakra</i> where biodiversity is managed at a farm level.</u>	Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft, allowing direct comparison of the different knowledge systems
Scott Black	43	1017	43	1023	Agroforestry and pollinator conservation are being practiced in the US. See: <a href="http://www.xerces.org/wp-content/uploads/2008/10/agroforestrynotes32-overview.pdf">http://www.xerces.org/wp-content/uploads/2008/10/agroforestrynotes32-overview.pdf</a>	Thank you for making this point. It does not seem to require changes to the text.
Nicolas Cesard	45	1020	45	1024	In the villages around Tesso Nilo National Park in Riau province, Indonesia, local honey harvesters plant fruit trees on degraded forest so the bees can forage (person. comm, Nicolas Césard) .	This section has now been refocused on the importance of pollinators OR NTFPs (ie not as a source of honey). This honey production example does not fit in this section.
Cynthia Scott-Dupree	32	1036	32	1036	Should read "Hanna et al (2013) show that a reductio in invasive wasps	Thank you, this change is made
Cynthia Scott-Dupree	32	1038	32	1038	Should read "in this case the primary pollinator - the honey bee ( <i>Apis mellifera</i> ) was also an invasive species."	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Felix Herzog	45	1038	45	1038	REPLACE "invase" by "introduced" ?	<i>Apis mellifera</i> successfully spreads well beyond the areas in which it is first introduced. It meets the criteria for an invasive species.

Scott Black	43	1039	43	1039	There is a very long history of species based conservation efforts for butterflies in Europe (especially the UK) and in the US as well as Africa. The Xerces Society was founded in 1971 to do just this and we have worked on dozens of butterfly species. Butterfly Conservation in the UK has a very long history (longer than the Xerces Society) of doing the same thing.	Thank you for pointing this out. The text now includes the following: "Butterflies have also been a target group for species focused conservation actions (New et al 1995) with a number of successful projects (e.g. Thomas et al 2009) including ex-situ (Schultz , Russell, Wynn 2008). Although they have had a high profile in species conservation, relative to other insects, butterflies are considered to be minor pollinators relative to other insect groups, especially bees"
Thomas Steeger	43	1041	43	1041	"distinctive, and some species of bumblebees have experienced . . ."	Thanks you, change made
Felix Herzog	45	1046	45	1046	SHIFT lines 1052 here	Thanks you, change made

Serena  
Heckler

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A case study could be added from line 1057 page 46 : "For instance, in Cevennes National Park (southern France), an initiative was developed to conserve the local black bee, *Apis mellifera mellifera*, an endangered species. This conservation strategy is based on the valuing of traditional knowledge held by cevenol beekeepers related to trunk hives, a sedentary hive which mimics the bee's natural habitat in chestnut trunks. In collaboration with the Cevennes National Park and scientists, some traditional beekeepers have set up a Conservatory with approximately forty trunk hives where they collect and manage local black bees for conservation purposes (Elie, 2005 ; Elie 2009 ; Lenglard, 2011)." Sources : Elie Y. (2005) L'arbre aux Abeilles. 30min [video/movie available on Internet] ; Elie Y. (2009) Chronique des ruches tronc, l'Arbre aux Abeilles" Editions GabriAndre, France. 107p [book] ; Lenglard D. (2011). Des racines et des ailes : L'Arbre aux Abeilles sur France 3. 13'52 min. [video/documentary available on Internet] ; [www.ruchetronc.fr](http://www.ruchetronc.fr) [website]

We focused attention on species level conservation in this section. The example provided is an interesting case of conservation of a sub-species of the honey bee - the honey bee as a species is not endangered, but is highly valued for honey production. It may be relevant to the beekeeping section , 6.4.4 (also see new sentences at the beginning of the section).

Scott Black	44	1066	44	1066	There are dozens of accounts of ex-situ conservation for butterflies in the US and UK.	Thank you for pointing this out. The text now includes the following: "Butterflies have also been a target group for species focused conservation actions (New et al 1995) with a number of successful projects (e.g. Thomas et al 2009) including ex-situ (Schultz , Russell, Wynn 2008). Although they have had a high profile in species conservation, relative to other insects, butterflies are considered to be minor pollinators relative to other insect groups, especially bees"
Barbara Herren	46	1081	46	1084	This working reflects a scientists approach only, not a policy makers approach within their realm of influence...I am perhaps not clear on hwo the document should reflect both approaches...but certainly a policy maker is not removed from what they can control.	The wording has been changed so that it no longer referes to legal responses as removed from what they control.
Barbara Herren	46	1087	46	1095	Will you not refer here to the heroic efforst to make a red list for European pollinators? Simon Potts, and Stuart Roberts in particular have ben involved.	The text does refer to use of Red lists. The text does not go into deeper detail on what has been listed, because the focus is on effectiveness of listing as a strategy, and in this regard evidence is limited.

Thomas Brooks	46	1088			Delete "the IUCN Red Lists" - these are tools for risk assessment, and have no legal basis. I'm also unaware of any species listing process under the Convention on Biological Diversity. Better examples would be the US Endangered Species Act and Canada's Species At Risk Act.	The text has been re-arranged to make it clear that the lists are not law in themselves, but they have an influence on national and international law.
Scott Black	44	1089	44	1092	Although there is some bias there have been many pollinators protected (mostly butterflies) under the US Endangered Species Act as well as other federal species protection laws (Canada and European laws). These laws have led to protection and restoration of species that would otherwise go extinct. See Black S. H. Insect Conservation and the Endangered Species Act: A History T.R. New (ed.), Insect Conservation: Past, Present and Prospects, 171 DOI 10.1007/978-94-007-2963-6_8, © Springer Science+Business Media Dordrecht 2012 for a full treatment in the US	Thank you, the text has been changed to the following "The Endangered Species Act has been credited with improving the prospect of survival of listed butterflies in in the USA (Black 2012), where the legislation has led to specific actions and investments by the federal government, that may not have happened without the Act."
Cynthia Scott-Dupree	34	1110	34	1110	Should read "non-native subspecies like <i>Bombus terrestris</i> " (make sure <i>B terrestris</i> is italicized)	Thank you, changes made
Cynthia Scott-Dupree	34	1118	34	1118	Bombus should read "B."	Thank you, changes made

Barbara Herren	47	1138	48	1146	I think there is an important response point to be made here, reflected in Ranier Krell's article in the 1995 FAO publication on Pollination of Crops in the Tropics and in the article here: Marlin, J. C. and W. E. LaBerge. 2001. The native bee fauna of Carlinville, Illinois, revisited after 75 years: a case for persistence. Conservation Ecology 5(1): 9. [online]- that the needed "protected areas" for pollinators may be quite different than for other taxa, that unmowed fences, small areas, and hedgerows may suffice to conserve a large portion of pollinator diversity; perhaps addressed in the next paragraph but I think these documents, and findings, need more emphasis when talking of protected areas and pollinators.	This message is indeed a key message for the section, and has now been included in the executive summary. I have also added text in the middle of this paragraph to make the message more clear and included the Marlin and LaBerge reference
Thomas Brooks	48	1148			A citation after "many locations" would be good. Joppa & Pfaff 2010 Proc R Soc Lond B would be appropriate.	Thank you, This is a suitable reference, Included
Thomas Steeger	46	1149	46	1149	". . .of any studies that have specifically addressed this question."	Thank you, changes made
Thomas Brooks	48	1151			Add something like "Although many recognize the value of small protected areas (Turner & Corlett 1996 TREE)..." before "reserve design for nature...".	Thank you, changes made

Nicolas Cesard	1155	48	1156	Some protected areas can be recognized and used for agricultural production, but also beekeeping activities. In supporting land use management, some lands in Mpanda Distric, Tanzania, has been set aside as village forest or bee reserve. See Hausser, Y. , H. Weber and B. Meyer (2009) Bees, farmers, tourists and hunters: conflict dynamics around western Tanzania protected areas. Biodiversity and Conservation Vol. 18: 2679 -2703. See Hausser, Y. and P. Mpuya (2004). When the bees get out of the woods: an innovative cross – sectoral approach to community based natural resource m anagement, Game and Wildlife Science 21 (3) :291-312.	Thank you, I have added the following: "In addition to supporting populations of wild pollinators, protected areas can, in some circumstances, provide floral resources that support beekeeping (Hausser , Weber and Meyer 2009)."	
Serena Heckler	48	1160	48	1164	<u>ILK related to taboos and sacred places should to be recognized as a knowledge in its own right, that is beneficial for biodiversity conservation. ILK is holistic and in most cases promotes the respect for nature, pollinators included (see Sacred Species and Sites: Advances in Biocultural Conservation, ed. Gloria Pungetti, Gonzalo Oviedo and Della Hooke. Published by Cambridge University Press, 2012.)</u>	Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft allowing direct comparison of the different knowledge systems

Barbara Herren	48	1174	48	1175	<p>true, these have not been assessed, but the concepts are very new. And to be honest, I would seriously doubt that there would ever be PES schemes solely addressing pollination, as farmers manage systems as a whole. Could there not be some coverage of sustainable agriculture incentive measures here which do not target pollinators but could benefit them, for example this, with a papaya farmer featured in Kenya (no mention of pollinators but still relevant:  <a href="https://www.wfp.org/stories/improving-food-security-through-cash-assets">https://www.wfp.org/stories/improving-food-security-through-cash-assets</a>)</p>	This comment is relevant to the agricultural practice section, 6.4.1
Felix Herzog	49	1189	49	1189	<p>ADD SENTENCE: In Switzerland, flower strips to support beneficial arthropods (bees, pest predators) have been introduced in the agri-environmental scheme.</p>	Flower strips are addressed in the agricultural practice section, 6.4.1

Serena Heckler	49	1192	49	1208	<p><u>An example of an initiative carried out by traditional beekeepers to raise awareness about the disappearance of the local black bee could be added from line 1208 :</u> "In the Cévennes National Park, awareness raising is carried out by some traditional beekeepers with park visitors to improve their connection to nature. By observing bees and managing traditional trunk hives, but also by enjoying the produce of the hives, these initiatives aim to raise awareness with the public about black bee conservation (Elie, 2015). Other activities are also proposed to transmit knowledge linked to trunk hives, to restore ancient apiaries, to open up the landscape... " <u>Source :</u> Elie Y. (2015). Abeilles noires et ruches troncs. Causses et Cévennes, Tome 23 : 163-174.</p>	<p>We focused attention on species level conservation in this section. The example provided is an interesting case of conservation of a sub-species of the honey bee - the honey bee as a species is not endangered, but is highly valued for honey production. It may be relevant to the beekeeping section , 6.4.4 (also see new sentences at the beginning of the section).</p>
Barbara Herren	49	1195	49	1196	<p>Perhaps I don't understand the meaning of social and behavioral responses, but the fact that there has been such a groundswell of support, from people and civil society organisations, concerned about pollinators...seems to merit mention here (citizen monitoring- Great Sunflower project, petitions re neonicotinoids, projects to place bee hotels throughout Zurich, etc.</p>	<p>The paragraph has been revised to include this sentence ". A number of initiatives related to pollinator conservation have garnered significant public support, including citizen science data collection and on ground actions. "</p>

Serena Heckler	49	1209	49	1223	It is not clear why "knowledge responses" for nature conservation should be limited to the fact that many farmers and local communities do not have taxonomic expertise. There are many reports of ILK holders recognising and managing diverse species and ecosystems (see references from ILK task force). This should be included here.	The following text has been added: "There is also an immense reserve of information regarding management for nature conservation outcomes in the form of indigenous and local knowledge. These are likely to provide strategies and solutions additional to those already examined in this section. Indigenous and local knowledge is examined in chapter 5."
Barbara Herren	50	1234	54	1235	see comments above (row 7) about the evidence column; these are particularly hard to parse in this table	Thank you for this comment. This has been a challenge in this table because there are many specific/particular management interventions involved with managed pollinators, which have very different weights of evidence. Still, we have separated evidence statements in the table now, matching evidence with each concrete statement, which is an improvement.
Phil Stevenson		1234		1234	This table is more informative than the others - particularly the evidence bit. What about citations for the evidence?	The summary table is meant to be just that, a summary, and it is directly reflective of remaining sections of text, which contain supporting detail and citations

Nicolas Cesard		1234	54	1235	I will add "Maintain and document traditional and indigenous knowledge surrounding honey harvesting and beekeeping for honey bees and social stingless bees..." "There is strong agreement of the value of such a proposition, but it needs more concrete assessment."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Felix Herzog	53	1234			4th line of Table Product certification ... "low confidence" (not high)	based on Chapter 2 and even just on the reasoning in the Table, which is " ... nor formal assessment if certificaition improves pollinator or plant pollination outcomes". This cannot be "High confidence"	We believe this is a misunderstanding in terms of the uncertainty terms. We are placing high confidence in our statements about product certification, not high confidence in the ability of product certification to positively impact managed pollinators. We have thus left this as-is.
Thomas Steeger	53	1239	53	1239	". . .that can potentially lead to . . ."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	53	1247	53	1247	". . .aimed at any managed insect pollinator species, . . ."		Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	54	1248	54	1248	By "optimal stocking densities" do you mean in support of pollination services ( <i>e.g.</i> , number of colonies per hectare)?		Thank you, by highlighting this you made us realize that this point is in the wrong section; we already had text in section 6.4d.1.7 related to this, so we deleted this point here.

Serena Heckler	55	1256	55	1258	<p><u>Meloponini research in Latin America which provides case studies from Central and South America. There is a network of researchers working on this topic that meet regularly in the Mesoamerican Congress of Native Bees, and other Latinamerican congresses on Native stingless bees (Sources: Nates-Parra et al (eds). (200)8. "IV Encuentro colombiano sobre abejas silvestres. Memorias." Laboratorio de investigaciones en abejas LABUN, Universidad de Colombia. 71p.; Yurrita Obiols, Carmen Lucía (ed.). (2009). "VI Congreso Mesoamericano sobre Abejas Nativas. Memorias." Universidad de San Carlos de Guatemala - Centro de Estudios Conservacionistas -CECON-368p.; Zamora, Gabriela F. (ed.). (2013)."VII Congreso Mesoamericano de Abejas Nativas: biología, cultura y uso sostenible". CINAT - FCTM.411p.)</u></p> <p><u>There are relevant traditions in which human communities and native pollinators in the Mayan region are seen to be in corelation. For example, in Vásquez-Dávila, Marco Antonio. (2009). "Las abejas nativas de los grupos étnicos del Istmo de Tehuantepec, Sur de México" in Memorias VI Congreso Mesoamericano sobre abejas nativas, Antigua Guatemala: pp.67-71,</u></p>	<p>Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft.</p> <p>In particular, much of this important and useful information is not related to policy or interventions, and is instead related to documentation of indigenous management, which is why this material is particularly appropriate for chapter 5.</p>
Lennard Pisa	55	1261	55	1261	<p>Put the frolicky "(and available space)" at the correct place, directly after "scope"</p>	<p>Thanks for this suggested change of wording. It is an improvement and we have adopted it.</p>

Barbara Herren	56	1281	56	1299	what is the topic of this list? Needs to be clear, particularly as the following paragraph starts off with "much less is known"	Thank you for this suggestion. We have put a statement about the theme of the list directly before it, and we have also clarified the topic sentence of the following paragraph
Thomas Steeger	54	1287	54	1288	It may be informative to mention that such activity can lead to the spread/transmission of disease/pests.	Thank you for this suggestion. It is relevant in a general sense across this list that management activities have trade-offs, so we have added a sentence to that effect directly before the list.
Cynthia Scott-Dupree	43	1300	43	1301	Should read "relative to honey bees, bumble bees and some solitary bees."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Nicolas Cesard		1311	56	1312	I would add Cambodia to the list. WARING C., JUMP D.R. (2004) Rafter beekeeping in Cambodia with Apis dorsata, Bee World 84, 14-18.	Thank you for this suggestion, we have added Cambodia to the list, along with the reference that you suggested

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A the end of this paragraph, a text could be added from line 1368 to the effect that traditional beekeepers also have methods to detect and prevent pathogens and parasites. These methods are used to assess the health of their colonies, and are based on regular and empirical observations of bees, and on rigorous inspections of the inside of the hives (Elie, 2005 ; Lenglard 2011). In addition, some traditional beekeepers have developed methods to protect bees from infection. For instance, traditional Berber beekeepers from the south of Morocco have noted that the harvesting by bees of pollen from specific plants protects the bees from parasites, including Varroa. Based on this knowledge, they select the best place to locate their hives according to the local flora and thereby maintain the health of their bee colonies (Crousilles, 2012 ; Simenel, 2015)."  
Sources : Elie Y. (2005) L'arbre aux Abeilles. 30min [video/movie available on Internet] ; Lenglard D. (2011). Des racines et des ailes : L'Arbre aux Abeilles sur France 3. 13'52 min. [video/documentary available on Internet] ; Crousilles A. (2012). La valorisation des vertus médicinales du miel. Rapport de stage de 5ème année de Pharmacie, option Industrie, en

Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft, allowing direct comparison of the different knowledge systems

Serena Heckler	57	1340	57	1343	<p><u>Some apiculturists have observed the behavior of bees and their relation to Varroa, and for example, in Andrés Santoja, Salvador. (2006). "¿Puede la abeja librarse de la varroa?" in La Fertilidad de la Tierra n.25, pp. 48-52, <u>an apiculturist explains how by observing the cycles of wild bee behavior, he has found out how the bees themselves eliminate Varroa. However, when the bees are domesticated and raised for honey production, it alters their cycle, provoking the spread of Varroa.</u></u></p>	<p>We have chosen not to include this as the evidence on this concept is speculative.</p>
Thomas Steeger	55	1351	55	1352	<p>"typical beekeeping practices which have evolved to facilitate colony manipulation . . ."</p>	<p>Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.</p>
Thomas Steeger	56	1362	56	1364	<p>There is evidence to suggest that mites present a new mode of transmission for bee viruses, i.e., inoculation via mite bites, that leads to increased virulence of the viruses.</p>	<p>We are not aware of any direct evidence of increased viral virulence as a direct consequence of vectoring by Varroa; no references were included to support this comment so we are unable to add this.</p>
Thomas Steeger	56	1369	56	1383	<p>Possible references see Rinderer et al. 2014 (<a href="http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=299119">http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=299119</a> ) and Danka et al. 2012 (<a href="http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=277876">http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=277876</a> )</p>	<p>thank you—both of these references are very informative and add depth to our coverage of these topics, we incorporated both.</p>

Nicolas Cesard		1409	59	1414	On bees and other pollinating insects as vectors of "genetic pollution" (from transgenic crops) see Lezaun, J. (2011) Bees, beekeepers and bureaucrats: parasitism and the politics of transgenic life. <i>Environment and Planning D: Society and Space</i> 29(4): 738–756	Bees as vectors of plant transgenes is an important point, but in this section we are specifically discussing transgenic pollinators themselves (e.g., transgenic honey bees); thus, this comment is not directly relevant to this material and we did not include it here.
Peter Campbell	59	1416	59	1416	there is evidence that improved nutrition reduces pesticide (an disease) resistance	Excellent suggestion to include this; we have added a statement to this effect with two relevant references
Barbara Herren	59	1440	59	1441	yes, this is an extremely important characteristic/challenge of science/policy interfaces, and probably should be highlighted at the beginning of this chapter	Thanks for this suggestion. We agree and have added a short section 6.3.1 to discuss this.
Barbara Herren	60	1455	60	1457	This would seem extremely important, and I would suggest the language is strengthened	Thank you for this comment. We agree that this is important, but relative to many other research needs it does not strike us as needing more strengthening other than pointing it out as a "particular research need"

Barbara Herren	60	1477	60	1479	really? Little evidence that floral resource availability is important for managed pollinators? I think there is a lot of evidence	We have found strong evidence that enhanced nutrition improves a range of outcomes in managed pollinators, and there is strong evidence that increased floral resources increase diversity / abundance of native bee communities, but we are unaware of studies that have specifically compared beekeeping outcomes in areas with more and less floral resource availability. If there is one or more specific references that we have not been able to find, we are happy to include this if you can bring them to our attention.
Barbara Herren	60	1487	60	1491	Not sure about the focus of translocation; should not the major translocations of pollinators that takes place to serve the almond block in California be mentioned, along with their trends, as noted in in the 2014 International Pollinator Initiative report to the CBD, UNEP/CBD/COP/12/INF/37 available at <a href="http://www.cbd.int/doc/?meeting=cop-12">http://www.cbd.int/doc/?meeting=cop-12</a> , with this graphic (in cell to right)	Thank you for pointing out that we were not clear enough in defining translocation. It is distinct from migratory beekeeping, as we have pointed out here. Migratory beekeeping is mentioned in several other places in this chapter.

Serena Heckler	62	1523	62	1534	<p><u>The benefit of product certification for ILK protection could be added from line 1534 page 60</u> : "The implementation of a product certification could also be useful to indirectly protect biodiversity and traditional knowledge. (Avril, 2008)" <u>Source</u> : Avril M. (2008). Quel potentiel pour la mise en place d'une Indication Géographique sur deux produits éthiopiens : le poivre timiz de Bonga et le miel blanc de Masha ? Mémoire présenté en vue de l'obtention du Diplôme d'Ingénieur de Spécialisation en Agronomie Tropicale IRC SupAgro (Montpellier), 115p. [Report-University/ available on Internet]</p>	Thank you, this is an excellent point and we have incorporated it here.
Matthew Heard		1550			<p>Could not find link/search not aware that Buck fast bees are trademarked?</p>	Thank you for double-checking this. The search as documented in the chapter worked with the given website as of December 2014, but did not work again in April when we re-tried it. We have updated the URL, and now it links to the appropriate UK trademark database search where Buckfast bees can be found. In addition, we included an EU trademark number.

Thomas Steeger	61	1569	61	1569	In the U.S., multiple states (e.g., North Dakota, Florida, California, Mississippi and Colorado) have developed managed pollinator protection plans to reduce exposure of managed bees to pesticides used in agriculture. The US EPA as well as the U.S. President have encouraged the development of such plans through stakeholder engagement and to foster communication and collaboration between relevant stakeholders.	Thank you for pointing this out; this helped us to clarify that this section is not about general pesticide management, including exposure reduction in pollinators (covered in 6.5b), but is rather about other methods that beekeepers themselves can undertake to help their bees cope with exposures. We have added language to clarify this point.
Cynthia Scott-Dupree	50	1571	50	1571	<i>et al. should read et al</i> - to remain consistent with format - but et al. and et al appears so a decision needs to be made on the form to use and then focus on consistency	et al. is an abbreviation of the Latin "et alia" (in the gender-neutral form), meaning "and others". Thus, the "et" is not abbreviated, but the "al." is abbreviated, and the abbreviation should thus be designated with a period.  The entire report will be edited for formatting consistency.

Natalia Escobedo	61	1573	61	1581	<p>Recently our research group has been working in training Maya Kakchiquel women in basic knowledge and techniques to manage native stingless bees. We were very enthusiastic about the initiative, since the idea came from the women group, and the ONG that is supporting them contacted us. The woman group was interested in honey bee management, but they also were enthusiastic about learning to manage species that have great cultural and ancestral value for them. They have not achieved many results yet (as it would be necessary to present a study case), but their interest in management and conservation of native bees could be a valuable way to promote wild bee species conservation and providing an income source for Mayan woman in Guatemala.</p>	<p>Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 in a forthcoming draft, allowing direct comparison of the different knowledge systems</p> <p>While this case study sounds very interesting, it also sounds like it is likely too preliminary to include in Chapter 5.</p>
Serena Heckler	63	1583	63	1590	<p>Biocultural community protocols could be mentioned here--for instance a BCP done by the Ogiek community of Kenya (see ILK Task Force for details). This is an emerging methodology for doing rights-based voluntary codes (see: <a href="http://www.community-protocols.org/context/biocultural-rights">http://www.community-protocols.org/context/biocultural-rights</a>; <a href="http://www.unep.org/communityprotocols/PDF/communityprotocols.pdf">http://www.unep.org/communityprotocols/PDF/communityprotocols.pdf</a>)</p>	<p>Thank you, this is an excellent point and we have incorporated it here.</p>

Serena Heckler	64	1602	64	1605	It is worth noting that technology transfer has often been less effective than hoped, largely because it has been introduced in a top-down manner and divorced from local needs, priorities and aspirations. To be successful, technology transfer should be driven from the bottom-up. There is an extensive literature on this (see ILK task force for more).	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence.
Lennard Pisa	65	1614	65	1614	Again, introduction lines are a matter of taste.	Thanks. We will add an introductory paragraph linking back to material in previous chapters.
Lennard Pisa	65	1614	65	1614	And the placement of the table as well	We will move the summary Table to the end of each section, so it comes after all the text that it summarises.
Phil Stevenson		1617		1617	Evidence could be supported by citations. Row 5 in table "effect on urban biodiversity IS unclear"	Text amended. Summary tables now provide a link to the relevant section, which has references.
Jeff Ollerton	65	1617			Suggest you also look at the following for evidence that grassland restoration, even if non-targetted for pollinators, can provide valuable habitat: Tarrant, S. et al. (2013) Grassland restoration on landfill sites in the East Midlands, UK: an evaluation of floral resources and pollinating insects. Restoration Ecology 21: 560–568	Added text and ref to 1628

Matthew Heard	1617	<p>Table 6.4.e In this and other tables the implication is that in Risk/opportunity all are benefits? However no sign is given (i.e. positive, neutral, negative) - this needs to be addressed throughout. In this table for example +ve might arise from manage rights of way due to increase floral resources/habitat area but also increase connectance may increase invasion and disease transmission which is a negative.</p>	<p>Thanks for this comment. This is a valid request but difficult to address. We have added a driver column and deleted the risks/opportunities column from all summary tables.</p>
Jeff Ollerton 64	1620 67 1780	<p>Unclear to me why there is such a focus on urban areas in this section when urbanisation is a minor factor in land use change compared to agricultural change. Also some of this contrasts with recent findings, e.g. Baldock et al. 2015 (Proc Roy Soc) and Sirohi et al. (in press) Diversity and abundance of solitary and primitively eusocial bees in an urban centre.... Journal of Insect Conservation</p>	<p>Thanks for this comment. Urban is a key policy sector for action to support pollinators, so it is important to have this section, which is substantially shorter than the agriculture and nature conservation sections. It is well established that hard surface leads to biodiversity declines, but green urbanisation can support much biodiversity (particularly pollinators) which we also show. Patterns of diversity in urban areas, not directly related to the effects of responses, are covered in chapter 2 (section 2.1.2.5)</p>

Thomas Steeger	64	1620	64	1645	Urban beekeepers may also be reluctant/adverse to treating colony pests/diseases or may be inexperienced in the need to do so. As such, these colonies may represent a reservoir of pests/disease that can spread to wild species through the robbing activity of bees or simply by contact through shared floral resources.	We found no evidence to support that city folks be worse than others in keeping their colonies well. Also, disease monitoring should be the same as in the rest of the country. I leave without action
Phil Stevenson		1641		1641	delete a	OK
Thomas Steeger	64	1653	64	1653	While an example is provided, it's still unclear what is meant by "less hostile "softened" matrix?	added "...where some resources and habitat stepping stones are available"
Thomas Steeger	65	1674	65	1674	Lack a "mechanistic understanding" of what?	added " of the population processes causing these patterns"
Thomas Steeger	65	1683	65	1683	". . .landscape to be more hospitable has potential . . ."	OK
Martha Groom	67	1689	67	1689	Actually, there is an effort to create a "pollinator pathway" in Seattle based on these and other findings. I would suggest linking to this work, even though it is still in its early stages. Could add a sentence as follows to substitute for the one presently in the text: "These ideas have not yet been widely tested or implemented, but an effort to create "Pollinator Pathways" in cities is underway, with a significant pilot study partially installed in Seattle, USA (Bergmann 2015)." Reference: Bergmann, S. 2015. <a href="http://www.pollinatorpathway.com">http://www.pollinatorpathway.com</a> .	OK

Thomas Steeger	65	1692	65	1692	"right-of-ways"		OK
Phil Stevenson		1692			Don't allotments have a particularly important place along with these other selected spaces.		Added allotments to the list
Cynthia Scott-Dupree	54	1698	54	1698	Should read " abundance of flowering plants in urban green spaces...."		No action. Did not delete floral area of blooms
Thomas Steeger	65	1708	65	1710	terms of art such as "xeric" and "mesic" should be defined.		Added (dry conditions) and (moist)
Nikolay Sobolev	68	1714	68	1714	Insert before "While...": "Beginning to be applied in Moscow (Russia) pollinator saving lawn management scheme consists of using many local wild herbs as well as imitating Russian traditional meadow use through mosaic mowing one time per year covering in total one third or a half of a lawn (Volkova and Sobolev 2004)."	A perspective idea, now partly adopted by regional authorities and initiativly realised by active citizens.	Added. but I would need a complete reference
Thomas Steeger	66	1723	66	1723	". . . parks in the city of San Francisco, California, U.S., and . . ."		OK

Scott Black	66	1732	66	1732	If artificial nest sites are not managed disease build up over time makes them unsuitable. Mader, E., M. Spivak, and E. Evans. 2010. Managing Alternative Pollinators: A Handbook for Beekeepers, Growers, and Conservationists. Sustainable Agriculture Research and Education, Handbook 11. College Park, MD: University of Maryland, Sustainable Agriculture Research and Extension and Ithaca, NY: Cornell University, Natural Resource, Agriculture, and Engineering Service.	Added
Thomas Steeger	66	1751	66	1755	The subject of supplemental food and its nutritional value has been a research issue in the US. See DeGrandi-Hoffman et al. 2010. The effect of diet on protein concentration, hypopharyngeal gland development and virus load in worker honey bees ( <i>Apis mellifera</i> L.). <i>J of Insect Physiology</i> 56: 1184 - 1191.	No action. The paper is interesting but applies to honey bees and not wild bees.
Serena Heckler	68	1752	68	1756	<u>Strategies to attract pollinators are being explored at local levels for farms, orchards and gardens. For example, in the desert of Sonora in</u> Chambers et al. (2004). "Polinizadores del desierto sonorense." Arizona-Sonora Desert Museum, Alianza Internacional del Desierto Sonorense and the Bee Works. 83pp.	No action. Does not fit the context. we are not discussing attraction, but instead about building populations

Scott Black	67	1758	67	1780	<p>Roadside management is not just an urban issue and should be presented more broadly. Also this issue is not presented in Chapter 2 and it seem like it should be. I would be happy to provide a sidebar on roadsides. I have just worked with staff under a contract with ICF International and the US Federal Highway Administration to prepare a comprehensive lit review on the subject. Several themes emerge.</p> <p>1) Roadsides cover more than 10 million acres of land in the United States (Forman et al. 2003), stretching across agricultural and urban landscapes. Though roadsides are not a substitute for wildlands, they can be valuable habitat for wildlife, acting as linear refuges and connecting remnant habitat patches. 2) Research has shown that the maintenance of native wildflowers on roadsides is beneficial to pollinators. In Kansas, Hopwood (2008) found bees to be twice as abundant on roadsides with native plants compared with those dominated by nonnative grass and flowers. Similarly, roadsides with native plants were found to support about 35 percent more bee species. Butterflies also benefit from the presence of native plants on roadsides, as shown by many North American and European studies (Ries et al. 2001)."</p> <p>Potentially add B-lines project - Buglife, UK.</p>	<p>I think we are already forwarding this main argument. Added 5 mil ha of road verges. Hopwood is already referred to. Added "Butterflies benefit from the presence of native plants on roadsides, as shown by North American and European studies (Ries et al. 2001)." The link to ecosystem services need more evidence to be included. Because od space constraints we include only the US as example to exemplify that there are enormous areas.</p>
Matthew Heard		1781			Added	

Scott Black 67 1790 67 1793

In 1989, the Iowa legislature passed a bill that created a roadsides program, the cornerstone of which was the establishment and protection of native vegetation through judicious use of herbicides, mowing, prescribed burning, and other management tools. The bill also established the Living Roadway Trust Fund, an annual competitive grant program through the Iowa DOT that provides funding for counties and State projects or research to support IRVM. Iowa's road use tax, along with several other sources, funds the Living Roadway Trust Fund. Roadside managers can submit applications to obtain resources to help them implement IRVM, including vegetation inventories, native seed, equipment for burns or plant establishment, GPS units, signage, workshops, and more. Roadsides are seeded with mixes of species that are appropriate for a particular site, including many wildflowers that are attractive to pollinators. Seed mixes also contain species that bloom at different times throughout the growing season, which helps support pollinators all season long. The targeted vegetation management practiced by Iowa's roadside managers also benefits pollinators (Ries et al. 2001). Since the bill,

Added in abbreviated form to 1781. I don't see this as an economic response as we defined it in the assessment. added "Iowa state, US installed in 1989 a program to establish roadside native vegetation funded partly by road use tax. 50 000 ha of roadsides have been planted with native vegetation (Brandt et al. 2011) also benefiting pollinators (Ries et al. 2001)."

Scott Black	68	1809	66	1809	<p>Might add that the first document to be released under this new memorandum was a supplement to older guidance on sustainable management of landscapes. The guidance will help Federal agencies incorporate pollinator friendly practices into new federal construction and landscaping projects.</p> <p><a href="http://www.xerces.org/wp-content/uploads/2015/02/CEQ-2014-Supporting-the-Health-of-Honey-Bees-and-Other-Pollinators-White-House-CEQ.pdf">http://www.xerces.org/wp-content/uploads/2015/02/CEQ-2014-Supporting-the-Health-of-Honey-Bees-and-Other-Pollinators-White-House-CEQ.pdf</a></p>	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Thomas Steeger	68	1809	68	1809	" . . .habitats through enhanced opportunities for public/private partnerships."	Not added. Does not add more information.
Barbara Herren	71	1823	72	1824	reporting on evidence within table seems more human, understanding, than in previous evidence columns, because it is interpreted/guidance given	Thanks for this comment. This table will be used as a model in developing the final draft for the other tables.

Scott Black	69	1823	Table 6.4f.1	<p>Outreach and education: No evidence of a direct effect on pollinators or food pollination. Although I agree that we cannot point to an effect on pollination I disagree with showing a direct effect on pollinators. In the past 5 years Xerces has directly educated more than 40,000 people in the US, as well as in India and Europe. This work has led to over 200,000 acres of habitat enhancement and restoration as well as insecticide mitigation. We can point to direct effects on pollinators from these projects. See: <a href="http://www.xerces.org/pollinator-conservation/">http://www.xerces.org/pollinator-conservation/</a></p>	<p>Thanks for this comment. We have cited the Bring Back the Pollinators report 2014, and added the text in section 6.4.2 to describe your habitat areas and self-reported behaviour change. We have also changed text in section 6.4.6.1 to reflect this. I cannot find any specific results on pollinators themselves.</p>
Matthew Heard	71	1823	<p>Table 6.4.f - Citizen science - can deliver benefits but depends critically on taxonomic expertise if data is to be meaningful data</p>	<p>This is discussed in the text. Please see section 6.4.6.3.4</p>	

Martha  
Groom

1823

Global comment: Nice presentation throughout, but need clarification on when confidence is low because of mixed evidence from studies vs lack of studies. This is made clearer in some cases, but in every case this should be highlighted - why does a conclusion about a particular issue or strategy get low or medium confidence? If possible, it would be helpful to add this to the summary tables - Low confidence due to insufficient study or Low confidence due to variability in evidence from studies... or some other short explanation following the CONFIDENCE ranking. See p. 71 for one strong example of how this could be done. Authors should ensure this is taken up prominently within the text to be sure the nature of the confidence determination is clear. This is not really needed in the case of high confidence because this can only be awarded due to consistent evidence from multiple studies, but of course the explanations are useful here too. It helps reinforce the knowledge gaps to understand the nature of those gaps. Overall, this is a highly constructive and well composed chapter.

The uncertainty times have been changed and clearly defined using a four box model that distinguishes between level of agreement and amount of evidence.

Matthew Heard		1831			medium- high according to all tables - see previous comment on consistency	Since this draft was produced, IPBES have developed guidance on the treatment of uncertainty, and we are using clearly defined uncertainty terms that distinguish between levels of agreement and evidence. Each individual use in these tables, and summary documents, will be agreed by discussion and consensus among the author teams at the third authors meeting.
Scott Black	70	1845	70	1848	Xerces Society work with USDA SARE (Sustainable Agriculture Research and Education Program) has shown real results. In follow up surveys to hundreds of participants we have found: Of farmers and landowners who responded to the post course follow up survey, 95% said they intended to change how they supported pollinators on the land they manage. Of those respondents, 91% said they would provide additional habitat resources for pollinators.	Thanks for this comment. We have cited the Bring Back the Pollinators report 2014, and added the text in section 6.4.2 to describe your habitat areas and self-reported behaviour change. We have also changed text in section 6.4.6.1 to reflect this.

Phil Stevenson		1851		1861	Include the citations for these examples here otherwise the reader has to traipse through the whole document to find this.	Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This is integrated with the scientific knowledge in chapter 6 in a future draft, allowing direct comparison of the different knowledge systems. This text is therefore shorter and does not need citations.
Scott Black	71	1868	71	1870	The US Memo on pollinators has led to many US agencies integrating pollinators into land use. This includes the US Fish and Wildlife Service, Forest Service and the Federal Highway Administration which is developing nationwide BMP's.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence and it does seem to be suggested elsewhere.
Thomas Steeger	71	1868	71	1869	The U.S. Department of Agriculture's Natural Resource Conservation Service is developing/implementing such plans (see: <a href="http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf">http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf</a> ).	Thanks for this. I looked at the reference, but did not see it as an example of pollinator conservation DRIVING land use plans. Rather it how to use Farm Bill provisions, some of which may be landscape-scale, for pollinator conservation.
Matthew Heard		1873			I would argue strongly that in conservation terms a more holistic approach is likely to most robust rather than a single service agenda..	Thank you for making this point. It does not seem to require changes to the text.
Matthew Heard		1880		1883	marginal change may require better definition on first use	Thanks for this suggestion. We have explained the term marginal on first use.

Scott Groom	73	1889	74	1928	The authors may be trying to avoid any negative comments within the text, but I feel it may be important to highlight the shortfall of other Pollinator Initiatives that have not been so successful. The Oceania Pollinator Initiative represents an area of potentially huge diversity from the tropics of PNG to the arid areas of Central Australia, much of which has not been documented well for bee species in particular. However, relative to the success of initiatives mentioned there has not been the same level of collaboration within this region despite there being clear potential for native species in agriculture and impending threats from introduced pathogens (i.e. Varroa).	Thanks for this suggestion. The Oceania, Asian and European Pollinator Initiatives are conspicuously not mentioned in this text. We are not trying to avoid negative comments, but there are various reasons why some initiatives are slower to start than others and we feel it would be unfair to single some out for not achieving.
Barbara Herren	73	1890	73	1890	led- should be facilitated	Changed.
Scott Black	71	1907	71	1907	Change "and is funded by the parent charity, the Pollinator Partnership" to "It is coordinated by pollinator partnership" Most organizations within NAPPC fund their own activities and get no funding from PP.	Changed, thanks.

Scott Black	72	1908	72	1908	I would contend the the work of the Xerces Society for Invertebrate Conservation should also be highlighted in this section. Xerces has the largest staff of any non-profit in the world working specifically on pollinators. We partner with agencies, farmers, individuals and others across NA and increasingly the world. Over 40,000 people have been directly engaged through workshops and other events and over 200,000 acres have been restored because of Xerces work. See FAO case study on line 126 of this spreadsheet as one example of our work.	This section is for high level initiatives, strategies and policies led by Government or International Governmental Insitutions. The Xerces Society is primarily a campaigning NGO. Although it works in partnership with Government on pollinators, its work is already mentioned in two places in the chapter - under knowledge responses in sections 6.4.2 and 6.4.6.
Thomas Steeger	72	1912	72	1912	The Honey Bee Health Coalition in the U.S. includes a broad range of stakeholders (government, industry, academia, environmental groups). The mission of the Coalition is to collaboratively implement solutions that will help to achieve healthy populations of noney bees while also supporting healthy populations of native and managed pollinators in productive agricultural systems and thriving ecosystems ( <a href="http://www.honeybeehealthcoalition.org/">http://www.honeybeehealthcoalition.org/</a> )	Thanks for this example. It would fit in the section on centres of knowledge exchange (6.4.6.3.3), where we have aimed to provide a geographically balanced set of examples in Table 6.4.6.2. In our view, your example would not add anything to the examples already described.
Cynthia Scott- Dupree	61	1915	61	1915	CANPOLIN is no longer active - the funding for the program ended in 2014	We have deleted the text on CANPOLIN.

Barbara Herren	74	1932	74	1933	the disclaimer "and relatively independent of the International Pollinators Initiative Initiatives, with the exception of the US!(see case study box) is not correct: the Interenational Pollinator Initiative is not "owned" by FAO, and is made up of all the intitatives and contributions around the world to advance pollinator conservation, thus there really are not things that are in or things that are out...	Text deleted.
Scott Black	72	1937	72	1937	Change "The NAPPC delivered ideas to ensure" To "many organizations including NAPPC, the Xerces Society and others worked with lawmakers to include pollinators in the 2008 and 2014 US Farm Bill, making pollinators a "Primary Resource Concern" and providing specfic language so that universities and non-profits could recieve funding for research both on honey bees and native pollinators. This was a major group effort -- not just NAPPC.	Slightly changed to 'worked with other organisations'.
Thomas Steeger	72	1937	72	1937	"NAPPC"	Corrected, thanks.
Anne Alix	74	1938	74	1938	As another action of the Pollinator Partnership, just to mention the making of short movies explaining application practices for pesticides that allow the maximum exposure reduction. It was educative as explained by farmers with their words.	This paragraph is about where the initiatives have led to actual policy change. This example of videos does not seem to fit.

Scott Black	72	1945	72	1949	Again this was not just a NAPPC initiative. Change first Sentence to: "The White House Office Of Science and Technology worked with a broad stakeholder group that included representatives of NAPPC, the Xerces Society, as well as other non-profits and businesses to develop a memo to all federal agencies." Also there is no comprehensive strategy as yet. The White House, agancies, NAPPC, Xerces and many others are providing input into development. Please re-write. See also on next line about what the memo is doing. This whole section could be written with more clarity as to what this initiative really is.	This case study is very political and generated several comments. We have deleted it.
Thomas Steeger	72	1946	72	1948	". . .worked with organizations such as the Pollinator Partnership, NAPPC, and the Honey Bee Health Coalition as well as other stakeholders to develop . . ."	This case study is very political and generated several comments. We have deleted it.
Barbara Herren	74	1950	74	1950	built should be build	This text is deleted.
Scott Black	73	1956	73	1958	Look at the presidents memo for directives: I think that clarity could be added here: Note this does not join the governors (as said on line 1956) as this is a federal initiave. It is simply a directive for all federal agencies to take action on pollinators. I would be happy to revise this section for accuract and clarity.	This case study is very political and generated several comments. We have deleted it.
Thomas Steeger	73	1960	73	1961	". . .for pollinators, directed research to address uncertainties, and educational outreach."	This case study is very political and generated several comments. We have deleted it.

Maria Laura Ruiu	75	1963	76	2008	<p>When the issue of "Integrated knowledge responses" is discussed, some problems should be considered, such as: 1) the inter(trans) disciplinary approach; 2) local knowledge; 3) translation of scientific results for policy makers, but also for local communities. As highlighted by the Intergovernmental Panel on Climate Change (IPCC 2014) an increasing amount of literature has focused on collaboration among scientific disciplines (by also including social and human science perspectives) and adopting a transdisciplinary approach. Moreover, the IPCC recognizes the importance of a synergistic exchange of information between science and local knowledge or stakeholder views, because of the resilience which might be built by human and social-ecological systems through adaptation, mitigation, and sustainable development.</p>	<p>2) The integration of science and ILK is discussed briefly in this section. Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. 3) translation of scientific research for policy makers and local communities is discussed in section 6.4.6.3.3, on knowledge exchange. This section presents approaches and show cases good examples. We have very limited space and have decided that to discuss the issue of inter-disciplinarity is not central issue, although clearly important.</p>
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Serena Heckler	75	1970	75	1970	<p><u>Initiatives for awareness-raising on pollinator conservation in Mexico are being developed and could be referenced. Source: Patlán Martínez, Elia, López Méndez, Sinicio and Guerrero Fuentes, Hugo. (2013). "Recuperación de abejas criollas sin aguijón, un proyecto agroecológico de educación comunitaria en la región del Totonacapan" in "Primer Congreso Internacional de Transformación Educativa", Alternativas en Educación, <a href="http://www.transformacion-educativa.com/congreso/ponencias/284-recuperacion-abejas.html">http://www.transformacion-educativa.com/congreso/ponencias/284-recuperacion-abejas.html</a>. They present a project for the recovery of Meliponiculture in communities in the region of Totonacapan in Mexico, by educating children in the importance of pollinators and the need of their preservation. <u>Another example is explained in Villanueva-Gutiérrez, Rogel, Colli-Ucán Wilberto, Tuz-Novelo, Margarito, Gracia, María Amalia. (2013). "Recuperación de saberes y formación para el manejo y conservación de la abeja Melopona beecheii en la Zona Maya de Quintana Roo, México". pp. 1-8. In Vit P. &amp; Roubik DW (eds) "Stingless bees process honey and pollen in cerument pots". Facultad de Farmacia y Bioanálisis, Universidad de Los</u></u></p>	<p>Following discussions with the ILK Task Force, we have placed all the detail of ILK case studies and stories, with appropriate framing, in chapter 5. This will be integrated with the scientific knowledge in chapter 6 somehow in a forthcoming draft, hopefully allowing direct comparison of the different knowledge systems.</p>
Barbara Herren	75	1971	75	1972	<p>Pollinator education programs are new, and is it realistic to expect impacts in the short time in which they have been instituted? Yes it should be monitored, but a lack of evidence should be qualified</p>	<p>We clearly state that these programs are recent.</p>

Felix Herzog	75	1978	75	1980	REVISE SENTENCE: "Knowledge is a necessary - but not a sufficient - pre-requisite making actors adapt more pro-environment behaviour (Kollmuss and Agyeman 2002)"	"proven false" is too strong, you only have one REF	Thanks for this suggested change of wording. We have amended the text.
Thomas Steeger	74	1991	74	1992	". . .are: 1) Building factual awareness and concern about the declines in populations of some pollinator species and their role . . ."		Thanks for this suggested change. We have amended the text.
Matthew Heard		2025			No mention of FERA National Bee unit which receives large annual funding in UK		Thanks for this suggestion. We have mentioned it, but without detail, as we have another detailed UK example in this section.
Christopher N Connolly	74	2028	74	2029	This study did not show synergistic effects (additive only)	see also Palmer MJ et al 2013 for mechanistic additive effects	Thanks, we have changed the wording.
Thomas Steeger	74	2028	74	2028	". . .effects between certain pesticides . . .". May want to identify the Colony Collapse Disorder (CCD) Action Plan which was developed by USDA through stakeholder engagement in 2007 ( <a href="http://www.ars.usda.gov/is/br/ccd/ccd_action_plan.pdf">http://www.ars.usda.gov/is/br/ccd/ccd_action_plan.pdf</a> ). In 2013, USDA released a synthesis of the research that had been conducted as a result of the Action Plan ( <a href="http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf">http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf</a> )		Thanks we have cited this.

Anne Alix	76	2032	76	2042	In this paragraph we might mention that the transfer of the knowledge generated will be valuable and will necessitate important resources. I am mentioning as in a recent meeting about the outcome of the European monitoring project EPILOBEE the lack of time and resources to fully analyse data and their transfer was an issue. We need to find a solution for this and it could well be a recommendation per se.	Knowledge exchange is covered in the following paragraph.
Felix Herzog	77	2034	77	2034	ADD PROJECT "BioBio <a href="http://www.biobio-indicator.org/">http://www.biobio-indicator.org/</a> "	the project proposes wild bees as biodiversity indicators and has tested them on >200 farms across Europe and Africa Added.

Felix Herzog 77

2042 77 2042

ADD SENTENCE: The BioBio-project has developed and tested a toolbox of 23 biodiversity indicators, including wild bees and bumblebees as well as pressure indicators such as pesticide and nutrient input (Herzog et al. 2013).

[Herzog F., Jeanneret P., Ammari Y., Angelova S., Arndorfer M., Bailey D., Balázs K., Báldi A., Bogers M., Bunce R.G.H., Choisis J.-P., Cuming D., Dennis P., Dyman T., Eiter S., Elek Z., Falusi E., Fjellstad W., Frank T., Friedel J.K., Garchi S., Geijzendorffer I.R., Gomiero T., Jerkovich G., Jongman R.H.G., Kainz M., Kakudidi E., Kelemen E., Kölliker R., Kwikiriza N., Kovács-Hostyánszki A., Last L., Lüscher G., Moreno G., Nkwiine C., Opio J., Oschatz M.-L., Paoletti M.G., Penksza K., Pointereau P., Riedel S., Sarthou J.-P., Schneider M.K., Siebrecht N., Sommaggio D., Stoyanova S., Szerencsits E., Szalkovski O., Targetti S., Viaggi D., Wilkes-Allemann J., Wolfrum S., Yashchenko S., Zanetti T. \(2013\) Measuring farmland biodiversity. \*Solutions\* 4\(4\), 52 – 58.](#)

Added.

Phil Stevenson

2043 2044

Its not just high quality scientific outputs - its robust and peer reviewed EVIDENCE.

Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Scott Black	75	2044	75	2058	Note: Xerces is a centre for information, research and knowledge exchange. As I said above Xerces had a largest staff of any pollinator group in the world. We work with scientists to translate science into practice and have teamed over 40,000 farmers, agency staff and others on pollinator conservation in the US, India, Europe, Canada and Mexico. See: <a href="http://www.xerces.org/pollinator-conservation/">http://www.xerces.org/pollinator-conservation/</a>	Thanks for this suggestion. We appreciate that Xerces is a very important player in pollinator conservation, and it is already mentioned several times in this chapter. These examples are focused entirely on pollinators - Xerces is an invertebrate conservation charity.
Serena Heckler	77	2046	78	2075	In France, a scientific project called "Sentimiel-Des abeilles et des hommes : savoirs locaux naturalistes, api-collecte et changement global" (Sentimiel : Linking local ecological knowledge on artisanal honey harvesting and beekeeping in a changing world) was carried out from 2010 to 2012. Faced with the decline of domestic honeybee populations, this initiative aims to study the local practices and knowledge of beekeeper of the South, their perceptions of global changes and their adaptive strategies to respond to them. By bringing together several actors, this project ensures mutual benefits by gathering scientific and traditional knowledge in a context of global change which threatens pollinators and biodiversity." <u>Source</u> : <a href="http://www.gred.ird.fr/programmes-de-recherche/programmes-acheves/sentimiel">http://www.gred.ird.fr/programmes-de-recherche/programmes-acheves/sentimiel</a>	Thanks for this suggestion. It seems like a research programme, rather than strictly knowledge exchange between researchers and practitioners. I can find only a description of the project, not any outputs. I have passed the link on to chapter 5 authors.

Thomas Steeger	76	2076	76	2076	Table 6.4f.2, the 7th row identified the Center for Pollination Research at Pennsylvania State University; however, this is a relatively limited reference. Recommend identifying the Bee Health section of the eXtension ( <a href="http://www.extension.org/bee_health">http://www.extension.org/bee_health</a> ). This website is more representative of the work of the Land Grant university system (of which Penn State is a member). In that case, the cell to the far left would change to "Bee Health eXtension Network" and the box on the far right would contain " <a href="http://www.extension.org/bee_health">http://www.extension.org/bee_health</a> "	Thanks for this suggestion. We agree that this is a better, broader example and we have amended the table as suggested.
Denise Margaret Matias	78	2077	79	2078	Consider including NTFP-EP South and Southeast Asia as proponent of training programmes of practitioners specifically wild bee hunters	Thanks for this example. It does not seem to have a focus on honey, pollinators or pollination, so we chose not to include it. For instance, honey does not seem to be included in the database of non-timber forest products.
Barbara Herren	78	2077	79	2077	nice table! No evidence column! But...in the second row ICPPR is not Canada, it is international; Apimondia is also truly interational; and suggest the International Pollinator Initiative is also a Centres of information, research and knowledge exchange ( <a href="http://www.internationalpollinatorsintiative.org">www.internationalpollinatorsintiative.org</a> )	Thanks for this feedback. I have amended details as suggested. The International Pollinators Initiative is described in a different section (6.4.6.2.2).

Serena Heckler	79	2077	79	2077	<p><u>Other initiatives and networks:</u>  Iniciativa Colombiana de Polinizadores - Colombia  Red para la Conservación y Manejo de Polinizadores de Guatemala - Guatemala  Red Interamericana de Información sobre Biodiversidad (IABIN)  Aldeas verdes (<a href="https://aldeasverdes.wordpress.com/">https://aldeasverdes.wordpress.com/</a>) - Argentina  Ponema (<a href="http://jmonet.free.fr/Site/ponema.html">http://jmonet.free.fr/Site/ponema.html</a>) - France  Agriculture and Ecosystems blog (<a href="http://wle.cgiar.org/blogs/">http://wle.cgiar.org/blogs/</a>)  Landscapes for People, Food and Nature Initiative (<a href="http://peoplefoodandnature.org/blog/">http://peoplefoodandnature.org/blog/</a>)  Arna Apícola (<a href="http://arnaapicola.es/">http://arnaapicola.es/</a>) - Spain  Finca Sant Miquel (<a href="http://fincasantmiquel.es/es.nosotros">http://fincasantmiquel.es/es.nosotros</a>) - Spain  Abeja Silvestre (<a href="http://abejasilvestre.es/">http://abejasilvestre.es/</a>) - Spain  Instituto Nacional de Ecología (<a href="http://www2.inecc.gob.mx/publicaciones/libros/446/ituarte.html">http://www2.inecc.gob.mx/publicaciones/libros/446/ituarte.html</a>) - México  Rodale Institute (<a href="http://rodaleinstitute.org/">http://rodaleinstitute.org/</a>) - USA</p>	<p>Thanks for these examples. We looked carefully at those outside Europe and the US, as these would have added geographical balance. Most are not specific to pollinators. As such, they do not qualify for inclusion in the table, but are national examples of the biodiversity information facilities for which we chose only to provide international examples, in the following paragraph. Only one is specifically focused on pollinators (Iniciativa Colombiana de Polinizadores) and this seems to be one of the Pollination Initiatives, discussed in section 6.4.6.2.2.</p>
Piotr Medrzycki	77	2077	Tab#6. 4f.2	<p>COLOSS has its headquarters at the University of Bern, Switzerland</p>	<p>Amended, thank you.</p>	

Les Davies	78	2077			Table could probably include a number of bee research centres established by the chemical industry in the US and Europe e.g. Bayer, Syngenta		Thanks for this example. There are many research centres not included here. You have not provided sufficient evidence to assess whether these are appropriate.
Scott Black	Table 6.4f.2	2077			Consider adding Xerces: <a href="http://www.xerces.org/pollinator-conservation/">http://www.xerces.org/pollinator-conservation/</a> and Integrated Crop Pollination an effort of US universities and the Xerces Society <a href="http://icpbees.org/">http://icpbees.org/</a>		Thanks for this suggestion. We appreciate that Xerces is a very important player in pollinator conservation, and it is already mentioned several times in this chapter.
Maria Laura Ruiu	79	2079	79	2097	As underlined in the paragraph "Case study: farmers, researchers and Government working together [...]", the importance to develop an effective strategy of training and dissemination is a crucial point. The participation in local public events might be a good solution to involve local communities for disseminating knowledge.		Thank you for making this point. It does not seem to require changes to the text.
Felix Herzog	79	2079	79	2097	REVISE PARAGRAPH	Sounds like copy paste from website. And the weblink does not work ...	Thanks for this comment. The weblink does work, and the paragraph was written specially for this report. It is not cut and paste from the website.

Serena Heckler	79	2098	82	2152	<p><u>An example of a French citizen science project with an educational aim which has been successful could be relevant in this paragraph.</u></p> <p>"The successfull SPIPOLL initiative (Suivi Photographique des Insectes POLLinisateurs) is an interesting way to improve the relationship between people and biodiversity. SPIPOLL is a photographic follow-up on pollinators launched in 2010 in France by the National Museum of Natural History and the Office for Insects. This citizen science project aims to collect quantitative data on pollinators and/or floricoles insects on French territory. Data are first collected by amateurs, then analysed by researchers . <u>Source</u> : <a href="http://www.spipoll.fr">www.spipoll.fr</a></p>	SPIPOLL is included in Table 6.4.6.3
Serena Heckler	79	2098	79	2148	<p><u>There is an initiative on the training of local correspondents for the development of local monitoring systems on glacier retreat in the Huascarán National Park in Perú that could be taken as example for locally monitoring pollinators.</u> <u>Source</u>: Guerrero, Ana Marlene and Ortega Trujillo, Jhony.(2011). "Guía para la formación de corresponsales locales en la cuenca del río Santa". Huaraz. The Mountain Institute. 53 pp.</p>	This example does not seem to relate to pollinators.

Colin Fontaine	79	2100	79	2106	It is not true that there is no government funded monitoring program. French government is funding a scheme since 2010 (The spipoll program, cited by the authors, see Deguines et al. (2012) The whereabouts of flower visitors: contrasting land-use preferences revealed by a country-wide survey based on citizen science. PloS one, 7(9), e45822) .	This text has been deleted.
Felix Herzog	79	2103	79	2103	ADD SENTENCE: Also in Switzerland, the methods for integrating pollinators into the national biodiversity monitoring are currently being tested.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence.
Colin Fontaine	80	2116	80	2123	I would try to insist more on the complementarities between expert data and citizen science data. I would say that Kremen showd that citizen science data are reliable to study the community level responses of pollinators to perturbations; although it cannot replace data produced by professional insect ecologists when actual species identity is needed.	We already make this point in the text. "citizen science data collected by inexperienced members of the public could not reliably reflect patterns in occurrence of specific pollinator species or groups."
Thomas Steeger	78	2120	78	2122	This last sentence seems to contradict the utility of citizen science-based data.	Thanks for this. The point made in this paragraph is that citizen science is useful for some, but not all questions relating to pollinators.

Barbara Herren	80	2123	80	2124	"could not reliably reflect patterns in occurrence of specific pollinator species or groups" could this not be reworded to give more encouraging guidance to policy makers as: "could not reliably reflect patterns in occurrence of specific pollinator species or groups while still able to detect coarse trends in pollinator abundance, richness and community structure" - with some reflection on what is really needed for policy decision making- surely not occurrence of specific species?	What you ask for here is stated in the previous two sentences: "Overall coarse trends in pollinator abundance, richness and community structure matched between citizens and scientists. Citizens could reliably distinguish between native bees and honey bees (which are not native in the US), allowing them to provide important data on the overall abundance of wild bees, for example. " We have added text to link these observations to what is really needed for policy decision-making, which depends on the policy area and the specific decision. Individual species and species-richness trends are important for biodiversity policy, for example and could be important for pollination of some crops (long tongued bees and field bean/clover, for example).
Barbara Herren	80	2123	80	2124	Is this necessary or realistic?	Yes, see responses to comment 644.
Matthew Heard		2123			Also huge cost in verifying cleaning data for effective use - large number of records unusable (UK BWARS pers.comm)	Thanks for this comment. I have chosen not to use it because it is not sufficiently backed up with evidence for such a negative statement.
Thomas Steeger	78	2126	78	2126	suggest replacing "validated" with "reviewed"	Validated is the correct term here.

Thomas Steeger	78	2131	78	2143	Another example is the 4th of July Butterfly count in the US by the North American Butterly Association ( <a href="http://www.naba.org/butter_counts.html">http://www.naba.org/butter_counts.html</a> )		Thanks for this example. There are many citizen science projects involving pollinators around the world. We already describe the breadth of them (6.4.6.3.4) and provide a geographically balanced set of examples in Table 6.4.6.3. In our view, your example would not add anything to the examples already described.
Felix Herzog	80	2131	80	2131	REPLACE "2011" by "2012"	Hill's paper was published in 2012	Amended, thank you.
Scott Black	6.4f.3	2151			Consider adding Bumble Bee Watch a citizen science project through the partnership of The Xerces Society, the University of Ottawa, Wildlife Preservation Canada, BeeSpotter, The Natural History Museum, London, and the Montreal Insectarium. <a href="http://www.bumblebeewatch.org">www.bumblebeewatch.org</a>		Thanks for this example. There are many citizen science projects involving pollinators around the world. We already describe the breadth of them (6.4.6.3.4) and provide a geographically balanced set of examples in Table 6.4.6.3. In our view, your example would not add anything to the examples already described.
Scott Black	6.4f.3	2151			Consider adding Butterfly Conservation as they have the largest citizen science effort on butterflies on the world. <a href="http://butterfly-conservation.org/">http://butterfly-conservation.org/</a>		Thanks for this example. There are many citizen science projects involving pollinators around the world. We already describe the breadth of them (6.4.6.3.4) and provide a geographically balanced set of examples in Table 6.4.6.3. Butterfly projects are listed by EU-MON, as cited in the text, and not a major focus here because of our emphasis on food production.

Martha Groom	82	2152	82	2152	Could add another example from US. The Urban Pollination Project, Seattle, USA, >100 participants, >500 community members engaged, Observational and experimental study of pollinator diversity and abundance, levels of pollination, and yield in urban garden crops [Reference: Urban Pollination Project, nwpollination.org]	Thanks for this example. There are many citizen science projects involving pollinators around the world. We already describe the breadth of them (6.4.6.3.4) and provide a geographically balanced set of examples in Table 6.4.6.3. In our view, your example would not add anything to the examples already described.
Anne Alix	83	2154	87	2345	The review of the tools often indicates that pollination services were not reported/taken into account. Was this an exception i.e. were other environmental services taken into account or was this specific to the pollination service?	In the context of this assessment, we have not evaluated this. I would speculate that the tools are more widely used for other, easier to measure, services such as climate regulation (measured as carbon storage), but I cannot say to what extent the tools have been applied to real decisions involving measures other than pollination.
Thomas Steeger	81	2183	81	2183	Additional efforts to synthesize data are reflected in the 2013 USDA report on the National Stakeholder Conference on Bee Health ( <a href="http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf">http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf</a> ) as well as the report by the National Research Council in 2007 ( <a href="http://www.xerces.org/wp-content/uploads/2008/11/nas_pollinator_report_summary.pdf">http://www.xerces.org/wp-content/uploads/2008/11/nas_pollinator_report_summary.pdf</a> )	Does this relate to the section on evidence synthesis? If so, I would not consider the cited document to be an example.

Thomas Steeger	82	2217	82	2217	Another tool which has been used to evaluate data is the Causal Analysis/Diagnosis Information System (CADDIS; <a href="http://www.epa.gov/caddis/">http://www.epa.gov/caddis/</a> ). Fairbrother et al. employed this tool to determine the potential role that neonicotinoid may play in honey bee declines in California (Fairbrother, A., J. Purdy, T. Anderson, and R. Fell. 2014 Risks of Neonicotinoid Insecticides to Honeybees. <i>Envir. Tox. and Chem.</i> 33(4): 719- 731	Thanks for this suggestion. The CADDIS tool does not seem to be mentioned in the cited reference, so we have not included this example.
Vanda Altarelli	85	2264	87	2309	These issues have already been discussed in Chapter 4, I wonder whether it would be sufficient to refer to it	Thank you for spotting this. We have more carefully aligned section 6.5 with section 4.6 to avoid repetition and overlap.
Barbara Herren	87	2310	87	2341	excellent section on the status and challenges of mapping	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Cynthia Scott-Dupree	74	2329	74	2329	<i>et al. should read et al</i> - to remain consistent with format - but et al. and et al appears so a decision needs to be made on the form to use and then focus on consistency	This is a stylistic issue for the final draft.
Matthew Heard		2341			The validation point should be more emphasised - this is a HUGE hole in evidence and the models used to create maps v. simplistic.	This point is already very strongly emphasized, with a column in the table, a WARNING in the Figure legend and some very clear text. We will emphasize the point further in the Executive Summary and strengthen the text on Knowledge Gaps (lines 3152-3154).

Thomas Steeger	88	2373	88	2373	". . .Stanford University in Palo Alto, California, US . . ."	Thanks, this has been amended.
Thomas Steeger	89	2412	89	2420	Honey bee population models have also been developed by USDA (see DeGrandi-Hoffman, G., D.S. Roth, G. L. Loper, and E. H. Erikson. 1989. BEEPOP: A honeybee population dynamics simulation model. Ecological Modeling 45: 133 - 150. EPA has been collaborating with USDA to include a module to account for pesticide toxicity in the revised version of the model (VarroaPop). Also, the BEEHAVE model (see: <a href="http://beehave-model.net/">http://beehave-model.net/</a> ) has also been under development in the EU.	This is been cited as an example, although I suspect there are many. The BEEHAVE model is cited - Becher et al.
Peter Campbell	91	2413	91	2421	the reference should be related to pesticide effects not "exposures" not all exposures lead to effects	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.

Barbara Herren 92 and 113 2471 92 and 113 2472 and 3016 (this is a comment more generally- to the focus on analytical tools and methods throughout this chapter, and it also relates to the statement on page 92, that a particular tool seems only to have been used by researchers, not be governments): IPBES is intended as a science policy interface, and thus it is important for the chapter to have a good and realistic understanding of how policy makers may use science, tools and methods. While a few advanced countries may employ analysts that will use the tools described here, I would question how many actually will? Certainly in the case of most other countries, government personnel rarely will have a mandate to carry out an analysis. It is much more common, and logical to assume that it is scientists, or other bodies that use tools for analysis, and report findings to governments, which may take action or need guidance on interpreting the results and identifying courses of action (as is done to some extent in Chapter 4). I would have thought that this chapter, rather than or in addition to looking so thoroughly and (very interestingly) into different tools and methods, might spend some portion on interpreting the results from the use of these tools for

We see a distinction between what drives policy change ('agenda-setting' in Figure 1 - research or public opinion, for example) and the tools and methods used to help make specific policy decisions, once a direction has been decided (used for policy formulation, implementation and evaluation). We know of no research looking at what led to specific pollinator-related policies, although there is such research for policies in other areas. There could be many different perspectives for a given policy change, so any content on this in the report is speculative. To respond to this comment we have added a paragraph in section 6.1.

Barbara Herren	92	2472	92	2472	statement that Gallai tool has been applied by researchers rather than government- actually it has applied in China (by the Chinese Academy of Science- a government body), Nigeria (assisted by Bees for Development (E. Mcleod pers. comm.), Vietnam and the Philippines (Hien et al.) as reported in UNEP/CBD/COP/11/INF/29. It has also been applied to Ghana and Nepal through the Global Pollination Project with these two countries as partners in this project; and by ICIMOD (an intergovernmental body) (Partap et al. 2012. Value of Insect Pollinators to Himalayan Agricultural Economies, ICIMOD) to regions of Bangladesh, Bhutan, China, India and Pakistan.	This statement has been deleted.
Barbara Herren	92	2483	92	2484	it has been updated.	The literature database has been updated, but not the crop dependence information.
Anne Alix	97	2529	97	2529	Table 6.5.3. It is proposed that modelling may engage farmers. Could some more detail be provided to illustrate how?	Thanks for asking for this. I could not come up with an example, so deleted the proposal from the table.
Matthew Heard	97	2529			Table - move scale header to above relevant columns	This is a matter of style and does not change the meaning.
Matthew Heard		2544			add 'only' after 'added' i.e. not only a posteriori	Thanks for this suggested change. We have included it in the new version.

Nicolas Cesard	2574	99	2575	<p>About Epistemic. An example of folk taxonomy shapes by local value. The Pankarare Indians of the Northeast of the State of Bahia, Brazil distinguish 23 folk species within the folk category "abria," the label used for both Apidae and Vespidae."Considering the ethnotaxonomic aspects, "abeias" are classified in two groups as "fierce bees" and "mild bees". They are also subdivided into three intermediate taxa depending upon whether or not they sting and, if so, if they can sting repeatedly. Costa-Neto EM: Folk Taxonomy and Cultural Significance of " Abeia " (Insecta, Hymenoptera) to the Pankarare, Northeastern Bahia State, Brazil. Journal of Ethnobiology 1998, 18 :1-13.<a href="https://ethnobiology.org/sites/default/files/pdfs/JoE/18-1/Costa-Neto.pdf">https://ethnobiology.org/sites/default/files/pdfs/JoE/18-1/Costa-Neto.pdf</a></p>	<p>Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is an example of ILK, we have chosen not to include it within the Chapter 6 (we decided to move all the ILK examples to Chapter 5).</p>
Matthew Heard	98	2574	99	<p>table 6.6.1 - no mentio of sensitivity analyses or modelling to look at impact of uncretainty in cretain parameters?</p>	<p>Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As these are another examples of methods to deal with uncertainty, we have chosen not to mention it.</p>

Jerome Casas Table 2574  
6.6.1  
entry 2  
stochastic  
and  
related  
enteries

A better defintion for the general public of stochasticity is needed. I disagree with the idea that stochasticity cannot be reduced, this is exactly what the field of "control theory of stochastic processes" is doing, see for axpale the work of JP Aubin on viability. The entry 2.a; Randomness of Nature mixes up the tow very different processes of stochastic processes and cahotic ones. The entry 4.d. does not provide an explanation of low power but give examples, not necessarily related to low power.

Thank you for your comment. We have modified the definition for stochastic uncertainty in the new version. We think (as many authors also) that this source of unceratinty cannot be reduced. It can be modeled or analysed by different statistical methods. We agree with your comment that entry 2.a mixes different processes. Nevertheless, this section is a brief description of some sources of uncertainties and we cannot add additional text to the chapter due to word length restrictions. We think that entry 4d provides examples of different sources of low power (e.g., low sample size, low number of replications).

Thomas Steeger 99 2600 99 2600

recommend deleting "one type of"

Thanks for this suggested change. We have included it in the new version.

Thomas Steeger 99 2610 99 2612

To what proposal is this sentence referring?

Thanks for this comment. The proposal is to classify uncertainty. We have modified the text accordingly: "This proposal to classify uncertainty is a first step towards..."

Anne Alix	102	2619	102	2619	Table 6.6.2 the precautionary principle is proposed to solve epistemic uncertainties. Could you explain how? The precautionary principle is itself subject of much misunderstandng and a variety of interpretation?	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. The precautionary principle is proposed as policy response for stochastic uncertainty, not to epistemic uncertainty. Moreover, this term is defined in the glossary.
Anne Alix	102	2619	102	2619	Table 6.6.2. just to mention OECD testing guidelines as another source of standardized methods, as an example (OECD 213 and 214, OECD 237 and OECD 75 specifically deal with bees.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Thomas Steeger	101	2626	101	2628	". . .another aspect of pollination services; whereas, synergy is when two or more aspects of pollination services are enhanced."	Thanks for this suggested change. We have included it in the new version.
Thomas Steeger	101	2650	101	2652	It is not clear what this sentence is saying.	Thank you foe the comments. We have changed words to make the sentence clear.
Jerome Casas	lines 2661 and other places	2661			A positive relationship between natural enemies of crop pests and pollinators which I did not see in this chapter is the work of J. Tautz published in Current Biology; They show that pest caterpillars drop from the plant due to the perceptino of wing vibrations of pollinators.	This was a good example, but we have not included. We tried to include at first meta-analysis and review papers to reach general idea.
Barbara Herren	104	2672			what are the geographical biases? Unclear	We have changed to "there are still unclear in many parts of the world".

Thomas Steeger	102	2682	102	2684	Terminology such as "weakly negatively correlated" and "weakly positively correlated" is not particularly informative. Were the correlations considered statistically significant? If so, then that should be stated. If not, then the correlations may be spurious.	Thank you for the comments. We have indicated the only things considered statistically significant.
Thomas Steeger	102	2689	102	2691	Reference should be provided to support sentence.	Thank you for the comments. The following sentences provided the references to support this sentence.
Thomas Steeger	103	2702	103	2703	It's unclear what is meant by "might be first focused by human societies"-- do you mean would likely be a priority for humans?	Thank you for the comments. We have changed the sentence.
Phil Stevenson		2711		2711	Nichols and Altieri is 2012 and change in reference list	It was 2013 as we have checked.
Matthew Heard		2719			This is an important point and I do not feel is emphasised enough throughout. It is important that crop production/yield impacts are balanced against other key biotic and abiotic limiting factors e.g. nutrients availability , water and disease control. Yield stability (as opposed to max. yield is also imp.)	Thank you for the comments. We have added more words to emphasise more.
Thomas Steeger	104	2747	104	2749	It's unclear what is meant by "setting in terms the sectors".	We have changed to "depend on the sectors and the stakeholders or humans involved".

Anne Alix	106	2757	106	2760	Looking in more detail the compilation of Marshall and Moonen (2002) the analysis on the side-effects of field margins as reservoirs of pest and weeds seemed to be species-dependant. The growth of some weeds was in some cases slowed down by sowing mixes at the edge of fields. Vegetation diversity could have a suppressive effect on pest abundance through bottom up mechanisms that disrupt the pest's ability to locate or access the host plant. Field margins may also be reservoirs for beneficial species. Also in another study comparing sown flower strips to semi-natural habitats, sap sucking insects were found to be more abundant in flower strips, although crop damage was found to be lower suggesting that flower strips may act as trap-crop (Balzan and Moonen, 2014, attached).	Thank you for the comments. We have added "some field margins" to indicate that could be species-dependent. The other suggested work by Balzan and Moonen was interesting. However as this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Barbara Herren	106	2763			wording wrong	Thank you for the comments. We have made changes in the sentence.
Phil Stevenson		2763		2764	Something wrong with sentence.	Thank you for the comments. We have made changes in the sentence.

Matthew Heard		2763			unclear. Also need to be careful in this section since overarching 'pollination services for native plants' is being set up as a disservice with 'pollination for only crop plants' i.e. economic value. This is a trade-off for sure but this needs better explanation and is at odds with other emphases elsewhere in the document. Clarify.				Thank you for the comments. We have made changes in the sentence.
Matthew Heard		2786			explain why?				Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is not crucial to our critical evaluation, we have chosen not to include it.
Matthew Heard		2791			Unclear what this really means?				Thank you for this suggestion. We have changed terms in the sentence.
Thomas Steeger	105	2816	105	2818	By "gums", do you mean Eucalyptus trees?				Thanks for the suggested change. "gums" has been changed to "eucalyptus trees"
Maria Jose Suso	107	2824	107	2824	There has been a relevant study identifying research questions and knowledge on the role of the crop-pollinator relationship in breeding for pollinator-friendly crops from a breeding perspective	(Palmer et al. 2009 The role of crop-pollinator relationships in breeding for pollinator-friendly legumes: from a breeding perspective. Euphytica 170:35-52)			Thank you for your comment. The chapter authors will consider including
Cynthia Scott-Dupree	96	2836	96	2836	agro ecological should read "agro-ecological"				Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Serena Heckler 109 2836 109 2842 There should be a recommendation for further studies on the traditional agricultural systems of indigenous peoples and local communities. These agroecosystems are often highly biodiverse and offer many examples of integrated pest management and the landscape management (see ILK Task force for references).

Thank you for your suggestion, the ILK examples were moved to Chapter 5.

Barbara Herren	109	2836	109	2842	<p>This small-scale individual farmer or landholder response would seem to me to be amongst the most important; and needs more policy responses to support it. There are many questions on how a farmer can introduce pollinator-friendly measures, and helping them to do so and to integrate into their farming system is not simply a matter of providing subsidies or schemes (which often don't achieve their aim in any case, and are not a possibility in low income countries). Developing farmer-researcher platforms or networks, helping researchers to interact with farmers and understand farmer problems, assisting researchers to work within the complexity of on-farm research are key ways of finding practical answers in a context that involves the participation of farmers. I would in this respect refer to the Agroecological Intensification Exchange; <a href="http://aeix3dev.devcloud.acquia-sites.com">http://aeix3dev.devcloud.acquia-sites.com</a>; their methods exchange is exemplary in this respect (not that they have addressed pollination explicitly, but they do focus on incorporating legumes in farming systems, which has benefits for pollinators).</p>	<p>Thank for making this point. The chapter 5 will address these issues</p>	
Felix Herzog	109	2837	109	2837	<p>INSERT WORD: "... of planting and managing new POLLINATOR foraging ..."</p>	<p>(you don't mean forage for cattle ...)</p>	<p>Thanks for this suggested change of wording. It is an improvement and we have adopted it.</p>

Felix Herzog 109 2842 109 2842

ADD SENTENCE: Similar attention needs to be paid to the possibilities of increasing nesting resources for pollinators, which can be a limiting factor in agricultural landscapes. These studies must be accompanied by investigations of farmers' acceptance and motivations to introduce such measures on their land.

Thank for your suggestion. Sentence was added

Serena Heckler 109 2844 109 2847 Local monitoring using ILK methods could be an economical way to gather data on change and trends regarding pollinator behavior and plant-pollinator interactions. For instance, in  
Pérez-Peña et al. (2012). "Evaluación del conocimiento indígena Kichwa como herramienta de monitoreo en la abundancia de animales de caza". Folia Amazónica, the results from two different methods of calculating game animal abundance are compared. On the one hand, quantitative scientific methods (transects and distance)are used, and on the other hand, indigenous kichwa hunters are surveyed in order to detect similarities and differences in the measured abundance of animals according to each method. The results are mostly similar (with three species not being coincident) showing that the local knowledge of hunters could be used for monitoring animal abundance in a more economical way. (The scientific method is much more expensive, takes more time and resources.)

Thank you for you comment. After chapter revision the indigenous people examples were moved to chapter 5

Thomas Steeger 107 2848 107 2850 By "social processes" do you mean "policies"?

Thanks for this comment but it is not. The social processes means the ways in which individuals and groups interact and establish social relationships.

Maria Jose Suso	107	2854	107	2854	<p>It was recognized at the Focus Group of the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP-FG), Genetic resources: co-operation models (<a href="http://ec.europa.eu/eip/agriculture/en/content/genetic-resources-cooperation-models">http://ec.europa.eu/eip/agriculture/en/content/genetic-resources-cooperation-models</a>) that the full potential of the pollination force in shaping diversity in pre-breeding and breeding strategies for optimum use of diversity was far from being met. Research is needed to enhance the synergy between pollination and food production services and breeding strategies for pollinator-friendly cultivars. Pollination service is essential for identifying appropriate procedures to be used for cultivar development in intensive conventional breeding, but also to develop strategies for low-input farming systems, including participatory plant breeding and evolutionary populations</p>	<p>Pollinators as agents of crossing are natural breeders of highest importance and are critical in breeding strategies if cross-pollination is required for breeding purposes or for hybrid seed production or if reduction of cross-pollination is necessary in seed stock multiplication. Regarding the design of pollinator friendly-crops, genotypes of crops with appropriate –attractiveness, discovery and reward traits should be explored as a management strategy to enhance pollination services for breeding strategies efficiency (Palmer al. 2011 Male sterility and hybrid production technology. In: Pratap A, Kumar J (eds) Biology and Breeding of Food Legumes, CABI International, Oxford, United Kingdom, p 193-207; Suso et al. 2015 "Reproductive Biology of Grain</p>	<p>Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it</p>
Thomas Steeger	107	2857	107	2858	<p>". . .risks, that in turn results in measures to reduce exposure . . ."</p>	<p></p>	<p>Thanks for this suggested change of wording. It is an improvement and we have adopted it.</p>

Thomas Brooks	109	2860	110	2867	van der Sluijs et al. (2015) Environ Sci Pollution Res provide a summary of research priorities regarding the impacts of neonicotinoid pesticides on biodiversity and ecosystem services (online at <a href="http://link.springer.com/article/10.1007/s11356-014-3229-5">http://link.springer.com/article/10.1007/s11356-014-3229-5</a> ), and would be a useful additional citation here.	Thank you for this suggested reference. The authors will consider including
Matthew Heard		2866			Also largely ignored is the cost of pesticide reduction on other costs (e.g. reduced yields can mean greater land use, impacts of other compounds when banning another on non-targets).	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it
Thomas Steeger	108	2867	108	2868	"Development of specific risk indicators . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Diane Castle	109	2868	109	2869	<b>Comment:</b> Amend text to include protection goals such as " The development of <u>clear protection goals</u> and specific risk indicators from exposure <u>in use</u> ....." <b>Rationale:</b> Risk management must be based on recognised protection objectives and realistic field use in order to ensure effective risk reduction programmes.	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it
Thomas Steeger	108	2872	108	2873	". . .which studies may not be necessary to conduct locally."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Thomas Steeger	108	2877	108	2879	". . .values are generated in Asia while 58%, 8% and 10% are generated in Africa, and South and Central America, respectively . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Barbara Herren	110	2878	110	2880	I don't understand this sentence at all	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Phil Stevenson		2878		2880	I think this sentence could be clearer	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Cynthia Scott-Dupree	97	2880	97	2880	Should read "America, respectively"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Barbara Herren	110	2880	110	2883	Is this not something the assessment could/should do? No primary information is to be gathered, but analysis of existing data is possible, is it not (not an a deeply analytical way, but simply lining up such mismatches)?	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately
Matthew Heard		2886			IPM includes better targetting and use of thresholds not just no/reduced pesticide	Thank you for your suggestion. Text was rewrite and caveat was added.
Phil Stevenson		2889			Also in phaseolus beans	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Matthew Heard		2896			Not sure why GM is separated here since general toxicological effects of all crop management should be included (not just the method). However if GM is separated it should also include the range of new (non GM) breeding technologies too e.g. Zinc finger nucleases	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately

Thomas Steeger	108	2900	108	2900	"Research is needed to better . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Thomas Steeger	109	2905	109	2905	"Research is particularly needed . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	109	2912	109	2918	". . . abrupt qualitative changes in landscape structure. These changes can limit survival and movement of pollinator. To properly conserve pollinator diversity and its associated processes, habitat loss should not reach such extinction thresholds. Therefore, it is necessary to determine the critical values (thresholds) for habitat loss which can lead to drastic increases in pollinator extinction rates (Viana 2012)."	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Barbara Herren	111	2913	111	2919	whole paragraph is a runon sentence, hard to understand	Thanks for your comment. This is a copy editing job that will be carried out at the final draft stage
Thomas Steeger	109	2920	109	2921	". . . mobility is also essential."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	109	2922	109	2927	". . . pollinator movement through the landscape. These technologies coupled with the knowledge . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.

Serena Heckler 111 2930 111 2932 An example of exploration on the possibility of payment for the ecosystem service of pollination in Colombia is introduced in Calle et al. (2010). "La producción de maracuyá (*Passiflora edulis*) en Colombia: Perspectivas para la conservación del hábitat a través del servicio de polinización" in Interciencia vol. 35 n°3: pp. 207-212. This is an study of agro-landscapes and perceptions of producers of maracuyá (*Passiflora edulis*) in three departments of Colombia. The authors survey different aspects of the management and production practices in several farms, and one of the aspects is the relationship between pollinators and production. The producers interviewed mentioned the black bumblebees (*Xylocopa spp.*, solitary) as the most important pollinator of their maracuyá crops and they agree that dry trunks are their main habitat. In second place, they mentioned the social bees (*Apis mellifera*, *Trigona spp.*) and hummingbirds (colibríes), but in a lower degree of importance. The majority of producers agree that the crop should be located close to the forest with the aim to guarantee the constant suminster of pollination by the black bumblebees. The interviewees agree in the

Thank you for your suggestion, but as our space is limited for detailed information, thus we focus on the examples AES or PES where apply sucessfully to enhance pollination service. Your example is god but focus on farmers perception.

Anne Alix	111	2934	111	2944	Another need, from the reading of this chapter is for approaches that can rank the factors influencing pollinators in the fields. The reason for this is the number of factors and related actions identified and the related needs for research and transfer tools. Some studies have attempted this (the epidemiological studies van Engeldorp et al performed on the honey bee under the frame of COLOSS) but they remain rare, although they are worth a try in order to help policy makers giving deserved priorities to projects.	Thank you very much for your suggestion, it is a very interesting approach but our space is limited for detailed information
Anne Alix	111	2934	111	2944	A second need would be the development of field approaches gathering the actions you indentified in this review and measuring their efficacy. This "success story" approach, although subject to drawbacks since knowledge will never be as comprehensive as we would like in first place, would really help to check hypothesis and build experience.	Thank you very much for your suggestion, it is a very interesting approach but our space is limited for detailed information
Serena Heckler	111	2934	111	2944	<u>Taking into account already practiced ILK for the protection of ecosystems that also protect pollinators needs to be further explored in order to affirm traditional best practices and to take into account the knowledge, techniques and innovations that already exist and are locally adapted.</u>	Thank for your comment. The ILK issues is being cover in Chapter 5

Thomas Brooks	111	2949			Add a final sentence to this paragraph along the lines of "This will facilitate the assessment of extinction risk of pollinator species beyond vertebrates, and of trends in these (Regan et al. 2015)." The paper is in Conserv Lett.	Thanks for this suggested. It was added
Barbara Herren	112	2953	112	2953	remove the word "Then"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	110	2960	110	2963	"More research is needed on the effects . . . Interventions interact. Such research could focus . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Anne Alix	112	2967	112	2969	The importance of this proposal is real if the mapping of pollinators overlaps with human population?	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Matthew Heard		2971			New study by Baldock et al (Proc. Roy.Soc B) on urban pollinator diversity and impact of urban environments	Thank for this suggested reference.
Thomas Steeger	110	2975	110	2979	". . .for households (Maxwell et al. 1998; Drescher 2004). However,there is a lack of information from some of . . .and India on addressing the importance . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted itThanks for this suggested change of wording. It is an improvement and we have adopted it
Thomas Steeger	111	3008	111	3008	revise "sub lethal" to "sublethal"	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Thomas Steeger	111	3018	111	3020	". . .developing and maintaining large scale . . . Networks will improve understanding of complex systems. . .and simultaneously decrease uncertainty."	Thanks for this suggested change of wording. It is an improvement and we have adopted it

Matthew Heard		3018			This section feels rather weak and ad hoc.	Thank you for your comment. We decided to delete the point 6.7.
Thomas Steeger	111	3023	111	3023	"It is necessary to unambiguously . . ."	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Thomas Steeger	111	3030	111	3030	". . .acknowledging and limiting uncertainty."	Thanks for this suggested change of wording. It is an improvement and we have adopted it
Serena Heckler	113	3032	113	3034	<u>Suggestion for addition:</u> "This should be done with wide participation across society including indigenous and local knowledge holders and careful consideration of how to characterise and communicate uncertainty considering the diversity of knowledge systems."	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Felix Herzog	113	3035	113	3035	ADD SENTENCE OF PARAGRAPH: To reduce the uncertainty on the actual status of pollinators, monitoring approaches need to be developed and implemented. Several approaches need to be tested, i.e. involving professional programmes, citizen science and combinations of the two.	Thank you for your comment. The section regarding uncertainty was rewritten and will cover this
Vanda Altarelli	114	3035	142	3281	There are several publications mentioned in Chapter 6 that do not appear in the Bibliography. Also I wonder whether to make the bibliography more user friendly it would not be possible to split it by sections in the chapter where a particular publication is referred to	Thanks for making this point. It is an improvement we will adopt for the whole assessment report

Nikolay Sobol ev	134	3036	134	3037	Insert a row before "Vovides...": "Volkova L.B., Sobolev N.A. 2004. Draft management scheme for lawns composed of local wild plants. Problems of urban greening: almanac. Moscow: Prima-M Publ. Vol. 10, pp. 125-128. <a href="http://www.biodiversity.ru/news/archive/sobolev_volkova.html">http://www.biodiversity.ru/news/archive/sobolev_volkova.html</a> (in Russian)."	See comment to p. 68, l. 1714. Added.
Matthew Heard	132	3036			Duplicate reference 'Sutherland et al'	Deleted.
Nikolay Sobol ev	127	3221	127	3222	Insert: "Russian Federation: Zakon Chuvashskoy Respubloki ot 19 dekabrya 1997 goda N 27 "Opchelovodstve i ob okhrane pchiol i dikikh nasekomykh-opyliteley": <a href="http://www.fpa.su/regzakon/chuvashiya/zakon-chuvashskoy-respubliki-ot-19-dekabrya-1997-g-n-27-o-pchelovodstve-i-ob-ochrane-pchel-i-dikich-nasekomich-opiliteley-s-izmeneniyami-ot-23-oktyabrya-2000-g-30-marta-2006-g-24-iiulya-2009-g/">http://www.fpa.su/regzakon/chuvashiya/zakon-chuvashskoy-respubliki-ot-19-dekabrya-1997-g-n-27-o-pchelovodstve-i-ob-ochrane-pchel-i-dikich-nasekomich-opiliteley-s-izmeneniyami-ot-23-oktyabrya-2000-g-30-marta-2006-g-24-iiulya-2009-g/</a> - "Chavash Republic Act on Beekeeping and the protection of Bees and Other Wild Pollinators"; several other regional acts on beekeeping and protection of bees."	Thank you. We have added the suggested text.
Martha Groom	152	3361	152		Thank you for your comment. However, as we are listing in this table organisations, websites and people consulted by each section, she has been listed twice, one for section 6.5c and another for section 6.6.	Thank you for your comment. We have removed the author listed a second time.

Madeleine Chagnon table A3 3361

Thank you for making this point. It does not seem to require changes to the text. We would like to clarify that even if this info may change in time we intended to register the "List of organisations, websites and people consulted by each section" at the time of the assessment, this is highly used in scientific and technical reports. Also, we are giving the credits for personal communications and acknowledging them.

Thank you for making this point. It does not seem to require changes to the text. We would like to clarify that even if this info may change in time we intended to register the "List of organisations, websites and people consulted by each section" at the time of the assessment, this is highly used in scientific and technical reports. Also, we are giving the credits for personal communications and acknowledging them.

Cynthia Scott-Dupree 3361

Thanks for this suggestion, we have adopted it.

Thanks for this suggestion, we have adopted it.



































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































