

**External review of the first order draft of the land degradation and restoration assessment**  
**30 May - 11 July 2016**  
**Chapter 4**

Reviewer Name	Chapter	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Reviewer Comments	Response (from Chapter 4)
Li Qingfeng	0	0	general comment on FOD LDRA			1, The Report in overall is too academia, too detailed in scientific exploration and descriptions. In consideration of the principal aim "to facilitate the implementation of the National ... and the "Inter-governmental" nature of the organization, the Report has to be more "publicly explicit", rather than "scientifically complicated". If the Report is to be read by the policy makers, and to draw attentions from the public, the content is to be simplified and the volume greatly reduced, one third is more than enough.	In the chapter revision, these points are taken into account. The content was simplified wherever possible.
Li Qingfeng	0	0	general comment on FOD LDRA			2, An Executive Summary and a List of Acronyms and Abbreviations are necessary.	Thank you, this has been done for the final draft of the Chapter 4 and all chapters of the report.
German government	0	0	general comment on FOD LDRA			We believe that the first order draft of the IPBES thematic assessment on Land Degradation and Restoration generally has a comprehensive and scientifically sound structure and we congratulate the authors for this achievement. This is a first order draft however, and, therefore, we hope that our comments was useful for the further development and maturing of this assessment so that in the second order draft scientifically strong and comprehensive key messages can emerge. We very much look forward to the second order draft of this important assessment.	Thank you for taking the time to review the full report. We appreciate your feedback and the constructive comments you offered thereafter.
German government	0	0	general comment on FOD LDRA			<b>We request the co-chairs of this assessment to ensure that the general comments listed for this assessment are made available to the CLAs and LAs of all 8 chapters.</b> Reason: Cross-referencing between the 8 chapters of the FOD sections by chapter authors should help to (1) avoid repetition; (2) use the same terminology/definitions, (c) strengthen the logical connection between the 8 chapters and, thus, (d) strengthen the overall storyline of the assessment.	This has been done. 1) In the Second Author Meeting (SAM) in Bonn chapter boundaries were defined; 2) glossary has been made; 3) common drivers and ES were addressed from different chapter perspectives. The general comments have been distributed to all chapters and revisions have been made by chapters as stated above.
German government	0	0	general comment on FOD LDRA			It needs to be critically highlighted that chapter 1 needs to provide a sound basis on the scope of this assessment and on the key definitions/terminology used throughout the 8 chapters. This should help to develop a strong storyline throughout the chapters. Chapter 8 on decision support should reflect more strongly on the findings of the previous chapters and also discuss policy support tools. Currently, chapter 8 remains quite general. All in all, the chapter authors should analyse the findings of the other chapters of the assessment and cross-reference to these. As we are discussing a thematic assessment which should also add value to the IPBES global assessment (D2c), we strongly encourage the authors of the 8 chapters to also analyse the relevant findings emerging from the four regional IPBES assessments.	The work of the regional assessments is ongoing and there is some coordination that happened at strategic points, including the joint Second Author Meeting that brought together all 5 assessments
German government	0	0	general comment on FOD LDRA			A major cross-cutting issue throughout the document is that <b>land degradation and restoration are being "lumped" too much together</b> , without considering that each of these measures has different drivers, processes etc. Discussing both aspects separately and with a stronger biodiversity and ecosystems perspective would add value to the document.	In the subsequent draft, Chapter 4 has taken that into consideration, discussing degradation and restoration separately. We also have tried to make the links to biodiversity and ecosystems more prominent.
German government	0	0	general comment on FOD LDRA			The assessment should provide balanced scientific-based opinions and <b>not overemphasize certain opinions, thereby possibly paying less attention to other perspectives. Therefore, the arguments in a chapter should not build just around one or two opinion-based citations.</b>	While we have used the available scientific evidence, we have also used other available information and knowledge to form a balanced opinion based on the literature we have assessed.
German government	0	0	general comment on FOD LDRA			Please ensure that all 8 chapters will start with an executive summary that includes a list of key messages and their degrees of confidences, based on the Platform's confidence framework in the Platform's guide on assessments (IPBES/4/INF/9). Such key messages was extremely relevant for the user groups of this assessment and most certainly for identifying policy options.	This has been done in the final draft.
German government	0	0	general comment on FOD LDRA			Provide an annex for this assessment that lists all the acronyms, abbreviations and key terms (including their definitions) used in the assessment.	This has been done in the final draft.
German government	0	0	general comment on FOD LDRA			Ensure consistency in the wording and the use of the key terms provided in section 1.1.2 throughout the document (all 8 chapters) of this assessment. Please also ensure that the wording of definitions provided in section 1.1.2 corresponds to the wording of these definitions as outlined in Decision 3/1, Annex VIII.	We agree that consistency needed to ensured. Chapter 4 has tried to be consistent with the 1.1.2
German government	0	0	general comment on FOD LDRA			Ensure that prescriptive language is not used.	Text has been checked for prescriptive language and replaced with "if...then" phrasing.

German government	0	0	general comment on FOD LDRA		In the further development of the assessment report, please also refer to other IPBES work programme items that are thematically linked to this assessment (e.g. "capacity development (D1a/b)"; "indigenous and local knowledge (D1c); "regional assessments (D2b)"; "global assessment (D2c)"; "pollination, pollination and food production (D3a)"; "scenarios and modeling (D3c)"; "policy support tools (D4c)".	Cross-reference to the IPBES policy support tools has been made.
German government	0	0	general comment on FOD LDRA		Regarding chapter 1 and in chapter 8: highlight the relevance of the LDR assessment for the Strategic Plan for Biodiversity 2011–2020 / Aichi Targets (specifically goal 15), and the SDGs (and especially SDG 15).	This has been done in the subsequent draft.
German government	0	0	general comment on FOD LDRA		Outline in chapter 1 and in chapter 8, how the land degradation and restoration assessment will deliver to/support the IPBES global assessment on biodiversity and ecosystem services (D2c).	A framework for the criteria of the success stories has been developed in Ch1. The aim of the framework is to be replicable and it our hope it was used in the global assessment.
German government	0	0	general comment on FOD LDRA		The terms "sustainable land use" and "sustainable land management" are somewhat being used interchangeably. Please check the definitions of both terms and if necessary, please align the use of these terms accordingly throughout the assessment report (all 8 chapters).	The terms have been defined in the glossary and used accordingly.
German government	0	0	general comment on FOD LDRA		Throughout the document the terms "reduction" and "mitigation" are being used. Please provide information about the technical difference between both terms.	The terms have been defined in the glossary and used accordingly.
German government	0	0	general comment on FOD LDRA		Regarding figures, tables, photos/images: Ensure in the <i>second order draft</i> and the associated SPM that the <b>quality of all visual materials should be high</b> .	Visual materials have been improved to the best quality possible through using a specialized cartographer to redraw the figures and obtaining high quality photos.
German government	0	0	general comment on FOD LDRA		Information and data targetting the same or similar issues (e.g. on urbanisation/global extent of land degradation, deforestation rates ...), are outlined in the various chapters of the report, partly by referring to different statistical sources. We strongly encourage you to develop <b>comprehensive chapters-spanning tables and figures on similar issues</b> in order to align information throughout the 8 chapters so that strong key messages can emerge.	Chapters-spanning tables were not possible due to sheet complexity. But we did ensure more alignment and hand-overs.
German government	0	0	general comment on FOD LDRA		Ensure for all 8 chapters that data and other facts (numbers, percentages, statements, citations) are provided with at least one reference.	Done.
German government	0	0	general comment on FOD LDRA		Not all references cited in the text are to be found in the reference lists of the chapters. Please critically cross-check.	All reference material has been added to the referece manager to ensure correct citations.
German government	0	0	general comment on FOD LDRA		We have acknowledged that professional language editing was taken care of at a later stage. We have therefore restricted ourselves to providing comments only on the thematic contents of each chapter. Therefore, please ensure that language editing is taken care of.	Text has been fully editing for the final draft .
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		Perhaps excusable in a FOD, but the majority of the text needs substantial editing to improve English expression and ensure clarity.	Text has been fully editing for the final draft .
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		The document length should be substantially reduced, so that it is readable for the intended audience of policy-makers. Delete the text that does not relate directly to the topic of assessment of land degradation. Condense the explanatory text and provide references for further detail.	We aimed to be as concise as possible in the chapter revisions.
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		The report title is misleading. The assessment is not about land degradation but rather about biodiversity loss, because land degradation has been defined here as "processes that cause biodiversity loss and loss of ecosystem functions and services". Ideally the title should be reworded to reflect the content.	Title used was given to us in the Scoping Document, which was approved by IPBES Plenary (please see annex VIII to Decision IPBES-3/1). We are not in the position to change the title.
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		We encourage the authors to elaborate on how land degradation/restoration can seamlessly integrate agriculture, ecosystems services and biodiversity.	This has been addressed in the final version of the assessment report.
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		It would be helpful if the report used the language of DPSIR; this could help to minimise the repetition between chapters, if authors can recognise that for example chapter 4 should be confined to pressure and state, and not also discuss drivers (ch3) and impacts (on ecosystems - Ch 5), and human responses (ch 6).	The assessment is build around DPSIR. Chapter 6 and part of 8 addresses the response part. Drivers, Pressures, State, Impact Response.
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		Not all references cited can be found in the reference list. This needs to be taken care of.	All literature has been added to the referece manager to ensure correct citations.
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		The second order draft should include key messages and their level of confidence. This is currently lacking.	Executive summary has been developed, including level of confidence
Hamid Custovic (SPI)	0	0	general comment on FOD LDRA		Some item are repeated on introduction of different chapters.	OK. Some overlap in intro is OK, as long as being dealt with from a specific chapter angle.

Peter Onorato	0	0	general comment on FOD LDRA		<p>Considering IPBES' role as the interface between science and policy, we consider it critical that the reports clearly communicate the key findings, implications and recommendations within chapters so that they can be readily used by policy makers. To assist this there may be value in the chapters having a uniform structure, similar to that in the Executive Summary of the IPCC Chapters. In addition to including an executive summary, the following headers might help focus the authors' attention to ensuring their chapters are targeted to policy-makers as opposed to an academic audience:</p> <ul style="list-style-type: none"> <li>- Executive Summary</li> <li>1. Key Findings</li> <li>2. Critical Implications</li> <li>3. Gaps in Knowledge and Data</li> <li>4. Recommendations</li> <li>5. FAQ</li> </ul> <p>A clear and consistent structure, along with key findings and recommendations, could be of great benefit to policy makers.</p>	All chapters have an executive summary. SPM addresses all other elements presented.
Peter Onorato	0	0	general comment on FOD LDRA		<p>Some of the Chapters (particularly Chapter 2) competing scientific views on certain issues are presented, almost debate-like, one after another. While it's important to understand the current state of the science, we do not think that IPBES Assessment Reports should be used as a platform to advance contested academic theories as this diminishes the report's ability to be a clear and concise communication document. In order to best bridge the gap between science and policy, and to provide policymakers with clear guidance, Assessment Reports should present the latest knowledge and make recommendations based on this. Policy makers generally don't have the depth of knowledge to balance contested scientific theories and will rely on IPBES' work to clearly identify the best policy options available</p>	Not directly relevant to Ch1, but we paid close attention to tone and presentation of evidence in the SOD.
Peter Onorato	0	0	general comment on FOD LDRA		<p>The SDGs constitute the new global paradigm for sustainable development. As such, we consider there to be value in drawing more links between the SDGs and IPBES' work within the reports. Again, this will help policymakers effectively prosecute the case for improved biodiversity policies, and help identify where clear links exist between biodiversity policy and other issues including development and broader environmental outcomes, strengthening the case for biodiversity policy priorities.</p>	This has been done.
Ayman Batisha	0	0	general comment on FOD LDRA		<p>The entire report should be homogeneously arranged, logically build and fully integrated with no inconsistency, disharmony or overlapping within its chapters and sections. The titles of chapters and sections are generally too long to be professional.</p>	Harmonization and the avoidance of overlaps has been ensured for the final draft. Titles of the chapters have been pre-approved by Plenary and are defined by the scoping for the assessment. We are not in the position to change the titles of the chapters.
Ayman Batisha	0	0	general comment on FOD LDRA		<p>Number of sections still requires more work and careful revision. As examples, in Chapter 1, There should be more sections to clarify 1.2 What constitutes Success in the restoration of degraded land?; 1.3.1.1 until 1.3.1.5 should be corrected; in Chapter 2, the classification of Natural and social science and the law, Human sciences, and Social inequities should be justified (or correct); in Chapter 3, how "3.6. Food security through tackling land degradation" is related with the direct and indirect drivers of land degradation and restoration; in Chapter 4, most of sections deals with multiple drivers and Key Human Drivers, although the reader expect that "the status and trends of land degradation and restoration and associated changes in biodiversity and ecosystem functions" was analyzed; in Chapter 5, the reader expect that there are some sort of comparisons between the case of land degradation and the case of land restoration; in Chapter 6, Responses to avoid land degradation and restore degraded land, the reader expect that there is an Environmental assessment evaluation and a full Economic and financial mechanisms, how can it be applied in the mentioned Case studies and how he/she can estimate the total cost in his/her Case study; in Chapter 7, Issues not being raised include how soft computing techniques such as Fuzzy Logic and Neural Networks can develop scenarios of how land degradation and restoration could evolve in both Near-term and Long-term; in Chapter 8, the reader expect that there a focus on soft computing techniques, and the possible application in the fields of the decision support systems used to address land degradation and restoration based on a well-defined Environmental indicators.</p>	The final draft has been extensively revised. The overlaps and redundancies solved, and the whole text edited. Thank you for your close reading of the report.

Ayman Batisha	0	0	general comment on FOD LDRA			The entire report should be homogenous and integrated with no interference within its chapters and sections. As a quick example, the first section in Chapters 1, 5 & 6 is Introduction; whereas in Chapter 2 is Executive summary: Key Messages; in Chapter 3 is Purpose and value of chapter; in Chapter 4 is Introduction to the degradation process; in Chapter 7 is Table of Content, Executive Summary (Key policy messages), At the global level, At the local level (only where different from global messages); and in Chapter 8 is Executive Summary. Similarly, the end section in Chapter 1 is 1.3 Case studies of successful land restoration; in Chapter 2 is Conclusions - Working with perceptions as a policy tool; in Chapter 3 is 3.7 References Cited; in Chapter 4 is 4.6 Conclusions, 4.7 Glossary, 4.8 References; in Chapter 5 is 5.5 Remaining Challenges; in Chapter 6 is 6.4.4.2 Case studies, 6.5 References; in Chapter 7 is 7.4.4 New approaches: Visioning LDR for Sustainable Futures; and in Chapter 8 is 8.4.3 Identify and prioritize responses to reduce trade-offs and/or enhance synergies to address land degradation and/or develop restoration.	The full assessment has gone through multiple revision rounds and streamlining across chapters. Consistent structuring across chapters has been developed as well.
Ayman Batisha	0	0	general comment on FOD LDRA			Numbers of topics still require work and revision, as examples, please compare "3.3.6 Fire regime change" with "4.3.6 Fire regime change", and "6.3.1.5 Fire regime change", also, compare "3.4 Climate change as a threat multiplier of degradation drivers", with "4.2 Cross cutting degradation processes common to multiple drivers", and "6.3.1.10 Climate change as a threat multiplier".	Harmonization across chapters has been ensured for the final draft.
Ayman Batisha	0	0	general comment on FOD LDRA			There should be examples/chapter to clarify how the biogeochemical cycle (carbon, oxygen, nitrogen, phosphorus, sulfur, calcium, rock and water etc.) through both biotic (biosphere) and abiotic (atmosphere, hydrosphere, and lithosphere) compartments of Earth can cause land degradation and restoration. Special attention should be emphasized to the human-caused cycle of atrazine, which may affect certain species. Land degradation and restoration should be assessed in the light of Global Changes; Global Warming; Global Sea Level Rise, and Global Ocean. Land degradation and restoration should be assessed into two categories which operates at different time scales: the biological – physical, (Near-term) and the geological, (Long-term). Land restoration opportunities, planning, economics, implementation constraints, and limits should be defined.	Drivers of LD, both direct and indirect are at the core of the chapter 3 and have been addressed accordingly. The biophysical aspects are discussed at length in Ch4.
Ayman Batisha	0	0	general comment on FOD LDRA			Assessment on land degradation and restoration should emphasize on multiple Land-use Categories; Forest Land, Cropland, Grassland, Wetlands, Peatlands, Settlements, and most important and significant Arid and Semi-arid land. Assessment on land degradation and restoration should emphasize on Policy Oriented Research. Human Settlements, Industry, and Infrastructure in both Urban and Rural Areas should be surveyed. Cross-cutting issues such that Agriculture, Water, Energy, Industrial Processes, CO2 Transport, Injection and Geological Storage, Waste Generation, Composition, Incineration, Treatment, Discharge, Disposal and Management should be focused.	Drivers of LD, both direct and indirect are at the core of the chapter 3 and have been addressed accordingly. Ch4 picks up from the drivers discussed at Ch3 from the level of biophysical processes.
Ayman Batisha	0	0	general comment on FOD LDRA			Research related to the Science of land degradation and restoration should be emphasized on. Assessment on land degradation and restoration generally deal with multiple meanings of fuzzy concepts, so it is strongly recommended to add chapter/section to provide General Guidance to the subject of how applying fuzzy concepts in the context of land degradation and restoration using soft computing techniques. The scope of soft computing covers the areas of Fuzzy Logic, Neural Networks, Chaos Theory, Evolutionary Computing, Rough Sets, Ant Colony, Immunological Computing, Particle Swarm, Wavelet, Probabilistic Computing, Hybrid Methods and other similar techniques to address real world complexities achieving tractability, robustness and low cost solution. The chapter may be devoted to effective approaches to Data Collection; dealing with Uncertainties; Methodological and efficient technique Choice; Time Series Consistency Identification of Key Categories, and Quality Assurance/Quality Control and Verification. The application areas of soft computing include but are not limited to Detection and Attribution of land degradation: from Global to Regional and local, land degradation Projections and Predictability (Near-term and Long-term). Land degradation Phenomena and its relevance for future Global and Climate Change. Detection and attribution of observed and multi-sector degradation, emergent risks, key vulnerabilities, and opportunities should be addressed. Land degradation and restoration should be assessed in the light of statistical analysis and levels of confidence.	This topic is more appropriate to Ch2 scoping (where it is discussed at length), no direct relevance to Ch4.
Ayman Batisha	0	0	general comment on FOD LDRA			Atlas of Global, Regional and local land degradation and restoration Existing, Projections and Predictability should be annexed.	We tried to integrate all relevant information within the body of the text, so as to not overload the final report with extensive back matter.

Anna Luise	0	0	general comment on FOD LDRA			The Chapters are disomogenous. Their structure is different as well as the degree of deepening of the topics which, in general, remains too weak. Some general concepts and the conceptual framework itself are repeated too many times with no real added value in the various Chapters. Even if all concepts should be based on sound scientific data and information, too many references could generate some confusion. The report should take into consideration its utilisation, among all, in policy making processes, and adopt an appropriate language. Some overlapping, for example for Chapter 7 and 8. On the contrary, some citations are disomogenous.	We solved inappropriate overlap between chapters and within chapters for the final draft.
Beverley Wemple	Chapter 4	0	0	--	--	General comment: Overall, this chapter is quite long and repeats some aspects of chapter 3. I encourage you to look for ways to shorten the chapter and avoid excessive detail that a reader could find in textbooks that you might reference. The most interesting aspects of this chapter are the trends information and case studies you provide.	Thank you. Given the complexity of the issues addressed at Ch4, we tried our best to simplify the structure, streamline content and shorten the entire chapter for the final draft.
Ashish Upadhyay	Chapter 4	0	0			Chapter 3, 4 and 6 some of the components are overlapping like Grazing land management, Cropland management, fire regime change, planted forest are like this topics are introduction and way of representation are overlap so pl. arrange the proper format.	A certain amount of overlap was necessary for continuity, but for the final draft we eliminated redundancies and streamlined the whole report.
Dr. Erika Berenguer	Chapter 4	0	0			General comment: Unfortunately throughout this chapter there is a lack of agreement regarding what land degradation is. This leads to some contradictions between different sections and an overall lack of consistency and coherence. In addition, often the impacts listed in the subsections are not explicitly linked to land degradation. I suggest the authors add a clear and objective definition of land degradation in the introduction, expanding on the current definition they already have, and then a comprehensive review of the whole chapter in order to deliver a clear message.	Agree - time limitations in the preparation of Ch 4 did not allow inter section harmonization. We ensured this for the final revision.
Dr. Erika Berenguer	Chapter 4	0	0			General comment: Throughout this chapter there is an overall lack of general figures to illustrate the different impacts of land degradation on biodiversity and ecosystem services. I understand sometimes figures come only from local rather than global studies, but still it would be useful to add these figures to help illustrate a variety of the impacts presented. Currently, parts of this chapter resembles just a generic textbook.	Chapter content was nuanced and "textbook" components were edited.
Dr. Erika Berenguer	Chapter 4	0	0			General comment: There is an overall lack of references throughout the chapter.	All reference material has been added to the reference manager to ensure correct and complete citation list.
Panos Panagos	Chapter 4	0	0			General Comment: Much of the text should be re-written taking into account latest developments in the literature. Examples are given above.	Most of the chapter has been revised, tightened and new references and material added
Li Qingfeng	Chapter 4	0	0			The overall of Chapter 4 read like a textbook rather than an assessment report.	Agree. This was prioritized in the revision phase
Stellmes, Marion	Chapter 4	0	0			General comment: The authors of the report did a tremendous work to create the first draft of the IPBES report on land degradation. This is probably the point where some streamlining needs to be done (overlaps between chapters) as well as the analysis of important gaps. The chapter comprises very extensive information about land degradation assessment status and trends as well as restoration. This is of course a very complex and interdisciplinary topic but the immense length and complexity of the chapter makes it difficult to read in detail and preserve the overview (especially as there are still quite a number of sub-chapters and sub-sections not written yet!). Moreover, there seem to be some overlaps with other chapters (e.g. drivers, chapter 3) which should be avoided where possible. I think it would be good to try to shorten the text (e.g. by using more references) and use more tables, where key findings of the state and dynamics of land degradation can be summarized. It could also be meaningful to move parts of the descriptions of more practical character in a special annex. Moreover, it would be worthwhile thinking about splitting chapter 4. On the one hand the mere description of the status and trends of land degradation and restoration and on the other hand a chapter that treats how assessment of land degradation and restoration can be done and which gives decision makers a guideline how to assess these processes in an adequate, replicable and comparable way. Moreover, the uncertainty aspects and analysis of existing gaps should be given more room, maybe by adding a separate sub-chapter.	All agreed. Most have been commented upon by reviewers above. The point about splitting the Chapter is not possible, but organizing the Chapter in this way is, and this has been done for the final revision.
Tandra Fraser	Chapter 4	0	0			General comment: There is very little mention of belowground biodiversity throughout this chapter, even though it is affected by and essential for all the processes that are mentioned in relation to land degradation. I was interested to see the section on soil biodiversity once it is complete.	Agree. More attention needs to be given to the Global Soil Biodiversity Atlas. Sect 4.2.1 was incomplete for the first round of review and below ground issues were strengthened for the final draft.
Ben ten Brink	Chapter 4	0	0			General: Much improvement compared to internal draft of October 2015	Thank you!

Ben ten Brink	Chapter 4	0	0			General: A great deal of the document elaborates on characterization of degradation processes especially sections 4.2 and 4.3. Although important and scientific correct, this information doesn't provide the assessment information for our target-audience: policy makers. They need to know the end results of the underlying processes as described in 4.2 and 4.3 in terms of human-caused change in biodiversity and ecosystem functions in past and present. Section 4.4 is a trial to do that, but is anecdotal by definition showing case studies. Section 4.5 is the key section, aiming at assessing past and present state of biodiversity (according to various indicators/aspects of biodiv) but hasn't been worked out for key ecosystem functions yet as agreed in the 1st authors meeting in Bonn, i.e. effects on food production, water and Cseq/climate. These are the key elements necessary for chapt 5 on impacts on human well being and chapt 6 on most urgent and promising responses. Chapt 7 shows the future of biodiv and ecosystem functions according to different scenarios and policy options.	All important points, and these formed our priority for revision.
Ben ten Brink	Chapter 4	0	0			General: Given the above remarks, I propose to elaborate section 4.5 on change in food production, water (shortage and floods), and Csequestration in relation to climate change in a similar manner as biodiversity for the past and present (see lines 20-22), and strongly reduce sections 4.2-4.3.	Ch 4 was reoriented to emphasize states and trends rather than processes alone
Ben ten Brink	Chapter 4	0	0			General: It would be very informative to our target audience to have geographical information on impacts on biodiversity and ecosystem services	The data are limited, but was added where available.
Hamid Custovic (SPI)	Chapter 4	0	0			General comment: The purpose of this chapter is to review the status and trends of land degradation.	Ch 4 was reoriented to emphasize states and trends rather than processes alone
Hamid Custovic (SPI)	Chapter 4	0	0			General comment: It may also be more logical if a chapter on status and trends precedes a chapter on drivers, rather than the other way round. Therefore, consider re-ordering both chapters. Chapter 4 is very descriptive and refers to drivers as well as to status, and therefore overlaps with the previous chapter: it is odd to see biodiversity included separately at the end. Consider also, whether all its case studies are appropriate.	All these points were addressed following discussions at the 2nd Author's meeting in August 2016 including the division of Ch 3/4 and new emphasis on states and trends in Ch 4.
German government	Chapter 4	0	0			General comment The sections in chapter 4 are rather unbalanced with regard to the level of detail. Please also ensure that the assessment includes the broad range of available literature on the subject and does not only refer to specific authors.	Balance of sections was corrected
German government	Chapter 4	0	0			General comment: Throughout the chapter, not all references cited in the text are to be found in the reference list.	Was corrected
Samuel Nshutiyayesu	Chapter 4	6	1	6	1	Title for section 4.1. missing	Was fixed after FOD
German government	Chapter 4	6	1	9	164	Drivers have been explicitly addressed in chapter 3 already, so this is somewhat redundant. Please cross-reference between the chapters in order to avoid redundancies. Also some entries may be conceptually a bit far-fetched (e.g. treating climate change as a sub-process of degradation); likewise, some of the aspects subsumed under "land use change" may need some more explanation, why they are appropriate here, e.g. bush meat hunting, medicinal plant collection). The section would really benefit from a clearer focus on the most important agents of degradation.	All these points were addressed following discussions at the 2nd Author's meeting in August 2016 including the division of Ch 3/4 and new emphasis on states and trends in Ch 4.
Penny van Oosterzee	Chapter 4	1	1			Regarding the title there is not much on restoration. If this is because there is very little then it might be worthwhile expanding on that. Perhaps a few boxes or case studies on restoration success stories might help. Some references cited not in list which seems to be a common issue across all chapters.	Restoration component of the chapter was increased.
Li Changxiao	Chapter 4	2	Table of contents			Please add 4.1 and its title	Section 1 was fixed after FOD
Li Changxiao	Chapter 4	2	Table of contents			4.2.1.4 Soil Biodiversity is not consistent to the other subtitles, and better rephrased it as "Soil biodiversity loss"	A contributing author was recruited to draft the missing sub section on soil biodiversity loss
Li Changxiao	Chapter 4	2	Table of contents			4.3.7 Alien Species should be "alien species", and "4.3.8 Abandonment" should be "abandonment"	Corrected
Markus Giger	Chapter 4	2		2		See issue mentioned above: which chapter reports about extend and status of degradation. Chapter 3 or 4?	All these points were addressed following discussions at the 2nd Author's meeting in August 2016 including the division of Ch 3/4 and new emphasis on states and trends in Ch 4.
Wang Jun	Chapter 4	2		2		Section 4.2.1.4 : Whether "soil biodiversity" can be changed into "soil biodiversity loss" ? And change "4.2.1 soil processes" into "4.2.1 soil degradation process".	Done.
M. Y. Yazdandoost	Chapter 4	6	3	61	1774	For this chapter following points recommended: · Quantification of non-market values of biodiversity; · Ecosystem response to changes in biodiversity; · Ecosystem process in changing environment; · Future challenges determination on interaction between biodiversity dynamics, ecosystem processes and abiotic factors; · Biodiversity Conservation Insurance (BCI) under Critical Environmental Shift (CES); · Predictive biodiversity functional classification in the changing environment; · The role of biodiversity as a potential modulators in ecosystem processes; and · Urban biodiversity challenges in the face of climate change.	Agree, there needs to be a stronger emphasis on biodiversity . These topics belong elsewhere in the assessment: quantification of non-market values of biodiversity; · Biodiversity Conservation Insurance (BCI) under Critical Environmental Shift (CES). This was conveyed to relevant chapters
Penny van Oosterzee	Chapter 4	6	3			need to state what the Bonn Challenge is. The sentence is also too long.	Done.

Ben ten Brink	Chapter 4	6	3	6	12	I do not see the need to use the Bonn challenge here as the key reason of the section or LDRA. The LDRA aim is to inform policy makers on the type, extent, degree, rate (speed), location, causes and consequences of land degradation and restoration. Further, 'intensity, degree, amount and level' are confusing. I propose we use a consistent terminology throughout the entire LDRA report. See also Chapt 2. Further it should be stressed that 'land degradation' also has great benefits such as high food production (sometimes 100x/ha) in highly industrialized but sustainable landscapes besides great losses in terms of eg biodiversity and fiber production. So 'land degradation' is a value-loaded concept which requires clear definition as set out in Chapt 1 and 2.	Agree on inappropriate importance given to the Bonn Challenge. We replaced "intensity...." with severity and extent (local and global) which are the criteria set out by the CLAs for selection of topics in Ch 4 - they need to be applied to the recently received content.
Victor M. Castillo (UNCCD)	Chapter 4	6	3	6	3	Consider including other global environment goals as CBD Aichi Target 15, UNCCD Strategic Objectives established by the 10-year strategic Plan and SDG, in particular target 15.2	Relevant goals were included, but a more extensive discussion of those is located in Ch6 and Ch8 (for policy relevance)
German government	Chapter 4	6	3	6	3	Provide a footnote that explains the "Bonn Challenge" if it has not yet been explained in the chapters 1, 2 and 3 of the Assessment on LDR.	This has been done
Li Changxiao	Chapter 4	6	11	6	12	Add a space between "reducing" and "mitigating", as well as between "degraded" and "land"	Corrected
Sarah Dalrymple	Chapter 4	6	11	6	11	spaces needed between "reducingandmitigating"	Corrected
Brajendra (ITPS)	Chapter 4	6	11	6	same line	words attached togetherreducingandmitigating	Corrected
Peter Onorato	Chapter 4	6	11	6	11	Spacing issue - reducing and mitigatingand the benefits that can be accrued for people by preventing, halting, reducingandmitigating	Corrected
Brajendra (ITPS)	Chapter 4	6	12	6	same line	words attached together degradedland	Corrected
Ben ten Brink	Chapter 4	6	20	6	22	This is the aim agreed in Bonn. See my general comment above. Here I would propose a brief elaboration how this Section fits in the DPSIR frame and why. Is this about the state (biodiv and functions)? And what is the impact: human well being as elaborated in Chapt 6?	All these points were addressed following discussions at the 2nd Author's meeting in August 2016 including the division of of Ch 3/4 and new emphasis on states and trends in Ch 4. DPSIR structure is now considered across the entire assessment
David Lamb	Chapter 4		24			I wonder if this definition is misleading? As stated, it would include productive agricultural cropland. This land might not now be able to supply all the original goods and services but few people would say such land is degraded. I suspect degradation is a perceptual term that means different things to different people. Thus a farmer may see his new farmland as being productive but a wildlife enthusiast might see the same land that was once a forests as now being degraded. Such perceptual differences make it difficult to define boundaries and thus to map degraded lands (see also line 236 and line 2002).	Agree. This was the reason for the discussion on "baselines"; in fact this is the official UNCCD definition! Early on it was realized that "degradation" means different things in different contexts, and it was proposed that a full discussion of this would go in Ch 1 and Ch2. Here in Ch 4, we summarize the baseline issue briefly, with a reference to the topic in Ch 2.
Cristina Branquinho	Chapter 4	6	24	6	36	there is a repetition of definitions from Chapter 1, avoid this repetition	Harmonization of definitions was done for the subsequent draft.
Victor M. Castillo (UNCCD)	Chapter 4	6	24	6	36	Even though we recognize the LDRA should follow definition approved in the full scoping phase, their relevance would be enriched by critically review the multiple definitions on land degradation, and desertification as a particular case for drylands, provided by scientific literature and how the conceptualization of this term has evolved following new insights into land systems dynamic and policy demands. See for a review Vogt et al, 2011. Land Degradation and Development 150-165 In particular reference to the widely accepted definition provided by UNCCD need to be mentioned, This concept has been expanding by Verstraete, Scholes and Stafford-Smit In Climate and desertification: looking at an old problem through new lenses Front.Ecol Environ., 2009 7 (8):421-428 to consider desertification as a "broad set of environmental degradation process that result in a persistent decrease in the productivity of drylands". Thus, desertification Includes any form of degradation in drylands ( which from should be specified in any given context) , where degradation refers to a persistent reduction in the bundle of services provided to humans by the ecosystem under consideration, thus encompassing both soicla and geophysical considerations	A discussion of the widely accepted definition of dryland degradation ("desertification") by UNCCD need to be discussed. See Section 4.4 Case Study on desertification.
German government	Chapter 4	6	24	6	30	Ensure that the wording of the definition of land degradation is consistent with the definition of "land degradation" provided in section 1.1.2.	Harmonization of definitions was done for the subsequent draft.
Ben ten Brink	Chapter 4	6	28	6	28	I suggest to focus only on human caused land degradation, and keep natural shifts/fluctuations outside the scope of this study.	"Natural" degradation (e.g. stream bank erosion) is to be omitted from the Assessment (except to explain the distinction and the focus on anthropogenic degradation). This is what the Ch 4. FOD text states

Marina Rosales Benites de Franco	Chapter 4	6	26	6	29	"Land degradation", in turn, refers to the many processes that drive the decline or loss in biodiversity, ecosystem functions or/and services, and includes the degradation of all terrestrial ecosystems. Land degradation is recognized as predominantly anthropogenically driven (including from climate change) and therefore, land degradation processes are <b>physical, and social and economic</b> processes.	Introduction was rewritten, including a "road-map" of the place of Ch 4 in the overall Assessment, especially in the Chapter 3, 5, 6 sequence.
German government	Chapter 4	6	30	6	31	Regarding the definition of "restoration": Refer to section 1.1.2 so that it is clear that the same definition is being used (throughout the document).	Harmonization of definitions was done for the subsequent draft.
German government	Chapter 4	6	31	6	32	Regarding the definition of "rehabilitation": Refer to section 1.1.2 so that it is clear that the same definition is being used (throughout the document).	Harmonization of definitions was done for the subsequent draft.
German government	Chapter 4	6	33	6	36	Include the definition of "ecosystems functions" in section 1.2.2. as it is a key term used throughout the LDR-Assessment.	Harmonization of definitions was done for the subsequent draft.
Stellmes, Marion	Chapter 4	6	38	9	150	The degradation processes listed here run on different levels and overlap. For instance, soil degradation and pollution are often results of mal-mangement of land-use. I would at least already structure them in the text according to the overall table of contents and explain the chosen structure. I would propose to use figure 11 of chapter 4 already in the beginning of the chapter as it nicely shows the main relationships between key human drivers and landscape-level degradation processes.	Figure 1 was replaced with an elaborated version of Fig 11
Ben ten Brink	Chapter 4	6	38	6	141	This feels as an anecdotal or arbitrary list. Maybe the list can be logically derived from those pressures or underlying processes that affect biodiv and the above mentioned 4 key ecosystem functions most. They seem not to be a consistent categorisation for they are partly overlapping, such as land use change-mining- infrastructure-urbanisation. Why forest degradation and not grassland degradation? Forest degradation is merely an endterm (biodiv loss) than an underlying process	The list of contents of Sections 4.2 and 4.3 was deleted and replaced with a presentation of status and trends associated with each driver, stressing fundamental issues.
Ernesto Viglizzo	Chapter 4	6	38	9	164	Regarding types of land degradation processes: degradation causes and degradation effects should not be confounded. For example, soil degradation is an effect, but mal-management or land-use change are causes of land degradation.	Introduction was rewritten, this point was dealt with in the introduction.
Hamid Custovic (SPI)	Chapter 4	7	43	7	43	Add text: soil mineralization and loss of plant nutrition, " <b>soil aridification</b> " etc.	Introduction was rewritten, this point was dealt with in the introduction.
Gerardo Ojeda	Chapter 4	7	43	7	43	I suggest to replace "soil mineralization" by "loss of soil organic matter by mineralization". If you search in google or sciencedirect, soil mineralization is not found. You can find nitrogen or carbon mineralization.	Introduction was rewritten, this point was dealt with in the introduction.
Gerardo Ojeda	Chapter 4	7	43	7	43	I believe that sedimentation is not a soil degradation process. "Hypoxia in sediments" could be considered a degradation process because it affects sediment fauna. In my opinion, sedimentation could be considered as natural process responsible of responsible for the creation of ecosystems such as estuaries or mangroves.	Introduction was rewritten, this point was dealt with in the introduction.
Chenu Claire	Chapter 4		44		L 44	biological rather than biotic	Corrected
D. Pennock (ITPS)	Chapter 4	7	46	7	49	The list of erosion processes does not include tillage, which has been demonstrated in 100's of studies to be a major erosion process	The revision of Sect 4.1 took this into account
Hamid Custovic (SPI)	Chapter 4	7	46		49	Revise list so that that it includes only discrete categories or explain that some processes are examples of broader categories. Delete infiltration, which is a process that minimises erosion.	The revision of Sect 4.1 took this into account
Gerardo Ojeda	Chapter 4	7	47	7	47	I suggest to replace "gully erosion" by "gully erosion"	Corrected
Gunay Erpul	Chapter 4	7	47	7	47	gully	Corrected
Li Changxiao	Chapter 4	7	48	7	48	Add at before "any land types"	Corrected
Dr. Erika Berenguer	Chapter 4	7	51	7	55	It is striking that this section does not include loss of forest carbon due to human disturbance. As a matter of fact, reading the section (pg 34-35) the section does not encompass almost any of the topics listed between lines 51-55. The section on biocarbon just covers soil carbon. Either re-adjust this part (lines 51-55) or the whole of the section (pages 34-35). Some references: Berenguer et al (2014), Global Change Biology; Edwards et al (2014), TREE, Page et al (2002), Nature	The revision of Sect 4.1 took this into account
Chenu Claire	Chapter 4		51			« Bio-carbon » is not a generally used term. In fact what is covered here is « organic carbon » either as dead organic matter or as biomass. Or replace by « organic matter and biomass loss » ?	Terminology corrected
Tandra Fraser	Chapter 4	7	51	7	57	Soil biodiversity should be include here as a large quantity of carbon can be held up in, and cycled by soil the soil biota	The revision of Sect 4.1 took this into account
Hamid Custovic (SPI)	Chapter 4	7	51		55	Revise list so that that it includes only discrete categories or explain that some processes are examples of broader categories. Delete "from burning of fuelwood" or substitute "for fuel". (Charoccal production occurs through pyrolysis, not "burning" (combustion).) Explain how "paper-making" is a "biocarbon loss". (Presumably this does not refer to harvest of pulpwood, as that is covered in "human appropriation of natural resources and primary production".	The revision of Sect 4.1 took this into account
Ernesto Viglizzo	Chapter 4	7	51	7	51	Deforestation and devegetation should be mentioned as a source of bio-carbon loss	The revision of Sect 4.1 took this into account
Kani ISIK	Chapter 4	7	57	7	60	Please also add "radioactive pollution" and "nuclear wastes" in the definition of pollution	The revision of Sect 4.1 took this into account
Gerardo Ojeda	Chapter 4	7	59	7	47	I suggest to add "sewage sludge"	The revision of Sect 4.1 took this into account
Li Changxiao	Chapter 4	7	62	7	62	Change "include" to "includes"	Corrected



Hamid Custovic (SPI)	Chapter 4	7	63		64	Reword. Inland rivers, lakes, wetlands, peatland and coastal water ecosystems are not "ground water".	Agree
Dr. Erika Berenguer	Chapter 4	7	67	7	71	This section should also include shifts in biodiversity baselines and community shifts resulting from degradation. Some references: Gardmark et al (2014), Phil Trans B, Solar et al (2015), Ecology Letters	Important issue: ecosystems have undergone 'regime shifts', i.e. abrupt reorganizations across trophic levels. Establishing whether these constitute shifts between alternative stable states is of key importance for the prospects of ecosystem recovery and for management. See references to this important point in Case Study 4, Desertification. Abrupt changes between stable states were added to type 5 of the typology of degradation (lines 1987-1996) in Sect 4.
Stellmes, Marion	Chapter 4	7	67	7	83	I think the wording is a bit confusing: landscape change and climate change and land use change are not per se causing land degradation. Therefore I would be more specific, e.g. landscape change related degradation processes	Agree, this was changed.
Wang Jun	Chapter 4	7	67	8	113-117	It is suggested that this "landscape changes" and "land use changes" parts are combined. The title is "land use and landscape changes".	These are not the same.
Wang Jun	Chapter 4	7	69	8	119-123	Suggested that two contents merge together. The subheading is "population changes and invasion of alien species"	These are not the same.
Hamid Custovic (SPI)	Chapter 4	7	70			What is meant by "changes in metapopulation effects"?	Agree, this is an inappropriate detail. The whole section (lines 38-141) was rewritten
Ernesto Viglizzo	Chapter 4	7	73	7	73	Climate change may be cause of land degradation, but it is not a degradation process by itself	It could be argued that climate change is, at least partly, caused by human degradation.
David Lamb	Chapter 4		81			not just alpine areas. Altitudinal changes can occur along altitudinal gradients in sub-alpine areas	Introduction now addresses status and trends associated with each driver, stressing fundamental issues.
Dr. Erika Berenguer	Chapter 4	8	85	8	90	I wonder till what point deforestation and urban expansion can be considered 'land degradation'. In line 239 the authors distinguish between 'transformation' and 'degradation', placing deforestation into the 'transformation' category and not into 'degradation'. The same argument could apply for expansion of urban areas. Some references: Putz & Redford (2010, Biotropica	What is the difference between utilization and degradation? This is a point that should be dealt with in the early chapters of the LDRA. It is a case of the 4th type of Baseline in "Baselines and reference conditions" (white paper by Steve Prince 21 February 2016)
German government	Chapter 4	8	85	8	90	In order to avoid redundancy and ensure alignment, please check the information provided in chapter 3 on "forest degradation" (section 3.3.1).	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting and streamlined for the SOD.
David Lamb	Chapter 4		86			clear cutting and selective logging are not necessarily causes of degradation. Rather, they can be part of a well-managed and sustainable silvicultural system. Many forests in Europe and elsewhere have been managed for over 100 years using these two tools. They only cause degradation when established silvicultural prescriptions are ignored and logging is too intense	This text was removed. The point is relevant to the full presentation of the topic in Sect 4.3.4
Hamid Custovic (SPI)	Chapter 4	8	86	8	86	Add text: changes in natural fire regimes, "forest fires, forest pest and diseases, movement of lands", reduced...	This text was removed. The point is relevant to the full presentation of the topic in Sect 4.3.5
Hamid Custovic (SPI)	Chapter 4	8	92			Mal-management is a clumsy term. Reword.	Agree. Reworded
Hamid Custovic (SPI)	Chapter 4	8	102		111	This sentence is an incomprehensible jumble of agricultural practices, and impacts. Reword to provide a clear description of the practices that can lead to land degradation in croplands. Are you claiming that conservation strips of natural vegetation in agricultural fields is a degrading practice?	This is a consequence of writing just a list of contents of Sections 4.2 and 4.3. Replaced with an Executive Summary which addresses status and trends associated with each driver, stressing fundamental issues.
Chenu Claire	Chapter 4		104			use of pesticides and herbicides (or excessive use of)	The revision of Sect 4.1 took this into account
German government	Chapter 4	8	104	8	104	Regarding "pesticides and herbicides (including effects on non-target species)": Provide a reference to the outcomes of the IPBES assessment report on "pollinators, pollination and food production" (D3a).	The revision of Sect 4.1 took this into account
David Lamb	Chapter 4	8	105			the world relies on large areas of monocultures for much of our food and has done so for a long time. Of course monocultures of crops and commercial trees carry some ecological (and economic) risks but the practice is unlikely to be entirely abandoned. Maybe the more critical point is that we should aim for diverse landscapes that can contain patches of monocultures?	The revision of Sect 4.2.6 and 4.3.3 addressed this. It is also a part of the discussion of types of baselines - type 4 (see Steve Prince white paper).
Chenu Claire	Chapter 4	8	107			« conservation strips of natural vegetation in agricultural fields » : why is this a mal-management ?	Agree, it isn't! The revision of Sect 4.1 removed this mis-statement.
Chenu Claire	Chapter 4	8	110			CO2 fertilization is not a mal-management. It is a side effect of climate change	Agree, it isn't! But neither is it effect of climate change, it is also a cause of climate change. The revision of Sect 4.1 removed this mis-statement.
Chenu Claire	Chapter 4	8	110		L111	L110-111 are difficult to understand	The revision of Sect 4.1 removed this text
Brajendra (ITPS)	Chapter 4	9	132	9	same line	according the subcategories	Comment not understood
Li Changxiao	Chapter 4	9	134	9	134	Change "cannel" to "channel"	OK, corrected
Hamid Custovic (SPI)	Chapter 4	9	135	9	135	Add text: ... urban areas and construction of other types of urban facilities "touristic infrastructure, acuatuc and semiacuatuc productive infrastructure, urban and suburban buildings/services".	This Section was removed, but the comment is relevant to the full presentation of the topic in Sect 4.3.10 and was considered as such there.

Dr. Erika Berenguer	Chapter 4	9	143	9	150	What about changes that we are not sure whether they are permanent or not due to the short timeframes since the onset the degradation process?	This is a qualifier of the 4th type of "degradadion state" , summarized on lines 1987-1996 ("Temporal trend of increase in degradation which persists when stressors e.g. drought, overstocking, are removed"). The typology of degradation states is now dealt with in an early section of the LDRA.
Hamid Custovic (SPI)	Chapter 4	55	152		153	Sounds interesting. Provide reference.	Not sure to what the reviewer is referring. Is it lines 143-150 on different types of "degradation"?
Elizabeth Bach	Chapter 4	9	157	9	164	A very clear structure is laid out here for the following sections. However, the individual sections vary widely in structure. Most sections include all of these elements, but it would be easier for readers if read section considered using consistent sub-headings to make this information easy to find.	Chapter 4 topics and overlaps with Ch 3 was discussed at the 2nd Authors' meeting. A clear delianation was agreed upon for the revision phase and delivery of SOD.
Stellmes, Marion	Chapter 4	9	160	9	160	Chapter 3 treats the drivers of land degradation in detail. This should be streamlined with chapter 4.	Chapter 4 topics and overlaps with Ch 3 was discussed at the 2nd Authors' meeting. A clear delianation was agreed upon for the revision phase and delivery of SOD.
German government	Chapter 4	9	164	9	164	Define "remediation" and explain its relationship to "restoration" and "rehabilitation".	Chapter 4 topics and overlaps with Ch 3 was discussed at the 2nd Authors' meeting. A clear delianation was agreed upon for the revision phase and delivery of SOD.
Hamid Custovic (SPI)	Chapter 4	10	182	10	182	Add text: The general objective of chapter 4 "is added" for to support	OK. Added
Hamid Custovic (SPI)	Chapter 4	10	183	10	183	linking " <i>and focusing synegetic visions and strategies of</i> " land degradation and biodiversity and ecosystem services.	This applies mainly to other chapters, not Ch 4. This paragraph was reviewed when Sect 4.1 was revised, but the nature of the comment applies mainly to other chapters
Chenu Claire	Chapter 4		188		192	I appreciated the graphs ! Could it be used also later on in the text ?	The 2nd version of the schematic was deleted. This graphic was edited by rotating 90 deg clockwise to reflect the order of Sections in the Chapter.
Elizabeth Bach	Chapter 4	11	189	11	193	The purpose of Fig. 1 is not clear to me. I appreciate thinking of the processes, human activities, and case studies as dimensions of the whole document. However, the image of a cube did not help my understanding of what was going to be presented.	The figure was replaced with Fig. 11.
German government	Chapter 4	11	189			The added information value of the cube (Figure 1) is not quite clear. Please check that the reasons for including Figure 1 are sufficiently strong to include it in this chapter.	The figure was replaced with Fig. 11.
Ernesto Viglizzo	Chapter 4	11	189	11	193	Figure 1: again, I believe that climate change is a driver of land degradation, but not a process.	Climate change is mostly a driver but, in a sense that is only marginally important to the LDRA, it is also a process since it is partly/mostly driven by human actions.
Ben ten Brink	Chapter 4	11	191	12	196	The figure is hard to understand. Positioning in the DPSIR chain would be more informative.	The figure was replaced with Fig. 11.
Ben ten Brink	Chapter 4	11	191	12	196	The drivers mentioned in the figure and dealt with in Section 4.3 are arbitrary and anecdotal as well. Why these, why not other? How do they distinguish from the processes? How do they fit in the DPSIR frame? See my comments above on line 38-141	These Drivers were selected to follow on from the human driverrrs in Ch.3 It is true they are not ideal (e.g. "Invasive species" is not a human driver, rather a process that arises as a result of other drivers). This interface with Ch 3 was discussed at the 2nd Authors' meeting.
Stellmes, Marion	Chapter 4	11	191	12	figure 2	Figure 1 and Figure 2 The contents of the figures are not very clear to me and I am not sure if they really add urgently needed information. If the figures shall be part of the report they need to be described in more detail.	The figure was replaced with Fig. 11.
Hamid Custovic (SPI)	Chapter 4	11	191			This does not aid understanding of the structure of the chapter nor its relationship to the other chapters. Delete or revise substantially.	The figure was replaced with Fig. 11.
Meredith Root-Bernstein	Chapter 4	11	191	12		Figure 1 and 2: I am not sure these are helpful. Hard to understand. The description in the text makes plenty of sense.	The figure was replaced with Fig. 11.
Elizabeth Bach	Chapter 4	12	194	12	196	Figure 2 is more compelling to me than Fig. 1, it might be more clear if only Fig. 2 was presented.	The figure was replaced with Fig. 11.
Stellmes, Marion	Chapter 4	12	197	13	228	Please, streamline/shorten the listed aims. Maybe a workflow would be good showing the different aspects and elements of the reports aims.	I agree they are not all relevant to Chapter 4. The list might be better placed earlier in the Introduction where it could replace the several repetitions of the aims.
Stellmes, Marion	Chapter 4	12	197	13	228	2. "... provide the information and guidance necessary to support stakeholders working at all levels to reduce the negative impacts of land degradation on biodiversity and ecosystem services" --> Is this really the aim of chapter 4? This sounds more like a separate chapter. I would keep the focus of each chapter on a concise topic.	I agree they are not all relevant to Chapter 4. The list might be better placed earlier in the Introduction where it could replace the several repetitions of the aims.
D. Pennock (ITPS)	Chapter 4	12	197	13	228	This list should be confinded to Chapter 4 only - the goal of the overall assessment has been covered earlier.	I agree they are not all relevant to Chapter 4. The list might be better placed earlier in the Introduction where it could replace the several repetitions of the aims.

Peter Onorato	Chapter 4	12	198	12	198	provide baseline, evidences and basis relevant to the linkage of land degradation and	provide a baseline, evidence and bases relevant to the linkage of land degradation and
Li Changxiao	Chapter 4	13	230	14	260	It would be great if there is a tree diagram or table list to be added to present the "History of degradation studies".	Noted thank you.
Kani ISIK	Chapter 4	13	230	13	235	The Hittites can also be mentioned among the ancient cultures that caused land degradation. Additional information: The Hittites were Ancient Anatolian people who established an empire starting around 1800 BC. They were one of the first to built one of the first known water dam used for irrigation purposes. This empire covered an area including most of Asia Minor as well as parts of the northern Levant and Upper Mesopotamia. Ref: Bryce, Trevor R. (2002) Life and Society in the Hittite World, Oxford	Are they an example of the demise of as culture owing to degradation?
Hamid Custovic (SPI)	Chapter 4	13	230			This material is covered in previous chapters.	Any material on the processes, their severity and extent belongs in Ch 4. The overlap with Ch3 was discussed at the second author's meeting
Peter Onorato	Chapter 4	13	231	13	235	This section is speculation, particularly the second part. Provide a source or delete. "Land degradation predates modern written history, with the earliest well documented example of degradation being Mesopotamia where irrigated agriculture in the Tigris and Euphrates systems starting in the 4th millennium BC, led to salinization (Conacher, 2009). It has been speculated that the downfall of many civilizations including the Carthage, the Harappan Civilization, Ancient Greece, the Roman Empire and Ancient China, has been in part related to resource degradation."	There is a citation, but more examples and their citations were added (but only on the status and trends aspects)
Comerma (ITPS)	Chapter 4	13	234			Add the Mayan in Central America	Noted - will be considered, if status and trends records exist
Peter Onorato	Chapter 4	13	236	13	236	Modern attempts to quantify the extent and scale of land degradation has proven to be extremely	"Extremely" what? Poorly known ?
Dr. Erika Berenguer	Chapter 4	13	237	13	241	This discussion about definitions of degradation and the difficulty of assessing it should be at the very beginning of the chapter, to avoid the contradictions previously pointed out. It is vital that scientists and policy makers alike are clear to what 'land degradation' refers to, which will help on the overall understanding of this chapter.	The definitions are now placed in the Preface of the final report, so it's the first thing that's laid out in the report.
Comerma (ITPS)	Chapter 4	13	245			there is now or there is no way?	"now no way"
Stellmes, Marion	Chapter 4	13	246	13	249	please, add more references here. There are some overview papers that summarize many important studies: 1) Turner, K.C., S. Anderson, M. Gonzales-Chang, R. Costanza, S. Courville, T. Dalgaard, E. Dominati, I. Kubiszewski, S. Ogilvy, L. Porfirio, N. Ratna, H. Sandhu, P. C. Sutton, J. Svenning, G.M. Turner, Y. Varennes, A. Voinov, S. Wratten(2016): A review of methods, data, and models to assess changes in the value of ecosystem services from land degradation and restoration, Ecological Modelling, vol. 319:190-207. 2) Stellmes, M., Sonnenschein, R., Röder, A., Udelhoven, T., Sommer, S. & Hill, J. (2015): Land Degradation Assessment and Monitoring of Drylands. In P. Thenkabail (ed.), Remote Sensing of Water Resources, Disasters, and Urban Studies, Remote Sensing Handbook, Volume 3, Boca Raton, USA, p. 417-452.	We have reviewed these sources and added what was appropriate. Turner et al. provide important material mainly on HUMAN drivers: it gives a list of topics for Ch 3 (see sect 2.1 and Fig 1 in Turner et al. ), but rather little on biophysical status and trends relevant to Ch .4
Stellmes, Marion	Chapter 4	13	246	13	249	The concept of HANPP could be interesting as well: Zika, M., & K.-H. Erb. 2009. The global loss of net primary production resulting from human-induced soil degradation in drylands. Ecological Economics 69: 310-318.	Dealt with in Section 4.4 Desertification Case Study
Stellmes, Marion	Chapter 4	13	250	13	157	Many of these studies refer to drylands only. Please, mention this. Are there any criteria which projects and initiatives are mentioned here?	This topic is dealt with in Sect 4.4 Desertification. Other datasets are referenced here as well (forest loss, soil degradation, atmospheric dust )
Stellmes, Marion	Chapter 4	13	256	13	256	please edit reference: Barrio = del Barrio	OK, corrected
Li Changxiao	Chapter 4	14	261	14	266	1) The data in Table 1 can be better presented through incorporating the percentage of the degraded land accounting for the total land area. 2) Author(s) should also briefly explain why there is such a big difference between different sources. 3) Which result is more accurate and can be trusted?	These studies were mostly carried out by inaccurate and, in some cases, inappropriate methods. The topic is dealt with (but not all these sources) in Section 4.4 Desertification.
Alberto Orgiazzi	Chapter 4	14	268	14	272	Being my expertise on soil biodiversity I would have appreciated to read this session. I am available to review this part as soon as it was drafted.	We are happy that you can review the next draft of this section when it comes out for second external review (SOD)
Alberto Orgiazzi	Chapter 4	14	268	14	272	There should be reference to the following publications that present an updated list of potential threats to soil biodiversity: 1. Orgiazzi et al. Global Soil Biodiversity Atlas. European Commission, Publications Office of the European Union, Luxembourg. 176 pp. 2. Orgiazzi, A., Panagos, P., Yigini, Y., Dunbar, M. B., Gardi, C., Montanarella, L., Ballabio, C. (2016). A knowledge-based approach to estimating the magnitude and spatial patterns of potential threats to soil biodiversity. Science of The Total Environment, 545–546, 11–20.	Noted and used in the chapter

Bo Wu	Chapter 4	14	268	21		There should be soil alkalization in the 4.2.1 soil processes.	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination (Yue, 2014) (Mu et al., 2014) (Smedley, 2003; Brammer and Ravenscroft, 2009) (Luo et al., 2009) (Williams et al., 1996) (Brammer and Ravenscroft, 2009) (Zhuang et al., 2009; Chang et al., 1999, 2007).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination (Simmons et al., 2005) (Li et al., 2009) (Asami, 1981) (Wei and Chen, 2001).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination (Dibiyantoro, 1998) (Shoiful et al., 2012; Rahmawati et al., 2013) (Limbong et al., 2003; Edinger et al., 2008) (Veiga et al., 2009) (Doyle et al., 2003).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination (Chan et al., 1986) (Sheppard et al., 2009) Watmough and Hutchinson (2004) (Sheppard and Sanipelli, 2012) (Grant et al., 1998).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination Naidu et al. (1996) (Tiller, 1992; Barzi et al., 1996), (Roberts et al., 1996), (Singh, Levett and Kumar, 1996) (Morrison, Gangaiya and Koshy, 1996) (Cartwright, Merry and Tiller, 1976).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	269	14	269	Soil contamination (Balks et al., 2002) (Aislabie et al., 2004, 2012; Delille et al. 2000).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Irrigation and soil salinization (Ghassemi, Jakeman and Nix, 1995) (Heinze, 2002), (Moreira et al., 2014), (Silveira et al., 2008) (Alvarez et al., 2008) (Jaramillo, Arahana and Torres, 2014) (Palacios-Vélez, 2012) (Cornejo, 1970) (Al-Hiba, 1997).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Status and extent of salinity (Ghassemi, Jakeman and Nix, 1995) (Squires and Glenn, 2011) (Casierra-Posada, Pachón and Niño-Medina, 2007) (Borroto and Castillo, 1986) (Villafaña, 1995) (Hussein, 2001) (Qadir, Qureshi and Cheraghi, 2008) (Abdelfattah, 2012), (Abdelfattah and Shahid, 2007).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Causes of soil salinization (Abdelfattah and Shahid, 2007) (Siadat, Bybordi and Malakouti, 1997)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Trends and impacts of soil salinization (Qadir et al., 2014).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Responses (Qureshi et al., 2008) (Qadir, Qureshi and Cheraghi, 2007) (Djavanshir, Dasmalchi and Emararty, 1996) (Koocheki, 2000; Nejad and Koocheki, 2000) (Abd Elrahman et al., 2012). (Mubarak and Nortcliff, 2010).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Soil salinization on the territory of the European region (Afonin et al., 2008; Toth et al., 2008; GDRS, 1987).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Soil salinization (Spain) (Hernández Bastida, Vela de Oro and Ortiz Silla, 2004) (Pérez-Sirvent et al., 2003; Acosta et al., 2011) (De Paz et al., 2004).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Clearing forest and soil salinization (Paruelo, Guerschman and Verón, 2005; Viglizzo and Jobbagy, 2010).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Land clearing, overgrazing and soil salinization (Taboada, Rubio and Chaneton, 2011, Bandera, 2013, Di Bella et al., 2015) (Szabolcs, 1979).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Extent of soil salinization. Areas in United States threatened by salinization and sodification. NRCS. Risk of soil salinization in Canada 2011 (Clearwater et al., 2015.)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	270	14	270	Dryland salinity (van Dijk et al., 2013) (George et al., 2008a; Robertson et al., 2010) (George et al., 2005). (George et al., 2008b) (Simons, George and Raper, 2013).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Hamid Custovic (SPI)	Chapter 4	14	271			How is "soil biodiversity" a degradation process?	It was "degradation of soil biodiversity"
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity (Gans et al., 2005) (Decaëns et al., 2006),,	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity as an important regulator of other vital soil services including nutrient cycling, moderation of greenhouse gas emissions, and water purification (Decaëns et al., 2006).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity as a biotechnological exploitation (Brevik and Sauer, 2015).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity under different soil, climatic and land use scenarios (Allison and Martiny, 2008).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The spatial structure of soil communities (Fierer and Jackson, 2006) (Griffiths et al., 2011).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Physiological activity of soil organisms (e.g. Radajewski et al., 2000) (Fierer et al., 2013).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity and functioning, Global Soil Biodiversity Atlas (European Commission, 2015) (Furusaka, 1993), (Orgiazzi et al., 2015).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The effect of pesticides on soil biodiversity (De et al. 2014), (Boldt and Jacobsen, 1998), (Bünemann, Schwenke and Van Zwieten, 2006), (Panda and Sahu, 2004), (Baxter and Cummings, 2008), (Heupel, 2002), (Amorim, Rombke and Soares, 2005).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The effect of pesticides on soil biodiversity (Pandey and Singh, 2004), (Endlweber, Schadler and Scheu, 2005), (Yasmin and D'Souza, 2010), (Espinoza-Navarro and Bustos-Obregon, 2005), (Zhou et al., 2007; De Silva et al., 2010), (Römke, Garcia and Scheffczyk, 2007), (De Silva et al., 2010)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)

Gunay Erpul	Chapter 4	14	271	14	271	The effect of pesticides on soil biodiversity (Navarro-Campos et al., 2012), (Eijsackers et al., 2005), (Van Zwieten et al., 2004).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biota and land use (Wagg et al., 2014), (Wardle et al., 2004; De Deyn and van der Putten, 2005; Bardgett and van der Putten, 2014), (Tsiafouli et al., 2015), (Breure et al., 2004), (Crossley et al., 1992), (Paoletti et al., 1993).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Biodiversity of soil fauna (Decaens and Jimenez, 2002), (Eggleton et al., 2002), (Wall et al., 2008),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil fungi (Tederloo et al., 2014), (Treseder, 2008), (Berch, Morris and Malcolm, 2011).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Threshold levels of soil biodiversity for functions (Van der Heijden et al., 1998; Liiri et al., 2002; Setälä and McLean, 2004), (e.g. Setälä, Berg and Jones, 2005),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil compaction effects on soil biodiversity (Beylich et al., 2010),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The roles of SOC and soil biodiversity (Naem et al., 2009; Bommarco, Kleijn and Potts, 2013; Palm et al., 2014), (Sylvain and Wall, 2011), (Bommarco, Kleijn and Potts, 2013)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Land use intensity and soil organic matter loss and soil biodiversity (Gardi, Jeffery and Saltelli, 2013), (Gardi et al., 2013)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity declines with conversion of natural lands to agriculture and agricultural intensification (Bloemers et al., 1997; Eggleton et al., 2002; Dlamini and Haynes, 2004), (Mulder et al., 2005; Postma-Blaauw et al., 2010; De Vries et al., 2013).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Climate change as a considerable threat to soil biodiversity (Bardgett et al., 2008), (Blankinship, Niklaus and Hungate, 2011; van Groenigen et al., 2014), (Nearing et al., 2005), (Mullan, 2013)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil sealing and soil biodiversity (Gardi, Jeffery and Saltelli, 2013), invasive species and soil environment (Wardle et al., 2011).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The functional consequences of belowground diversity loss (Cardinale et al., 2012), (Nielsen et al., 2011), (Heemsbergen et al., 2004), (Wagg et al., 2014), (Handa et al., 2014), (De Vries et al., 2013),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil resilience (De Vries et al., 2012).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil biodiversity and vegetation dynamics (van der Putten et al., 2013), (van der Heijden, Bardgett and van Straalen, 2008), (van der Heijden et al., 1998), (Bever, Westover and Antonovics, 1997; Packer and Clay, 2000; Klironomos, 2002), (Wardle et al., 2011).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Soil physical properties and soil biodiversity (Hallett et al., 2009), (Rillig and Mulley, 2006), (Bardgett, 2005).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Loss of soil biodiversity (Okwakol, 2000), (Ayuke et al., 2011) (Baoming et al., 2014), (Doi and Ranamukhaarachchi, 2013), (Rossi and Blanchart, 2005), (Mujeeb Rahman, Mujeeb, Varma and Sileshi, 2012), (Blanchart and Julka, 1997),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Loss of soil biodiversity (Alegre, Pashansi and Lavelle, 1996, White et al., 2005; Urquiaga et al., 2014), (Ferraro and Ghera, 2007), (Balotta et al., 2004; Sicardi, Garcia-Prézac and Frioni, 2004; Nogueira et al., 2006; Green et al., 2007; Franchini et al., 2007; de Moraes Sa and Lal, 2009; Romaniuk et al., 2012; Henriquez et al., 2014).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Loss of soil biodiversity (Al-Eisawi, 1998), (Nunez and Dickie, 2014),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Deforestation and soil biodiversity (Crowther et al., 2014)	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Crop rotation and soil biodiversity (McDaniel, Tiemann and Grandy, 2014),	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Permafrost melting and climate change and soil biodiversity (Vincent et al., 2009), wildfire and soil biodiversity (Krawchuk et al., 2009).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	The Global Soil Biodiversity Initiative (GSBI) (GSBI, 2014): platform for the coordination of research	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	14	271	14	271	Woodman et al. (2008): distribution and status of biodiversity in Australia	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
German government	Chapter 4	14	274	21	471	Overly detailed information: Is it really important to explain soil acidification at the level of molecular processes? If so, then please consider putting such detailed information in a box.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Hamid Custovic (SPI)	Chapter 4	15	274			Add section on the extent of acidification.	What little information there is, has now been added
Beverly Wemple	Chapter 4	14	274	34		Text within these sections is excessively detailed. As a reader, I struggle to get the key points with so much detail in these sections. Beginning with section on Carbon Balance (4.2.3), text seems more to the point.	Section completely rewritten without process details

D. Pennock (ITPS)	Chapter 4	14	276	14	272	Agree with Montanarella comment - this material should be condensed from SWSR report	Section completely rewritten without process details
Kani ISIK	Chapter 4	15	276	15	277	Jenny's (1941) "Soil Forming Factor Equation" is well known by this equation: $S = f(CI, O, r, p, t...)$ (abbreviations are in order of importance of their impacts on soil formation). This equation could also be inserted near the related sentence.	Section completely rewritten
Comerma (ITPS)	Chapter 4	15	282			highly weathered soils because of their low buffering capacity.	Section completely rewritten
Beverley Wemple	Chapter 4	15	285	16	324	This is quite detailed information on soil chemistry that I'm not sure the lay reader would absorb. Perhaps better placed in a box or in a footnote?	Section completely rewritten without process details
Stellmes, Marion	Chapter 4	15	285	ongoing		I would not expect this information about acidification etc. in a chapter describing the status and trends of land degradation and restoration. Even though this handbook-like descriptions are interesting I would rather expect to read about the occurrence of these soil degradation types (see general comment on chapter 4).	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
D. Pennock (ITPS)	Chapter 4	15	285	16	332	This is far too detailed for a report of this scope.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Comerma (ITPS)	Chapter 4		288		324	too much detail, should be simplified and reduced	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Hamid Custovic (SPI)	Chapter 4	15	288	16	322	Delete or substantially condense. This level of detail on underlying chemical reactions should not be included in this report, for which the intended audience is stated as decision-makers. The chapter is already far too long; If the same detail was added for the processes that are yet to be described, the chapter was much longer. Refer the reader to a text book, for further reading.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Gunay Erpul	Chapter 4	16	346	17	390	The global distribution of acid sensitive soils (Bouman et al., 2002), (Rodríguez-Lado, Montanarella and Macías, 2007), (Tipping et al., 2003; Laudon et al., 2004; Daniels et al., 2008), (Krug and Frink, 1983; Monteith et al., 2007).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Comerma (ITPS)	Chapter 4	17	361		362	this is very similar to the concept of negative balance of nutrients or more extraction than supply, which is very extensive in grazing with no fertilization . typical in south America	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Alberto Orgiazzi	Chapter 4	17	369	17	369	"nutrients" not "nutrients"	Corrected
D. Pennock (ITPS)	Chapter 4	17	370	17	379	Again, this is far too detailed.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Gunay Erpul	Chapter 4	17	392	18	409	Impact of soil acidification: microbiological activity (Cronan and Grigal, 1995; Robson and Abbott, 1989; Slattery and Hollier, 2002; Sverdrup and Warfvinge, 1993; Whitfield et al., 2010).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	17	392	18	409	Impact of soil acidification: carbon sequestration (Haynes and Swift, 1986), subsoil acidity (Tang, 2004) (Chen, 2007), soil erosion (Slattery and Hollier, 2002).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Gunay Erpul	Chapter 4	17	392	18	409	Impact of soil acidification: mobilization of heavy metals into water resources (Driscoll et al., 2003; Reuss and Johnson, 1986; Schindler et al., 1980; Slattery and Hollier, 2002; Voegelin, Barmettler and Kretzschmar, 2003).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
Jian Zhang	Chapter 4	18	411	19	444	As an important part of soil biota, microbiol response should be included in this section.	Now included
Kani ISIK	Chapter 4	18	411	19	444	Responses of soil organisms (mac-, micro..) need also be mentioned under the title "Biotic Response to Soil Acidification"	Now included
Alberto Orgiazzi	Chapter 4	18	411	19	444	In this section there should be a part dedicated to the effects of soil acidification on soil-living organisms. Some references to be considered are: 1. Zeng, J., Liu, X., Song, L., Lin, X., Zhang, H., Shen, C., and Chu, H. 2016. Nitrogen fertilization directly affects soil bacterial diversity and indirectly affects bacterial community composition. Soil Biol. Biochem. 99:92:41-49 2. Brunner, I. 2001. Ectomycorrhizas: Their role in forest ecosystems under the impact of acidifying pollutants. Persp. Plant Ecol. Evol. System. 4:13 – 27. 3. Rusek J. & Marshall, V. G. (2000). Impacts of airborne pollutants on soil fauna. Annu. Rev. Ecol. Syst. 31,395-423	Now included
Gunay Erpul	Chapter 4	18	411	19	444	Biological recovery of soil acidification (responses) (Marschner and Noble, 2000).	Thank you, this citation was incorporated into the relevant section of the revised chapter (SOD)
D. Pennock (ITPS)	Chapter 4	18	412	18	418	The statements about agroecosystems is incorrect - acidification was judged in the SWSR report to be the gravest threat to soil functions in Australia and the southwest Pacific. Ancient soils are very susceptible to acidification	Section completely rewritten
Tandra Fraser	Chapter 4	18	441	18	441	What about the effects of soil acidification on soil biodiversity? Soil biodiversity is regulating most of the processes listed here.	Now included
German government	Chapter 4	21	473	24	584	The whole section needs redrafting because it currently sounds more like a textbook rather than an assessment (in fact, some phrases/sentences seem to be incomplete). Include also references to the statements in this section, and include title and numbering of the figures.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.

D. Pennock (ITPS)	Chapter 4	21	474	24	584	This is very basic and simplistic material, and should be greatly condensed.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Comerma (ITPS)	Chapter 4	21	478		482	confused definition of natural or geologic erosion. Examples given are not appropriate as are too local to illustrate well	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
D. Pennock (ITPS)	Chapter 4	21	479	21	482	Where is the citation for this?	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
David Lamb	Chapter 4		480			erosion can be significant in undisturbed forests. Examples are rainforest growing on steep hills in places with intense rainfall (e.g. Papua New Guinea). One can see the extent of such erosion by looking at soil accumulations above buttress roots or other impediments on the forest floor compared with the downslope side.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Kani ISIK	Chapter 4	21	485	22	493	Wind erosion, Ice erosion, Cave erosion etc... I know that use of these terms are well established in soil science and environmental sciences. However, I cannot help to indicate once more that there is a Linguistic problem in the use of word "erosion" in these expressions... For example, "Soil erosion" is the accurate use of the term "erosion", which means "the phenomenon of the physical destruction of topsoil", or "the process of eroding or being eroded of top soil by wind, water, or other natural agents". However, the terms "wind erosion" or "water erosion" are not correct linguistically. By definition, "water erosion" would mean "eroding of water". Similarly, "wind erosion" would mean "eroding of wind".... In conclusion: the correct terms should be "soil erosion by water", "soil erosion by wind", "soil erosion by ice" etc... not "water erosion", not "wind erosion" etc...	Was corrected
Li Changxiao	Chapter 4	22	501	22	502	The figure has no caption.	Caption was added
Comerma (ITPS)	Chapter 4	22	512			instead of loam include silt particles	Included
Peter Onorato	Chapter 4	23	522	23	522	These processes, when strong, can lead to heavy dust and sand storms,	Was corrected
Panos Panagos	Chapter 4	23	533	23	533	The sentence "They are caused and accelerated by different disadvantages in land use." is not correct. Please rephrase it	Was corrected
Tandra Fraser	Chapter 4	23	535	23	536	Many soil organisms and plants roots helps to stabilize soil i.e through fungal networks; also for improving infiltration and thereby reducing erosion	This section was revised
Panos Panagos	Chapter 4	23	539	24	585	Soil erosion is case-sensitive and depends on the combination of different natural and anthropogenic factors. In your bullet list you miss Climate. This is an important natural factor for accelerating soil erosion. Moreover, you miss an additional bullet: Managment Practices which can include "grass margins, contouring, plant residues, terraces, cover crops, etc....	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Ernesto Viglizzo	Chapter 4	23	539	24	584	Regarding factors in soil erosion: literature cites are necessary	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of
Beverley Wemple	Chapter 4	23	541	24	584	All of the factors outlined in this section are important in controlling soil erosion, but I wonder if this could be shorted into a paragraph. The current text reads like a textbook, and is perhaps too detailed for a reader of this report.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Gerardo Ojeda	Chapter 4	24	558	24	558	I suggest to add "The rates of soil erosion depends mainly on the detachment of soil particles and on the transporting capacity of overland runoff". Julien PY, Simons DB, 1985. Sediment transport capacity of overland flow. Transactions of the ASAE 28, 755-762	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Ashish Upadhyay	Chapter 4	24	586			In addition, remote sensing can also provide useful information regarding erosion. The use of satellite image interpretation to identify changes in the extent of land cover provides a prediction of erosion potential rather than a measure of actual erosion (Porarinsdottir, 2008). Lantieri (2003)	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Gunay Erpul	Chapter 4	24	586	34	734	Location of active and fixed aeolian deposits (Thomas and Wiggs, 2008).	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
D. Pennock (ITPS)	Chapter 4	24	587	31	651	This section contains a very large amount of completely uncited or dubiously cited material and needs to be re-thought. For example, the Pimental and Burgess (2013) article cited for the first sentence does not provide any credible support for the two pieces of information provided (75 billion tonnes of erosion equating to 10 million ha lost each year). The erosion sections in the SWSR provide credible and well-supported estimates of erosion and should be used in this section.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Samuel Nshutiyayesu	Chapter 4	25	588	25	558	Citation of authors should be harmonized throughout this chapter (e.g. there's a mixture of APA and Chicago citation styles and this should be avoided)	Final citation was harmonized throughout
Wang Jun	Chapter 4	25	588	25	589	Thmpson's article which published in 1995 is a bit old. Whether there is new data to illustrate the status of soil erosion?	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Panos Panagos	Chapter 4	25	591	25		figure 5: in the legend the measurement unit is missing. What the classes represent for?	Corrected
German government	Chapter 4	25	591			Figure 5: In what unit is erosion shown in this figure (> 200 ?).	Corrected

						The information regarding regional assessments in Europe are not updated. According to latest developments and the new erosion assessment in European Union, around 970 million tonnes of soil are under erosion risk every year. The analysis has been described in the publications: - Panagos, P., Imeson, A., Meusburger, K., Borrelli, P., Poesen, J., Alewell, C. 2016. Soil conservation in Europe: wish or reality? Land Degradation and Development. DOI: 10.1002/ldr.2538. - Panagos P, Borrelli P, Robinson DA. 2015. Common Agricultural Policy: tackling soil loss across Europe. Nature 526: 195. DOI:10.1038/526195d	The citation was consired and incorporated in the significantly revised section
Panos Panagos	Chapter 4	25	601	25	613		
Hamid Custovic (SPI)	Chapter 4	25	601			Peculiar statement. Delete or reword.	Revised
German government	Chapter 4	25	601	26	613	It is not clear, where these different numbers are coming from because a lot of references are missing. Please insert references/evidence for each number cited in the text.	Section completely rewritten
Li Changxiao	Chapter 4	26	617	26	618	It should be of interest to add a percentage of each severity accounting for the total area. Is there any newest data available?	Table now removed
Wang Jun	Chapter 4	26	617	26	618	Table 2 should be explained.	Table now removed
Li Changxiao	Chapter 4	26	618	29	629	Figures 6-9 are just given here, but lack of corresponding description in the text.	Figures now removed
Wang Jun	Chapter 4	27	619	29		Figure 9 should be placed in the back of figure 6.	Figures now removed
Hamid Custovic (SPI)	Chapter 4	28	623			Figure 7: Needs some explanation. What is "other"? Are you indicating that dry regions are not susceptible to wind erosion?	Figures now removed
Samuel Nshutiyayesu	Chapter 4	29	626	29	629	The sources of the two figures are missing (Figure 8 and Figure 9)	Figures now removed
Panos Panagos	Chapter 4	29	631	29	631	"sad figures" is not appropriate. Please rephrase	Section completely rewritten
German government	Chapter 4	29	632	29	632	Replace "Mankind" with "humankind".	Section completely rewritten
Gerardo Ojeda	Chapter 4	29	639	29	639	Just one comment: If the units of soil erosion are Mg/ha/year, probably these data are based studies from runoff plots (e.g. physically isolated in their borders). The problem is that, in the field, rain distribution and intensity are not homogeneous along plots. Then, the particles collected at the bottom of plots (e.g. by Gerlachs) just coming from some parts of the plots. Then, soil erosion, as the ratio between sediments collected / plot area / time could be underestimated, also due to its isolation (free runoff flux is bloqued by ist physical isolation). Probably, it could be better to talk about sediment concentration (g L-1) as observed CERDAN O, LE BISSONNAIS Y, SOUCHERE V, MARTIN P, LECOMTE V, 2002. SEDIMENT CONCENTRATION IN INTERRILL FLOW: INTERACTIONS BETWEEN SOIL SURFACE CONDITIONS, VEGETATION AND RAINFALL. Earth Surface Processes and Landforms 27, 193–205	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Li Changxiao	Chapter 4	29	639	30	648	Lack of current or newest data, as the old data might not present the current situation.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed. References to newer publications are made in the revised section
German government	Chapter 4	30	643	30	644	"delivery ratio of 13-20%" of what compared to what?	Section completely rewritten
Panos Panagos	Chapter 4	30	645	30	645	Please correct it as "Walling and Webb (1983)"	was corrected
Hamid Custovic (SPI)	Chapter 4	30	647			Point not clear - reword.	Section completely rewritten
Panos Panagos	Chapter 4	30	648	31		This part is copied from the Lal (2003) publication. I would propose to keep the tables but elaborate more the text.	Section completely rewritten
Beverley Wemple	Chapter 4	31	658	31	672	These points regarding types of ecosystem services have been made in Chapter 1 and could be eliminated here to help shorten this length chapter	Agree. General selection of definitions, categorizations, conventions etc.should be agreed and placed in an earlier chapter, for reference in all later chapters. This has now been insured by adding Preface to the Report, which outlines scoping definitions, which eliminates the need for repetition
Hamid Custovic (SPI)	Chapter 4	31	663		665	Explain the link between soil erosion and pollination.	This text belongs in an earlier chapter that provides this information for all chapters.This was now deleted
German government	Chapter 4	31	668	31	669	Provide examples for "physiological needs", "psychological needs"; "self-actualization needs".	This text belongs in an earlier chapter that provides this information for all chapters. was deleted
Wang Jun	Chapter 4	31	672	32	680	It would be better to enumerate some calculation methods of soil erosion or soil and water conservation service.	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.
Comerma (ITPS)	Chapter 4	32	673		674	The methods for assessment of erosion are well developed, is very contradictor with the evaluation done by Gracia Ruis at al below in the same page	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed.



Beverley Wemple	Chapter 4	32	681	32	699	Could this section be eliminated since the data availability issue has been addressed in chapter 3?	No - it is specific to soils. However, some examples of the best estimates, or ranges of estimates may be possible.
Li Changxiao	Chapter 4	32	681	32	699	Can the author(s) use the newest available data from the governmental official gazettes/publicities?	This section was completely revised and re-written so that it reads more streamlined and not overly detailed. The description of process details has been removed and references to up to date publications made.
Wang Jun	Chapter 4	32	681	32	699	The "Data issues" part is not necessary.	The next iteration of the text was refocused on status and trends, in which the strengths, weaknesses, and different values for each aspect was discussed in detail.
Samuel Nshutiyayesu	Chapter 4	32	684	32	684	Missing reference in the References List	Corrected
Sally Valdes	Chapter 4	32	701	33	707	It is especially important to cover soils along streams/rivers/ to prevent erosion. It may also be a good idea to limit access of livestock of the slopes leading down to the water to prevent loss of vegetation and prevent erosion.	This is addressed under Sect 4.2.1. in the SOD
Lim Li Ching	Chapter 4	32	701	33	714	Many of the soil conservation and remediation measures listed are agroecological practices e.g. rotations, intercropping and mulching, use of organic fertilizers.	Agree
Gerardo Ojeda	Chapter 4	32	701	32	701	Question: why site-specific activities counting start from 4, not from 1?	Corrected
Panos Panagos	Chapter 4	32	704	33		The bullet numbers should start with 1 and not with 4.	Corrected
Wang Jun	Chapter 4	32	704	33	711	The serial numbers of "conservation and remediation measures" are wrong.	Corrected
German government	Chapter 4	32	704	33	711	Numbering is incorrect	Corrected
Panos Panagos	Chapter 4	32	705	32	706	The footnote citation should be corrected and delete the a, b, c, d, e from Authors names	Corrected
Panos Panagos	Chapter 4	33	708	33	708	"Decrease of the rainfall and runoff". It is better to reformulate the bullet as there is no immediate human activity that can decrease the rainfall (only climate change effects rainfall increase/decrease).	Agree, reformulated
D. Pennock (ITPS)	Chapter 4	31	708	31	708	Decreasing rainfall is not a viable option	Agree, reformulated
Comerma (ITPS)	Chapter 4	33	708			Decrease of the rainfall??	Is a decrease in the TYPE of rainfall intended? was corrected.
Gerardo Ojeda	Chapter 4	33	712	33	712	I suggest to replace "organic fertilizers" by "organic amendments (compost, pig slurry, sewage sludge, biochar, etc)"	Section completely rewritten
Hamid Custovic (SPI)	Chapter 4	33	715			CO2 emissions: This is an important topic. Include reference to Chappell, A., Baldock, J. and Sanderman, J., 2015. The global significance of omitting soil erosion from soil organic carbon cycling schemes. Nature Climate Change.	Discussion now improved SOD section 4.2.3.1.
Tandra Fraser	Chapter 4	33	717			The soil erosion section could also include nutrient transfer (i.e. P attached to soil particles) causing contamination of waterways. Also, the movement of soil biota, especially pathogens may be a concern.	This is now mentioned in several section in the SOD (e.g. Sect 4.2.2.4.)
Victor M. Castillo (UNCCD)	Chapter 4	33	717	33	730	Updated data on the relationship between land use and CO2 emission and the potential role of sustainable land management in mitigating and adapting to climate change can be found at the recent document published by the UNCCD, 2015 Pivotal soil carbon ( <a href="http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015_PolicyBrief_SPI_ENG.pdf">http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015_PolicyBrief_SPI_ENG.pdf</a> ) Land matters for climate: reducing the gap and approaching the target ( <a href="http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015Nov_Land_matters_For_Climate_ENG.pdf">http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015Nov_Land_matters_For_Climate_ENG.pdf</a> ) On the relationship between land degradation and climate change, one of the most recent reference is the impulse report produced for the UNCCD 3rd scientific conference on "Climate change and desertification: Anticipating, assessing & adapting to future change in drylands" available at: <a href="http://3sc.unccd.int/documents-outputs/preparatory-documents/impulse-report">http://3sc.unccd.int/documents-outputs/preparatory-documents/impulse-report</a>	This comment seems to be misplaced: the Section is not about climate, but we have take these suggested publications on board in the relevant section on climate.
Emanuele Lugato	Chapter 4	33	717	33	730	The role of the erosion in the global C cycle is more complex and debated than presented here (BOX). According to some authors, the erosion could induce a sink of CO2 globally [1,2]. Also the large-scale EU modelling made by the JRC [3], showed that CO2 emissions related to erosion are strongly dependent on the assumptions of processes that are still not totally known. [1] Quinton, J.N., Govers, G., Van Oost, K., Bardgett, R.D. The impact of agricultural soil erosion on biogeochemical cycling (2010) Nature Geoscience, 3 (5), pp. 311-314; [2] Van Oost K, Quine TA, Govers G et al. (2007) The impact of agricultural soil erosion on the global carbon cycle. Science, 318, 626-629; [3] Lugato, E., Paustian, K., Panagos, P., Jones, A., Borrelli, P (2016). Quantifying the erosion effect on current carbon budget of European agricultural soils at high spatial resolution. Global Change Biology, 22, 1976–1984.	Sect 4.2.3.1 in the SOD now deals with this
Chenu Claire	Chapter 4		733		L734	Fig 9 source of information is missing	Source was added
D. Pennock (ITPS)	Chapter 4	34	733	34	735	Source for figure9?	Source was added

Kani ISIK	Chapter 4	34	734	34	734	Fig 9 Title: Wrong "eroded soiles". Right "eroded soils"	Was corrected
Lim Li Ching	Chapter 4	34	736	35	771	Agroecology, through practices that restore and build soil organic matter, can also contribute to soil carbon sequestration.	This was included - see line 756
Chenu Claire	Chapter 4		736			again I do not understand the term of bio-carbon, as in fact this section deals with soil organic matter.	Section completely rewritten
Chenu Claire	Chapter 4		736			Section 4.2.3 is OK.	Thank you.
Elizabeth Bach	Chapter 4	34	736	35	771	There are numerous detailed works on soil organic carbon, which the authors rightly cite, as this should not be an exhaustive re-iteration of that previous work. However, this document is an opportunity to add a biodiversity-focused perspective on this topic. The current text seems to not fully embrace this opportunity.	Sect 4.2.3.1. and 4.2.6.4. in the SOD deals with this now
Elizabeth Bach	Chapter 4	34	736	35	771	There is increasing awareness of the role soil organisms, particularly microbes, play in soil organic matter formation and stabilization, it would enhance this section to include some discussion of the linkages between biodiversity and this critical ecosystem services. Some suggested citations include Schimel & Schaeffer 2012 (Frontiers in Microbiology, DOI: 10.3389/fmicb.2012.00348), Baumann et al. 2013 (Biogeochemistry, DOI: 10.1007/s10533-012-9800-6), Gabor et al. 2014 (Soil Biology & Biochemistry, DOI: 10.1016/j.soilbio.2013.09.029), and Schneider et al. 2012 (ISME Journal, DOI: 10.1038/ismej.2012.11).	Sect 4.2.6.4. in the SOD deals with this now
Elizabeth Bach	Chapter 4	34	736	35	771	Soil organisms are what drives cycling and accrual of SOC. There is emerging research and synthesis considering soil organic matter decomposition from a more biological perspective, considering biological access to organic matter a major driver of soil organic matter decomposition and storage (Lehmann et al. 2015 (Nature, DOI: 10.1038/nature16069), Cotrufo et al. 2015 (Nature Geoscience, DOI: 10.1038/ngeo2520)).	Sect 4.2.6.4. in the SOD deals with this now
Elizabeth Bach	Chapter 4	34	736	35	771	This section exclusively focuses on soil organic C. Soil organic C is an extremely important pool of C, but there is no consideration of the contribution of C present in living organisms, above or belowground. This is especially important in tropical systems where vegetation (primarily trees) can contain 1.5x more C than SOC (Raich et al. 2014 (PLoS One, DOI: 10.1371/journal.pone.0100275)).	Carbon stocks and sequestration Sect 4.2.3. now deals with carbon in all pools.
Wang Jun	Chapter 4	34	736	35	771	Little information is recorded in the description of carbon balance/biocalbon loss, maybe author should add some specific performance of land degradation's impact on carbon balance, calculation methods of carbon balance, etc..	Carbon stocks and sequestration Sect 4.2.3. now deals with carbon in all pools.
German government	Chapter 4	34	736	35	771	Carbon balance/biocalbon loss are rather poorly described (does this have to do with data availability; sensitivity of findings?)	Carbon stocks and sequestration Sect 4.2.3. now deals with carbon in all pools.
Diane L. Douglas	Chapter 4	34	737	35	767	I suggest reviewing some of the work of Coert Geldenhuys on Miombo forests in Africa. His research indicates that carbon uptake is higher during the period of forest regrowth than in a mature forest. He advocates that in some areas the slash and burn agriculture practiced by locals actually contributes to carbon storage, rather than diminishing it, because they leave live stumps in place when they clear and plant around these stumps. When they move on after 3 to 5 years, the forest is allowed to grow back in this location. During the 15 to 20 yr period that the forest plot regrows, the trees take up higher carbon levels than they do at full maturity. He presents some good arguments for forest management that includes allowing local people to conduct controlled/managed harvesting of parts of trees (for various economic uses) within forests to promote regrowth of this nature. Of course managing this approach with increasing population pressure presents challenges, but perhaps is feasible in some regions.	While Miombo itself is not mentioned, the effect of slash and burn are. See Sect 4.2.3.2 and 4.3.4.2.
Dr. Erika Berenguer	Chapter 4	34	737	35	771	This section is extremely weak unfortunately, despite its great importance. It only deals with soil carbon, ignoring aboveground carbon stocks. I suggest a severe change here, with a great expansion of this section to encompass all the topics supposed to be discussed here as per lines 51-55.	Section was strengthened and revised. Carbon is now dealt with in all its relevant aspects (see Sect. 4.2.3.1.
Comerma (ITPS)	Chapter 4	34	740		741	It could be emphasized that soil is the major sink for organic carbon in nature see World Soil Resources. Tec Report page 21. 2015	Soil carbon section (4.2.3.1.) has been completely rewritten.

Emanuele Lugato	Chapter 4	34	740	34	741	The sentence is ambiguous... Soil is the component that stores and can sequester C.	Soil carbon section (4.2.3.1.) has been completely rewritten.
D. Pennock (ITPS)	Chapter 4	34	743	34	745	Citation for these figures?	Citation was added
Hamid Custovic (SPI)	Chapter 4	34	746		747	reword. This is true in every biome.	Revised
German government	Chapter 4	34	751	34	752	Insert the bold words 'in fens' in the following sentence: "Historical land use change such as forest clearance for conversion to agriculture and conversion of grassland <b>and fens</b> to managed pasture and cropland has reduced soil C stocks."	In the SOD, Sect 4.2.3.3 Peatlands mentions this
Emanuele Lugato	Chapter 4	35	755	35	757	No mention of other management practices showing potential SOC accumulation (cover crops, residues management, crop rotations etc). It is fully of literature about it.	Soil carbon section (4.2.3.1.) has been completely rewritten.
German government	Chapter 4	35	755	35	755	With reference to the depletion of soil carbon stocks, also consider that drainage of fens in temperate (and boreal ?) zones also significantly contributes to the global CO2 emission!	In the SOD, Sect 4.2.3.3 Peatlands mentions this
David Lamb	Chapter 4	35	766			soil carbon accretion after reforestation can often be slow – e.g. see Marin-Spiotta and Sharma 2013 Global Ecology and Biogeography 22: 105	Applies to lines 757-758. Was revised accordingly
Gunay Erpul	Chapter 4	35	773	35	773	Heavy metal (Pb, Cd, Hg, Cu, Co, Zn, Cr, Ni, As) pollution of soils (Fakayode and Onianwa, 2002; UNEP, 2007; Odai et al, 2008), (Simmons et al., 2005), (Asami, 1981), (Wei and Chen, 2001), (Makino, 2010), (Umweltbundesamt, 2004, 2007).	This topic was included when in the revision of Section 4.2.4
Gunay Erpul	Chapter 4	35	773	35	773	The pollution of soils and adjoining water bodies caused by fertilizers and agrochemicals (Nriagu, 1994; Malm, 1998; Mol et al., 2001).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Residues of herbicides in soils and groundwater in fields devoted to no-till farming (Ometo et al., 2000; Christoffoleti et al., 2008; Cerdeira et al., 2011; Aparicio et al., 2013).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Mercury compounds and downstream pollution in soils and waters (Nriagu, 1994; Malm, 1998; Mol et al., 2001).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Use of agricultural by-products and sludges (Torri and Lavado, 2008).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Dust and soil pollution with heavy metals in the Arabian Peninsula (Yaghi and Abdul-Wahab, 2004).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Excess nutrients, fine sediments and pesticides as diffuse source pollution from agriculture (Brodie et al., 2013).	This topic was now placed in Sect. 4.3.3 and suggested references added. Thank you.
Gunay Erpul	Chapter 4	35	773	35	773	Local pollution from hydrocarbon spills (Aislabie et al., 2004; Kim, Kennicutt II and Qian, 2006; Klein et al., 2012) and from waste disposal (Claridge et al., 1995, Snape, Morris and Cole, 2001; Santos et al., 2005; Sheppard, Claridge and Campbell, 2000);	This topic was included into revised Section 4.2.4.
Royal C. Gardner	Chapter 4	35	775	35	784	The emphasis on aquatic processes is critical for the assessment.	Treatments of wetlands and freshwater sources was included in the final draft as an important section of its own.
Gerardo Ojeda	Chapter 4	35	775	35	775	Just one comment: I miss some reference to the role of estuaries to filter water between sea and rivers and the consequence of its degradation.	The LDRA is not supposed to deal with coastal degradation. However the problem of oxygen depletion and sedimentation in water bodies is mentioned in several places (e.g. Sect. 4.2.4.3.2. and .5.)
Ernesto Viglizzo	Chapter 4	35	775	35	775	Instead of title "Aquatic processes", I suggest saying "water processes in terrestrial ecosystems"	Thank you, this was taken on board.
David Lamb	Chapter 4		786			I found the white, blue and green water terminology confusing. Might it be better to stick with the more basic descriptor?	Agree, this was changed.
Jian Zhang	Chapter 4	35	792	36	793	Cover of vegetation should include dead plant.	See next item in the list
Royal C. Gardner	Chapter 4	36	813	36	814	Consider "LD is the greatest stressor impacting freshwater quality, biodiversity and ecosystem services" as one of the key messages.	This is what it says now in our Executive Summary.
Samuel Nshutiyayesu	Chapter 4	38	847	40	928	Sub-sections should be numbered (e.g. 4.2.5.1. Reductions in Green Water...)	Agree
Ernesto Viglizzo	Chapter 4	38	847	38	847	Why not using fresh water instead of "green water"? Green water is a concept used to estimate virtual water.	Agree this was changed
Jian Zhang	Chapter 4	39	891	39	901	Fishery breed should be included in this part.	Fish and fisheries are mentioned in four places in the SOD (e.g.4.2.4.3.1) , but not the types or species involved. The LDRA is mainly restricted to land (L).
Sally Valdes	Chapter 4	39	892	39	893	Statement that agriculture is the source of 60% of all pollution could use a reference.	Added Strokal et al. (2016) on this point
D. Pennock (ITPS)	Chapter 4	39	892	39	894	What is the source for the 60% of all pollution figure?	Added Strokal et al. (2016) on this point
D. Pennock (ITPS)	Chapter 4	40	941	40	943	Source for the depletion values shown?	See Section 4.2.5.1.3. Groundwater (e.g. Wada et al., 2010; Gleeson et al., 2012)

Ashish Upadhyay	Chapter 4	40	954			Landscape Function Analysis has been introduced in Namibia recently by David Tongway, Australia. Early in 2008, Tongway gave a presentation and practical training to a group of environmental specialists and managers from mining companies and research institutions. Application of LFA to restoration of damaged landscapes is a special objective (Tongway, 2008). According to participants in this training, the tool is easily understandable and useful in assessing land degradation.	Detection of degradation is now included in a section on desertification (4.2.6.2.4.)
Meredith Root-Bernstein	Chapter 4	40	954	42	1018	This section on the relation between land cover change at the landscape scale and degradation is much clearer than the related discussion in Chapter 3. I hope these two treatments of the issue can be coordinated better.	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting and a delianation between the 2 chaptres was established.
German government	Chapter 4	40	954	42	1013	With reference to section 4.2.6 titled "Landscape-level degradation": The issues raised here don't only affect the loss of habitats or their fragmentation. Landscapes have also always been perceived differently. Thus, any attempt to address landscape should also take into account certain values attributed to what is there (different perceptions of the various components of a landscape). Therefore, the change in the diversity, uniqueness and beauty of a landscape in terms of perception and its recreation of the people must be considered in your assessment as well. See also the IPBES document IPBES/4/L.8 on "... diverse conceptualisation of multiple values of nature ..."	Probably Ch 3 and Ch 5 topics, but in the scope of Ch3
Kani ISIK	Chapter 4	41	964	41	965	Fig 11. There should be arrows also from "invasive species" to several other changes such as aquatic degradation, landcape-level degradation etc	Agree. We have made revisions and edits to this figure.
Tandra Fraser	Chapter 4	41	967			Fig 11 - This figure isn't very described. Why are there no arrows going to climate change or pollution? It seems that effectively, most things on the left are linked to boxes on the right.	Agree. We have made revisions and edits to this figure.
Hamid Custovic (SPI)	Chapter 4	41	967			Figure 11: Many "main relationships" are not shown, eg between mining and pollution. Explain the logic of which interactions are shown and which are not.	Agree. We have made revisions and edits to this figure.
German government	Chapter 4	41	967			Figure 11: Improve the reading of this figure: Use for instance different colours for the arrows. I.e.: Arrows emerging from one box should have the same colour.	Agree. We have made revisions and edits to this figure.
German government	Chapter 4	41	980	41	982	Highlight the three main categories: changes in quality and composition of landscape units; modification in landscape connectivity; modification of disturbance regimes."	The issues are now set out clearly in the SOD Section 4.2.7.
David Lamb	Chapter 4		990			"less integer native community"? Meaning unclear.	The Sect on landscapes (now 4.2.7.) has been completely rewritten.
Dr. Erika Berenguer	Chapter 4	42	1007	42	1008	Humans have altered fire regimes in tropical forests as well. Some references: Archibald et al (2013), PNAS; Aragão & Shimabukuro (2010), Science.	The Sect on landscapes (now 4.2.7.) has been completely rewritten.
Ben ten Brink	Chapter 4	42	1020	1063	1081	Unclear why this underlying process (CC) has been elaborated in 5 sub sections. See also my general comment reconsidering sections 4.2 and 4.3.	Meaning of comment not clear, but the SOD has been streamlined considerably and repetitions eliminated
Dr. Erika Berenguer	Chapter 4	42	1021			Despite the importance of this whole section, it failed to link back to degradation impacts in ecosystem services in each subtopic. As it stands this section seems more like a sumamry of impacts. I believe it could greatly benefit if all the listed impacts were discussed under the lens of ecosystem services, as described on the chapter's aims.	The focus of this section (now 4.2.8) is now much more on impacts rather than processes.
Victor M. Castillo (UNCCD)	Chapter 4	43	1038	43	1095	See comment below on the information on these topics available at the impulse report produced for the UNCCD 3rd scientific conference on "Climate change and desertification: Anticipating, assessing & adapting to future change in drylands" available at: <a href="http://3sc.unccd.int/documents-outputs/preparatory-documents/impulse-report">http://3sc.unccd.int/documents-outputs/preparatory-documents/impulse-report</a>	These points are largely included in the revised text for the SOD.
German government	Chapter 4	43	1038	43	1047	Please add in section 4.2.7.2. titled "impacts on land and soil", preferably in line 1043, that warming also leads to the melting of permafrost soils, leading to the loss of specialised habitats, reducing the ecosystem function of carbon storage and <b>inten</b>	This point is included in the SOD (Sect 4.2.8.2.)
Panos Panagos	Chapter 4	43	1039	43	1039	Please add a eference to effect of climate change in soil erosion: "Climate change can also result in changes of soil erosion due to increase of rainfall erosivity"	The effect of climate change on dryland erosion is now mentioned (SOD, Sect 4.2.8.2), also water erosion at length (Sect. 4.2.1). The specific effect of increased rainfall on erosion is missing (partly because we found no good citations) , but we think is implicit in these Sections.
Dr. Erika Berenguer	Chapter 4	43	1049	43	1063	It is striking that a subtopic on 'impacts on vegetation' does not discuss tropical forests. For example, studies have shown that climate change is likely to prolong the dry season in the Amazon, thus increasing the chances of wildfires burning large swathes of the forest as it was the case during the 2015/16 El Niño. Some references: Betts et al (2013), Biogeosciences	The issue of phenology is dealt with 4.2.8.1 and increase in fire in 4.2.8.4. are applicable to all ecosystems
Ben ten Brink	Chapter 4	43	1049	44	1081	Vegetation change and biodiversity seems not to be part of underlying processes but part of the endterms (biodiv and ecosystem services), being affected by a series of underlying degradation processes.	The chapter is supposed to address status and trends, not the underlying processes

Tandra Fraser	Chapter 4	43	1065			Since a large proportion of diversity is belowground, soil biodiversity should be included here. These organisms are not able to move large distances so they either have to adapt or they will not survive.	Now included as Sect 4.2.6.4.
Kani ISIK	Chapter 4	43	1065	44	1081	It seems to me that only the "species" level of biodiversity has been emphasized under this subsection titled "Impacts on biodiversity". It is necessary to mention the impacts of climate change on "ecosystem" and "genetic" levels of biodiversity as well. It is because Ecosystem diversity harbors species diversity... Genetic diversity promotes adaptive capacity...	This now included in the new Sect 4.2.6.3.2.
German government	Chapter 4	43	1065	44	1081	Please consider the following point in section 4.2.7.4. titled "Impact on biodiversity": In addition to range shifts and population changes, the most severe impact of climate change on biodiversity is the change in biological interactions (predator-prey relationships).	Thank you, this now included in the new Sect 4.2.6.3.1. and 4.2.6.3.2.
Thomas Brooks (IUCN)	Chapter 4	43	1066	43	1067	Foden et al. (2013) PLoS ONE <a href="http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0065427">http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0065427</a> is another important citation to add here.	Thank you for the references, it was incorporated into the revised chapter.
Lim Li Ching	Chapter 4	44	1083	44	1094	Agroecology is a key climate adaptation strategy for agriculture and farmers, that builds resilience. See Altieri et al. (2015). Agroecology and the design of climate change-resilient farming systems. <i>Agronomy for Sustainable Development</i> , 35(3): 869-890.	Thanks! The advantages of some agroecological issues are dealt with in a new section in the SOD (4.3.4.6.). The citation was passed on the the Author and incorporated accordingly.
Kani ISIK	Chapter 4	44	1083	44	1094	Genetic diversity should also be emphasized in this sub-section titled "Adaptation".	This now included in the new Sect 4.2.6.3.1 and 2.
Comerma (ITPS)	Chapter 4	44	1090		1094	Here we could add to adaptation to climate change: plant breeding to resist stresses, and include Many Voluntary guidelines for sustainable soil management that will help adaptation to climate change	This is mentioned in the new Introduction - Executive Summary
Dr. Erika Berenguer	Chapter 4	44	1097	45	1141	What about habitat loss and fragmentation of other ecosystems, such as savannas?	This Section covers all ecosystem types
Saija Kuusela	Chapter 4	44	1097	45	1141	I understand that the text is forced to be on a very general level, but I hardly see any estimate of how much biodiversity is affected and how seriously - and still this was mentioned as one of the aims in this chapter. Moreover, there is not a single reference in the whole section, not even on line 1105 where the authors state that these processes are well studied! This section is hardly on the same level like e.g. the next section. However, this seems to apply to many other sections in this chapter making the review of it impractical at this point.	Agree. Some re-orientation of the Chapter was discussed at the 2nd Authors' meeting. The sections are now more streamlined and the level of detail is similar across.
Kani ISIK	Chapter 4	44	1097	45	1141	The following topics should also be briefly discussed as influenced by "Native habitat loss and fragmentation": "isolated habitat islands", "small populations", "inbreeding", "loss of genetic diversity and loss of adaptability"...	The extent of native habitat loss is covered in sections (4.2.7) as well as in chapter 3. The impacts from habitat loss on biodiversity are covered in sections (4.2.6.3.1) and (4.2.7).
German government	Chapter 4	44	1097	45	1141	With reference to section 4.3.1: The dissection of (natural) habitats and landscape elements is referred to as fragmentation by all forms technically dominated space utilization (industrialized agriculture and forestry, transport and housing infrastructure etc.). The effects of fragmentation can be: the overbuilding of habitats, the reduction of habitats (including through increase in adverse edge effects), the change of habitat quality by disturbance and emissions (noise, light and material discharges), isolation of habitats and populations and, consequently, the reduction of their ability to survive, including the reduction of genetic diversity within populations, the prevention of migrant relations (time of day, seasonal) and long-distance paths, the elimination of the vector function of species and the increase in mortality due to traffic. So this is not just about the fragmentation of habitats of species or vegetation types. The loss refers to the connectivity between habitats, landscape structures and species. These effects should be reviewed in chapter 4.3.1 again.	The Landscape section has been completely rewritten in Section 4.2.7. Landscape-level degradation processes
Samuel Nshutiyayesu	Chapter 4	44	1098	61	1774	Some identical information has been elaborated in chapter 3 and this might result in duplication (e.g. chapter 33, line 1041-1044 and chapter 4, line1583-1590),a comparative review between the two chapters may be necessary to help defining which information should appear in which specific chapter (same case for page 69-line 1721 to page 81-line 2395)	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting. A clear delianation of content was agreed upon and the chapter was revised accordingly.
Samuel Nshutiyayesu	Chapter 4	44	1099	44	1100	There might be confusions between drivers (Chapter 3) and processes (Chapter 4)...(see comment above)	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting. A clear delianation of content was agreed upon and the chapter was revised accordingly.
Dr. Erika Berenguer	Chapter 4	45	1114	45	1125	It would be very useful to see the references upon which the data presented in this paragraph is based.	Thanks! The Landscape section has been completely rewritten in Section 4.2.7. Landscape-level degradation processes

Peter Onorato	Chapter 4	45	1116	45	1117	conversion of forest to agricultural, pasturelands and urban areas has been one of the most important process of land use and land cover change around the world	This what the text on line 1116-1117 states.
German government	Chapter 4	45	1120	45	1123	Regarding forest regrowth that exceeds deforestation in some temperate regions: Provide a reference to chapter 3, section 3.3.4.2, page 25, lines 684-688.	Chapter cross-linking happened at the stages after the submission of FOD unfortunately. But we have incorporated changes and aligned our content with Ch3 for the final draft.
Peter Onorato	Chapter 4	45	1122	45	1123	and forest plantations (i.e. monocultures or species-poor forests) are also expanding in all world, particularly in temperate region.	This what the text on line 1122 states.
Peter Onorato	Chapter 4	45	1137	45	1137	All those processes can outcome in changes in species composition	All those processes can <b>result</b> in changes in species composition
Ashish Upadhyay	Chapter 4	45	1142			The Grazing Gradient Method (GGM) has been of use in Australia for rangeland assessment. As described by Australian scientists, the method involves visual field observations, measurements and modelling with remote sensing tools for quantifying temporal and spatial trends of vegetative cover as an indirect indicator of land degradation. The implementation of GGM is relatively simple and uses the standard grazing gradient software described by Bastin, Chewing and Pearce (1996) cited in Pickup et al. (1998). The method has potential for use in arid and semi-arid rangelands in North and South America, Asia, and Africa as they are managed on a large enough scale to allow development of the spatial patterns of grazing impact that the method exploits (Pickup et al., 1998). On the other hand, Pickup et al. (1998) stated that the method also has potential as an early warning technique, if applied routinely. In addition Roder et al. (2007) stated that the GGM can be used as a management tool to detect areas of over- and undergrazing and to test different grazing regime scenarios. The Grazing Gradient approach has been applied in Namibian rangelands where it has shown good results (Getzin, 2005; Klintonberg et al., in prep).	This topic is better covered in Section 4.4 Case study, Desertification. It was added there.
Ernesto Viglizzo	Chapter 4	45	1142	48	1256	Abrupt transitions in non-linear processes should be considered in 4.3.2 Grazingland management. I suggest the reference Viglizzo, E.F., Noretto, M.D., Jobbágy, E.G. Ricard, F.M., Frank, F.C. (2014). The ecohydrology of ecosystem transitions: a meta-analysis. Ecohydrology DOI: 10.1002/eco. 1540.	This topic is covered, briefly, in Section 4.4 Case study, Desertification. This was further considered in Section 4.3.2
Stellmes, Marion	Chapter 4	45	1142	47		Australian scientists have worked intensively on rangeland monitoring and developed with ACRIS (Australian Collaborative Rangeland Information System; <a href="https://www.environment.gov.au/land/rangelands/acris">https://www.environment.gov.au/land/rangelands/acris</a> ) and "Vegmachine" ( <a href="http://www.csiro.au/solutions/Vegmachine">http://www.csiro.au/solutions/Vegmachine</a> ) advanced monitoring tools for rangelands. Following some interesting and important references: - Bastin, G.N., D.M. Stafford Smith, I.W. Watson, and A. Fisher. 2009. The Australian collaborative rangelands information system: Preparing for a climate of change. The Rangelands Journal 31: 115-125. - Reeves, M.C., and L.S. Baggett. 2014. A remote sensing protocol for identifying rangelands with degraded productive capacity. Ecological Indicators 43: 172-182. - Wallace, J., G. Behn, and S. Furby. 2006. Vegetation condition assessment and monitoring from sequences of satellite imagery. Ecological Management and Restoration 7: 31-36 - Wallace, J., P.A. Caccetta, & H.T. Kiiveri. 2004. Recent developments in analysis of spatial and temporal data for landscape qualities and monitoring. Australian Ecology 29: 100-107.	This topic is covered, briefly, in Section 4.4 Case study, Desertification. This was further considered in Section 4.3.2.
Dr. Erika Berenguer	Chapter 4	45	1146	45	1148	I am afraid the statement about Mato Grosso doesn't make sense - if forest is converted to pasture (as 80% of the deforested area in the Brazilian Amazon and not only in Mato Grosso), it is a case of habitat loss (as per the previous session) and not of grazing land management. I suggest the removal of this sentence as it is only partially true, unclear and confusing.	Moved to Sect 4.3.4 native and planted forests
Hamid Custovic (SPI)	Chapter 4	41	1150		1189	Material is covered in other chapters. Out of scope for this chapter on processes.	We respectfully disagree - these are processes.
German government	Chapter 4	46	1154	46	1156	The contribution of "browsers" remains unclear. Please expand your discussion on this issue.	This point has been missed. We will try to add some text on it after the 3rd authors' meeting in July 2017.
German government	Chapter 4	46	1169	46	1171	Provide numbers and references to justify your statement on the "susceptibility to overstocking of livestock" on communal land. Otherwise delete this sentence. Reason: Mentioning that this is potentially the case is not sufficient to highlight it in the text since all land tenure regimes have the potential to lead to overstocking.	This is now dealt with in the SOD section 4.3.2.2. Extensive grazing.
German government	Chapter 4	46	1174	46	1176	"The tragedy of the commons" (Hardin 1968) has led to quite controversial opinions among experts. Some believe that it is far from being proven. It is therefore important that you expand your discussions in order to assess the different opinions on Hardin's economic theory. In fact it is important that you include the work conducted by Ostrom as this may be of far greater relevance and more up-to-date with recent economic findings.	This topic belongs in Ch 3.
Yuxue Pan	Chapter 4	46	1180	46	1180	Inner Mongolia in China	Agree, but it is also true of Mongolia itself. Chinese part added.

Peter Onorato	Chapter 4	47	1223	47	1223	If livestock caring capacity is reduced then this has a direct impact	Corrected
							Australia has used remote sensing extensively for rangeland assessment, but the methods remain somewhat crude. On woody "densification", additional citations are possible, but a few reviews of the topic world-wide would be better than multiplying papers on specific cases. E.g D'Orico, P., Okin, G. S., & Bestelmeyer, B. T. (2011). A synthetic review of feedbacks and drivers of shrub encroachment in arid grasslands. <i>Ecohydrology</i> , 5, 520–530. Huxman, T. E., Wilcox, B. P., Breshears, B. D., Scott, R. L., Snyder, K. A., Small, E. E., ... Jackson, R. B. (2005). Ecological implications of woody plant encroachment. <i>Ecology</i> , 86(2), 308–319. Graz, F. P. (2008). The woody weed encroachment puzzle: gathering pieces. <i>Ecohydrology</i> , 1, 340–348.
German government	Chapter 4	47	1226	48	1242	In Australia, grazing management supported by remote sensing is a well-established method (see e.g. Bastin et al. 2015, Remote Sensing of Environment).	Degradation and loss of livestock carrying capacity is well documented and forms many case studies.
Peter Onorato	Chapter 4	47	1226	47	1226	Degradation and loss livestock carrying capacity is well documented form case studies	
Yuxue Pan	Chapter 4	47	1230	47	1230	China. and in particular Inner Mongolia	Also true of Mongolia itself.
						Here and elsewhere: the selection of remote sensing based approaches appears highly limited to a small selection of authors and neglects a large body of work undertaken in different parts of the world; this relates to both, case studies and conceptual work; suggested starting points of reference: Assessment methods: Stellmes et al. 2015: Land Degradation Assessment and Monitoring of Drylands. in Thenkabail (ed.) Remote Sensing of Water Resources, Disasters, and Urban Studies. Remote Sensing Handbook Vol III. CRC Press; Time Series Analysis: Udelhoven et al. 2015: Assessing Rainfall-EVI Relationships in the Okavango Catchment Employing MODIS Time Series Data and Distributed Lag Models. In C. Kuenzer, S. Dech, & W. Wagner (Eds.), Remote Sensing Time Series. Springer International Publishing; Conceptual work: Geist & Lambin 2014, BioScience; Hill et al. 2008, Global Planetary Change; Stellmes et al. 2013, Land Use Policy).	Most of the mapped global data in the Chapter comes from remote sensing. However, since we have been asked to minimize material on techniques in Chapter 4. we have avoided direct discussion of methodology.
German government	Chapter 4	48	1232	48	1269		
Meredith Root-Bernstein	Chapter 4	48	1247			Indeed, why is this not succession? Please explain.	The type of woody encroachment referred to here does not occur on ungrazed land.
Ernesto Viglizzo	Chapter 4	48	1271	49	1312	Regarding 4.3.3. Cropland Management: I am attaching a word document with ideas and concepts that deal with this issue. See attachment.	Thank you, we have reviewed your attachment
Hamid Custovic (SPI)	Chapter 4	49	1272		1299	This proposed text seems out of scope, but could be relevant if it is limited to, for example, a chart showing the relationship between practices and degradation processes.	All topics in the list are there because they are associated with effects on degradation and biodiversity.
John Parrotta	Chapter 4	49	1311			For this section (to be developed), please see my comments related to planted forests in Chapter 3 (page 24 and 43).	Thank you, we have requested to see relevant comments from Ch3
Josu G Alday	Chapter 4	50	1313	50	1313	I miss here a very important non-timber forest resource such as mushrooms, which is a very important seasonal economic value for certain areas.	While collection of fungi is not mentioned explicitly, it is included in statements such as on line 1345. There are other products, such as honey collection, that fall into this catch-all sentence, but there has to be evidence of over-exploitation of a resource causing degradation and changes in biodiversity.
Peter Onorato	Chapter 4	50	1352	50	1352	In the case of bushmeat harvesting, the impact can be a the loss of a large proportion	Corrected
Peter Onorato	Chapter 4	51	1382	51	1382	bit in addition there are major impacts on soil of the actual kiln	Corrected
Peter Onorato	Chapter 4	51	1386	51	1386	It is estimated that between 1 (Wilkie and Carpenter 1999) and 5 (Fa et al 2003) million <del>tone</del> tons	Corrected
Peter Onorato	Chapter 4	51	1394	52	1395	Regions of specific concern are the Congo basin and Madagascar. The impacts in Amazonia appear less serious due to a lower urban demand (XX). . This claim should be sourced.	Added Swamy and Pinedo-Vasquez (2014)
Jian Zhang	Chapter 4	52	1429	52	1432	Woodfuel harvesting including charcoal, could affect climate. Climate change should be involved in the part.	Agreed, but the danger is that, since everything affects everything, the really important ones get buried!
Marina Rosales Benites de Franco	Chapter 4	1419	1429	52	52	Further, though forests have very high levels of vegetation biomass, their carrying capacity for vertebrates is relatively low. <b>On the other hand, this driver is related with human population growth, change land use and lack of manage of wild population in situ.</b> <a href="http://weberpub.org/wef/wef_176.pdf">http://weberpub.org/wef/wef_176.pdf</a> and <a href="http://weberpub.org/wesee/wesee_167.pdf">weberpub.org/wesee/wesee_167.pdf</a>	The reference was consulted, thank you
Peter Onorato	Chapter 4	53	1436	53	1437	In Africa it is especially in the east and west African regions where the greatest problems are observed	This was corrected
Hamid Custovic (SPI)	Chapter 4	53	1436			Much of this page is out of scope - either about drivers or responses.	Thankyou for pointing this out. This text was passed on to Ch3, where it is now more appropriately integrated.
Peter Onorato	Chapter 4	53	1444	53	1444	Africa's produces about 58% of the world's charcoal,	This was corrected
Peter Onorato	Chapter 4	53	1466	53	1466	However, many knowledge gaps still exist in all aspect son the bushmeat and woodfuel sectors.	This was corrected

Gerardo Ojeda	Chapter 4	54	1483	54	1483	I suggest to add some information about how fire in woodlands affect aquatic ecosystems like estuaries.	The erosion aspect of fire is mentioned on line 535 and its effect on waterways on line 850.
Peter Onorato	Chapter 4	54	1489	54	1490	This last point is particularly salient given that 90% of all global vegetation fires are ignited by humans. This claim should be referenced or deleted.	The 90% has been removed.
David Lamb	Chapter 4	54	1500			sometimes changes in the seasonality of fires can have major impacts (e.g. when traditional burning practices are replaced by "modern" burning practices	This was overlooked in the SOD, but we incorporated it in the final submission of the chapter, after the 3rd authors' meeting in July 2017.
Kani ISIK	Chapter 4	55	1520	55	1522	Impacts of wildfire on the Mediterranean ecosystems should also be briefly mentioned near these lines. For example, wildfire is an ever present and increasing threat to forests in Mediterranean basin, especially due to relatively dry summers, human population pressure and climate change. Every year wildfires destroys about 0.7 to 1.0 million hectares of forests in the Mediterranean basin, with serious impacts on the environment and on socio-economic life in the basin. See Ref: <a href="http://www.fao.org/forestry/40319-06791969d1427714a896b8faee2aa501.pdf">http://www.fao.org/forestry/40319-06791969d1427714a896b8faee2aa501.pdf</a>	This point has been missed, but was added in the final submission of the chapter, after the 3rd authors' meeting in July 2017.
David Lamb	Chapter 4	55	1522			insert reference to Australian Government	Reference corrected
Peter Onorato	Chapter 4	55	1522	55	1527	In 2009, the Australian government published a comprehensive study of fire regimes and climate change for their country. The results pointed to increased risk of severe fire weather as a result of changes in precipitation, temperature, humidity, and wind. Climate change was determined to have complex and nonlinear effects on fuels; on the one hand increasing potential fuel load with increased atmospheric CO2 while the other hand reducing fuels due to persistent and sustained droughts. Please either reference this study or delete the text.	Text removed
Peter Onorato	Chapter 4	55	1525	55	1527	On the one hand increasing potential fuel load with increased atmospheric CO2 while the other hand reducing fuels due to persistent and sustained droughts. This claim should be referenced or deleted.	Reference added
German government	Chapter 4	55	1539	55	1548	The topic 'fire on peat soils in South-Eastern Asia' due to destruction of tropical rainforests on peat soils for the creation of palm-oil production areas is missing here, especially because it is caused by measures which should mitigate climate change (biofuel production). Please include this issue in your discussions in this section.	This is a "human driver", therefore should be in Ch 3, not 4.
Peter Onorato	Chapter 4	55	1539	55	1541	And what of the costs associated, not just mortality? The Australian assessment clearly sounds the alarm for potential loss of life and property and the increased financial burned to protect against and suppress fires. If this claim cannot be sourced, please delete.	This text has been removed.
Kani ISIK	Chapter 4	55	1550	56	1597	It appears that only "plant" species "and terrestrial ecosystems" have been emphasized in the subtitle "invasive species". It is better also to mention invasive species in aquatic ecosystems, and animal invasive species that are potential threats to biodiversity.	Added material on animals and soil microbes.
David Lamb	Chapter 4	55	1563			reference for Bellard	This reference was added after 3rd authors' meeting Jul17
Peter Onorato	Chapter 4	56	1588	56	1588	With the rapid growth of economy of China, numerous opportunities exist for the entry	Text removed
Jian Zhang	Chapter 4	57	1599	57	1707	The section of "land abandonment" was emphasis too much on the history of land abandonment. Are there any examples of abandon land management?	The section was revised
Meredith Root-Bernstein	Chapter 4	57	1613		1639	This section is also a more balanced and clear treatment than the related section in Chapter 3.	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting. A clear delianation of content was agreed upon and the chapter was revised accordingly.
Thomas Brooks (IUCN)	Chapter 4	57	1613	57	1629	It would be useful to explain that it is critically important to consider which metrics of biodiversity are being used here. Certainly land abandonment often results in declines in metrics like local species richness (alpha diversity). By contrast, it generally has a positive impact on species with small ranges (and thus on beta diversity) and on threatened species (and thus on extinction risk). It was important to clarify the different relevance for policy of using these different metrics.	This issue was missed in the FOD, but was added after the SOD review.
German government	Chapter 4	58	1648	58	1649	The abandonment of agricultural land in the EU does not fit to the definition of "land abandonment" given in the lines 1600-1601 (page 57). Reason: Human control over this land has not been given up: It was allowed to cultivate it extensively in order to use it for agriculture after a few years again. Most of this land might be used again in order to produce biofuel.	This issue was missed in the FOD., but was added after the SOD review.



Josu G Alday	Chapter 4	59	1708	59	1708	It is a pity that the mining section has not been developed yet.	Agree but we have worked on it for the second draft.
Elizabeth Bach	Chapter 4	59	1711	61	1774	Section 4.3.10 is an excellent example of following the structure laid out in the Introduction (pg. 9), I recommend all sections following a similar format to improve the functionality of the document as a reference.	Thank for your feedback. The chapter was revised and restructured for ease of readability, taking your input into consideration
German government	Chapter 4	59	1711	61		With reference to section 4.3.10 titled "Infrastructure, industry, urbanization": This section describes the general phenomena associated with urbanization processes. Although it gives a general overview of the impact of urbanization on biodiversity, a more differentiated assessment of the processes taking place is absent. The reference to species diversity is not sufficiently detailed in view of the complexity of urban nature. We therefore urgently request the expansion of the discussions in this section.	Section 4.3 text is mainly intended for readers coming from Ch3 and wanting to see the processes involved as a result of human drivers, to direct them to the Processes Section (4.2). Therefore detail on diversity is not here, rather in Sect on biodiversity (4.2.6.3.)
Samuel Nshutiyayesu	Chapter 4	59	1712	60	1718	This is already covered in Chapter 3, and can be removed from here	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting. A clear delianation of content was agreed upon and the chapter was revised accordingly.
Samuel Nshutiyayesu	Chapter 4	60	1720	61	1767	This outline should be adopted for each process discussed to help the reader (sub-sections should also be numbered).	The structure of the chapter was substantially revised to help the reader navigate the chapter.
Thomas Brooks (IUCN)	Chapter 4	60	1720	60	1720	This sentence seems a bit of a tautology. Better to explain in a bit more detail: urbanisation negatively impacts specialist, non-commensal species that cannot adapt to cities (this often includes threatened species, etc), but positively impacts generalist, commensal species ("urban biodiversity") that can adapt.	This section has been entirely rewritten
Samuel Nshutiyayesu	Chapter 4	60	1721	60	1721	The sentence "urbanization impacts on urban biodiversity" should be more elaborated	This section has been entirely rewritten
Tandra Fraser	Chapter 4	60	1745			This section is vague and not well written. A conceptual diagram would be very good here to visualize the link between urbanization activities and the effect of specific ecosystem services	This section has been entirely rewritten
German government	Chapter 4	61	1767	61	1774	The loss of fertile land/soil impact on biodiversity and ecological functions is missing; Is 'suburban sprawl' intended to be a positive recommendation?	A new study on this has been published since the SOD was submitted. Its conclusions were added after the Jul 2017 3rd authors' meeting.
Royal C. Gardner	Chapter 4	61	1784	64	1863	The case study on peatlands is an excellent example.	Good! Thank you
Dr. Erika Berenguer	Chapter 4	61	1784	64	1863	Although an interesting subject for a case study, this section needs to be more objective. How peatland degradation affects biodiversity and ecosystem services and functions? How many species are affected? How does climate change interacts with fire and peat burning? This section would greatly benefit from more figures. In addition, it can be drastically reduced, as it is currently slightly confusing. For example it starts with the description and distribution of peatlands in the world, but it finished again on the same subject. Finally, it would be interesting to see some programs for peatland restoration in this section.	This and all case studies have been removed. Some of this material was moved to Sect. 4.2.3.3.
Peter Onorato	Chapter 4	62	1827	62	1829	While the quality of Scottish whisky famously relies on such water quality, it is less widely known that 70% of UK drinking water is obtained from peat-dominated catchments or watersheds (Bain et al., 2011). When such systems are damaged, however, the treatment costs can be substantial. This claim should be referenced or deleted.	This and all case studies have been removed. Some of this material was moved to Sect. 4.2.3.3.
David Lamb	Chapter 4		1865			might it be useful to mention the concerns raised by Cao and others about the impact of reforestation on water resources when reforestation is done in these dryland areas (Cao et al 2011. Ambio 40:828)	Thank you - this was incorporated into the final draft
Peter Onorato	Chapter 4	64	1872	64	1874	TNSFP aims to increase the forest coverage in the program region from 5.05% in 1977 to 14.95%, and to effectively control sand-dust storms and soil erosion, improve ecological conditions and the living conditions of local farmers. This claim should be referenced or deleted.	Deleted
Wang Jun	Chapter 4	64	1882	64	1902	The area unit was not properly formatted. For example, "km2""hm-2". Please check the full draft.	Was done after revision of all Sections
Penny van Oosterzee	Chapter 4	64	1882			Sentence is confusing. Does each respective increase include the prior increase?	Section deleted
Penny van Oosterzee	Chapter 4	64	1887			What does 35. t.hm-2 mean?	Section deleted
Penny van Oosterzee	Chapter 4	66	1953			Diagram needs labelling	Figure now reformatted and moved to a box (Sect 4.3)
Panos Panagos	Chapter 4	66	1955	66		Figure 13: It is not clear what this figure means? What are the units? Where it refers to? Which is the scale?	Figure now reformatted and moved to a box (Sect 4.3)

Kani ISIK	Chapter 4	67	1958	67	1965	The immediate implication of the term "desertification" give an alarming impression on me too. In my conferences and writings in Turkish, I prefer the term "Land degradation" and indicate that "desertification" is the final stage of "land degradation". It gives people a smooth relieve and gives them the message that they still have time before desettification stage, and that "land degradation" can be mitigated /restored... I propose that the fact that "desertification is the final stage of land degradation, in case necessary measures are not taken" should be emphasized in several places of this report.	There are so many attempts to "define" desertification. We use the term in line with UNCCD definition but use it appropriate circumstances only.
Victor M. Castillo (UNCCD)	Chapter 4	67	1958	69	2075	It is recommended that the author considers a significant revision of the case study on desertification in order to more objectively account for the different perspectives by which to approach the issue of desertification. The personal bias is quite evident and there are plenty of other venues in which to express these opinions in such a singular fashion but not IPBES which must take into account the vast scientific literature that underpins the concept of desertification and recent advances in understating dryland systems dynamic . To get start some aspect that could be considered as a follow: On the definition of land degradation and desertification: ( see line 2035-2041 for example) Attempts to define desertification have proved hard mainly because disagreement about the origin causes, characteristics and consequences of the degradation process (Reynolds et al. 2007: Global desertification: building a science for dryland development Science 316: 847-51). However Verstraete et al 2009 (Verstraete, Scholes and Stafford-Smit In Climate and desertification: looking at an old problem through new lenses Front.Ecol Environ., 2009 7 (8):421-428 ) recognizing that although scientific consensus regarding the causes of desertification has been slow, new insight into dryland ecology prvide rationale for international collaboration to effectively address the problem. They paraphrase and expand the widely accepted UNCCD definitions in a way that desertification includes any form of degradation in drylands ( which from should be specified in any given context) , where degradation refers to a persistent reduction in the bundle of services provided to humans by the ecosystem under consideration, thus encompassing both solid and geophysical considerations. In that sense they defines define desertification as a "broad set of environmental degradation process that result in a persistent decrease in the productivity of drylands". A comprehensive review of the evolving interpretation of the concept of desertification from that fixed by the UNCCD could be found at Voigt et al 2001 Land degradation and Development 22:150-165. On the causes of desertification: the role of climatic factors and the socio –ecological system approach (see for instance line 1967-1986, line 2028-2033) It is widely accepted that causes and consequences of desertification are multiple, multi-scales and	All the citations helpfully provided by the Reviewer were assessed and incorporated when editing this Section. However, the Author respectfully points out that much of the discussions around "desertification" are conceptual, lack data and are therefore often opinions, not fact.
Tandra Fraser	Chapter 4	61	1961			This section is vague and not well written	The section was revised
Tandra Fraser	Chapter 4	61	1967			As stated above	Meaning of this comment not clear.
Hamid Custovic (SPI)	Chapter 4	68	2021			Which phenomenon?	"Dryland degradation" - was added to clarify
German government	Chapter 4	68	2035	69	2041	Consider the definition of desertification used by the UNCCD, and also consider the findings of the "Ecosystems and Human Well-Being - Desertification Synthesis" (Millennium Ecosystem Assessment, 2005) in the discussions in this section: <a href="http://millenniumassessment.org/documents/document.355.aspx.pdf">http://millenniumassessment.org/documents/document.355.aspx.pdf</a>	This raises the issue of whether a "Case study" is appropriate to capture the enormous literature on this subject. Since LDRA Ch 4 is supposed to deal with "Status and trends",we feel that it might be better to restrict it to the Sahel example
David Lamb	Chapter 4		2045			might we not see bush encroachment as a reversal of degradation?	Good point; it well-illustrates the confusion about "desertification". Bushes are not good for livestock, but they are for carbon sequestration. Which is degradation here?
David Lamb	Chapter 4		2077			there appears to be some repetition here of earlier information?	Repetitions were eliminated for the final draft.
Dr. Erika Berenguer	Chapter 4	69	2077	82	2415	This important section is currently very convoluted and confusing. I strongly suggest the authors rewrite it under a different structure, possibly focusing first on global trends and then moving on to each ecosystem type (forests, savanahs, freshwater etc). Under the proposed global section, the authors could incorporate the subsection on future global biodiversity and discuss the figures. It is striking to see that by 2050 the model predict a loss >40% of species abundances. I also suggest the authors make clearer links between the trends presented and the delivery of ecosystem services.	The ecosystem services are dealt with in Ch 5.
Dr. Erika Berenguer	Chapter 4	69	2077	82	2415	Throughout this section I missed a mention to trends in forest degradation besides fragmentation. What are the current trends in illegal logging? And forest fires? And hunting?	Some information on forest changes is included in Sect 4.3.5, lines 2363-2394
Chenu Claire	Chapter 4		2077		L2414	Section 4.5 : This section could incorporate also the recent « Status of world soil resources report », published by FAO and ITPS in 2015.	Thank you for this reference. We have included it into the revised chapter draft.
Jian Zhang	Chapter 4	69	2077	82	2415	In this section,besides biological diversity, the status and trends of land degradation and restoration should be involved at regional, country and continental scales.	Agree, but some of that material may be better in the more specific Sections 4.2 - 4.4.

Victor M. Castillo (UNCCD)	Chapter 4	69	2077	82	2415	The title of chapter 4 suggests that "states and trends of land degradation and restoration" is the main focus of this chapter. However, while most of the text show clear overlap what it is also covered by chapter 3, the key section only comes at the end of the chapter and is pretty short. Even more problematic is the fact that the section only considers certain biodiversity aspects and does not engage at all with the various approaches, methods and studies to assess the state of land degradation beyond specific biodiversity aspects. This very limited focus on biodiversity also strongly contradicts the section on "history of degradation studies" (4.1.2) which at least gives a short overview of some of the more comprehensive assessment approaches. As a result, there is hardly any connection between this overview of existing studies (table 1) and section 4.5 that is looking at a different set of biodiversity assessments. It is recommended that section 4.5 builds on the overview of studies provided in table 1 and presents the similarities and differences between the existing assessment approaches in more detail to provide readers with real information on respective status trends. Also, more recent studies such as Le et al (2014 <a href="http://www.zef.de/uploads/tx_zefnews/zef_dp_193.pdf">http://www.zef.de/uploads/tx_zefnews/zef_dp_193.pdf</a> ) and suggested approaches to monitor land degradation under the SDGs (15.3; <a href="http://unstats.un.org/sdgs/files/metadata-compilation/Metadata-Goal-15.pdf">http://unstats.un.org/sdgs/files/metadata-compilation/Metadata-Goal-15.pdf</a> ) should be taken into account.	Reviewer's are points answered in turn: 1. Status and trends focus was emphasized to a greater extent. 2.The Ch 3 overlap was addressed at the second Authors' meeting and the delianation of the content between the two chapters was established 3. In addition to biodiversity, expansion of the status and trends topics was attempted. 4. Where appropriate assessment and monitoring methods was added. 5. The use of Table 1 as an organizing principle could only be negative - that is, the lack of information on the extent and severity of degradation at this scale is only available for a few, specific items. 6. The citation has been reviewed and incorporated
Bo Wu	Chapter 4	69	2077	82		The state and trends of LDR should be an important component of this section.	Agree, this section was elaborated.
Panos Panagos	Chapter 4	70	2110	70	2116	A recent work of Orgiazzi et al (2016) describes the 13 main threats of soil biodiversity in Europe: Orgiazzi, A., Panagos, P., Yigini, Y., Dunbar, M. B., Gardi, C., Montanarella, L., et al. (2016). A knowledge-based approach to estimating the magnitude and spatial patterns of potential threats to soil biodiversity. <i>Science of The Total Environment</i> , 545–546, 11–20	Thank you for the suggested references. We incorporated it in Sect 4.2 as we felt it was more appropriate there.
Penny van Oosterzee	Chapter 4	70	2115	70	2116	Reference is missing	Refernces were added
Dr. Erika Berenguer	Chapter 4	71	2124	71	2127	This paragraph, although important, seems entirely disconnected with the previous ones.	Disagree, we feel it belongs there
Dr. Erika Berenguer	Chapter 4	71	2129	71	2139	It would be very useful to see the references upon which the data presented in this paragraph is based.	Refernces were added
Royal C. Gardner	Chapter 4	73	2148	73	2173	Are the trends derived from data from a 2006 publication? That seems dated.	Updated
Sally Valdes	Chapter 4	73	2148	73	2173	There is an indicator of the genetic diversity of domestic species. Should also be trying to evaluate changes in the genetic diversity within non-domestic species.	Agree, but IPBES incorporates biodiversity in other assessments. A brief statement about levels of diversity, genetic diversity, diversity of functional types , a, b & c. was added
German government	Chapter 4	73	2149			Table 3 provides useful and easily accessible information on status and trends of the components of biological diversity. Nicely done!	Thank you!
Sally Valdes	Chapter 4	74	2194	74	2195	Perhaps a good place to mention the ecological concept of island biogeography, i.e., many small patches of similar habitat can't maintain as much diversity as a larger patch (See Simberloff, Daniel; Wilson, Edward O. (March 1969). "Experimental Zoogeography of islands - colonization of empty islands" (PDF). <i>Ecology (Ecological Society of America)</i> 50 (2): 278–296. doi:10.2307/1934856	This is dealt with in Section 4.3.1. A cross-reference to that was added here.
Royal C. Gardner	Chapter 4	74	2201	74	2205	While it is true that global change rates of wetland losses are not known with precision, we have certainty in the negative trend.	Trends were included
Brajendra (ITPS)	Chapter 4	74	2221		same line	5.84 x 106 wrongly written	Corrected
Brajendra (ITPS)	Chapter 4	74	2222		same line	3.65 x 106 ha/yr wrongly written	Corrected
Li Changxiao	Chapter 4	75	2230	75	2241	There is no legend for the darkness shown in the figure.	The legend was revised
Penny van Oosterzee	Chapter 4	75	2230			Can't really see forest gain in this diagram though the website is clear.	The quality of all figures has been improved for the final submission together with the assistance of the graphic design team
German government	Chapter 4	75	2231			At this scale and resolution the Hansen map (Figure 15) is hardly interpretable; tropical dry forests are in large parts not covered by the analysis due to forest definitions, which is a major problem when using lump estimates based on the Hansen data which does not become adequately clear from the text.	The quality of all figures has been improved for the final submission together with the assistance of the graphic design team
German government	Chapter 4	75	2246	75	2246	Regarding the statement that "by 2011, over 50% of the global population, about 3.6 billion, had urbanized": In chapter 3 (page 45, lines 1426-1428) similar statistics have been provided. Therefore, please develop one table for all chapters of the LDR report that shows the rising trend in the world's population that lives in cities.	Chapter 3 topics and overlaps was discussed at the 2nd Authors' meeting. A clear delianation of content was agreed upon and the chapter was revised accordingly.

Ashish Upadhyay	Chapter 4	76	2254			Over the period 1981–2003, the productivity declined across 40 % of croplands in the country—a critical situation in the context of a doubling of the human population over the same period in the country (Bai and Dent 2008). Other than modifications for agricultural purposes, unplanned growths of built-up areas are observed to be on the increase and are observed to contribute to the degradation processes (Maitima et al. 2009 ; Mundia and Aniya 2006; Were et al. 2013; Mireri 2005). The rising conversion of agricultural lands into industrial and residential lands especially with the increasing urbanization has also led to an increased pressure on initially productive lands	Thank you, we checked and incorporated Bai and Dent 2008; Maitima et al. 2009 ; Mundia and Aniya 2006; Were et al. 2013; Mireri 2005).
Panos Panagos	Chapter 4	76	2286	76	2291	According to a recent Study in 19 countries of European Union, the land take area between 1990-2006 is estimated to be equivalent of more than 6 million tonnes of Wheat (Gardi et al 2015): Gardi, C., Panagos, P., van Liedekerke, M., Bosco, C., De Brogniez, D. (2015). Land take and food security: assessment of land take on the agricultural production in Europe. J Environ Plan Manag. 58(5) : 898-912	Thank you, we checked and incorporated Gardi et al 2015: Gardi, C., Panagos, P., van Liedekerke, M., Bosco, C., De Brogniez, D. (2015). Land take and food security: assessment of land take on the agricultural production in Europe. J Environ Plan Manag. 58(5) : 898-912
Royal C. Gardner	Chapter 4	77	2301	77	2306	The discussion relies on the WWF LPI from 2004. The WWF LPI was updated for freshwater species in 2014. Figure 16 also needs to be updated with the more recent data.	Thank you we incorporated the new WWF LPI
Royal C. Gardner	Chapter 4	77	2311	77	2311	If you wish to discuss bird trends in the US, "freshwater breeding birds (data on 87 species) have increased by more than 40 % since 1968 (North American Bird Conservation Initiative, US Committee 2014). Similarly, birds wintering along US coasts (50 species) have seen a 28 % gain since 1968, including an 8 % rise in the most recent five years studied. In contrast, however, long-distance migrant shorebirds in the United States (19 species) have declined by 50 % since 1974." <a href="http://www.ramsar.org/sites/default/files/documents/library/cop12_doc23_bn7_sowws_e_0.pdf">http://www.ramsar.org/sites/default/files/documents/library/cop12_doc23_bn7_sowws_e_0.pdf</a>	Thank you, we checked and incorporated North American Bird Conservation Initiative, US Committee 2014) and <a href="http://www.ramsar.org/sites/default/files/documents/library/cop12_doc23_bn7_sowws_e_0.pdf">http://www.ramsar.org/sites/default/files/documents/library/cop12_doc23_bn7_sowws_e_0.pdf</a>
Penny van Oosterzee	Chapter 4	78	2315			There are more recent data.	More recent data was assessed for the next revision phase
Thomas Brooks (IUCN)	Chapter 4	78	2317	78	2329	This section on extinction risk is very important. It would be wise to cite the latest Red List data ( <a href="http://www.iucnredlist.org">www.iucnredlist.org</a> ). Brooks et al. (2016) Scientific Data ( <a href="http://www.nature.com/articles/sdata20167">http://www.nature.com/articles/sdata20167</a> ) summarised these data (and others) according to the IPBES regions and sub-regions, and would be the easiest place for the authors to access this information. All of the underlying data are freely available in Data Dryad ( <a href="http://datadryad.org/resource/doi:10.5061/dryad.6gb90.2">http://datadryad.org/resource/doi:10.5061/dryad.6gb90.2</a> ). This important material could usefully be included here. IUCN stands ready to help with synthesis or interpretation if useful: please feel free to contact me directly ( <a href="mailto:t.brooks@iucn.org">t.brooks@iucn.org</a> ) if so.	Thank you, relevant indicator and data was incorporated.
Penny van Oosterzee	Chapter 4	78	2331			Needs more explanation.	Added details of the nature of the model, inputs and, if possible, errors
Royal C. Gardner	Chapter 4	80	2371	80	2380	It may be important to note that just because an area is in protected status does not mean it is effectively protected. There are numerous references for this, including pages 137-139 of Juffe-Bignolia et al., Achieving Aichi Biodiversity Target 11 to improve the performance of protected areas and conserve freshwater biodiversity, Aquatic Conserv: Mar. Freshw. Ecosyst. 26 (Suppl. 1): 133–151 (2016), published online in Wiley Online Library ( <a href="http://wileyonlinelibrary.com">wileyonlinelibrary.com</a> ). DOI: 10.1002/aqc.2638	Noted, we checked pages 137-139 of Juffe-Bignolia et al., Achieving Aichi Biodiversity Target 11 to improve the performance
Dr. Erika Berenguer	Chapter 4	80	2371	80	2380	It would be very useful to see the references upon which the data presented in this paragraph is based.	All references added (Aquatic Conserv: Mar. Freshw. Ecosyst. 26 (Suppl. 1): 133–151 (2016), ( <a href="http://wileyonlinelibrary.com">wileyonlinelibrary.com</a> ). DOI: 10.1002/aqc.2638)
Tandra Fraser	Chapter 4	80	2371			Trends in soil biodiversity?	Agree, but belongs in Sect 4.2.1
Thomas Brooks (IUCN)	Chapter 4	80	2371	80	2380	This section on protected area coverage is very important. I Brooks et al. (2016) Scientific Data ( <a href="http://www.nature.com/articles/sdata20167">http://www.nature.com/articles/sdata20167</a> ) summarised these data (and others) according to the IPBES regions and sub-regions, and would be the easiest place for the authors to access this information. All of the underlying data are freely available in Data Dryad ( <a href="http://datadryad.org/resource/doi:10.5061/dryad.6gb90.2">http://datadryad.org/resource/doi:10.5061/dryad.6gb90.2</a> ). This important material could usefully be included here. IUCN stands ready to help with synthesis or interpretation if useful: please feel free to contact me directly ( <a href="mailto:t.brooks@iucn.org">t.brooks@iucn.org</a> ) if so.	Thank you for the reference and the data, it was incorporated into the next revision.
Dr. Erika Berenguer	Chapter 4	80	2375	80	2378	The end of this sentence doesn't make sense, it seems to be some typos.	All typos were corrected for the final submission
German government	Chapter 4	80	2388	80	2391	Please list systems established by countries to prevent and control invasive alien species, or at least provide references for further reading.	Further references provided and better linkages with CH3 invasive alien species section provided.
Kani ISIK	Chapter 4	83	2418	83	2418	Glossary... I believe that "Glossary" section will cover not only the "technical terms", but also the terms that seem to be "so simple" to the experts. Such terms may be "simple" to the experts in the field, but not to the layman (or many administrators not in the field) on the street. For examples such words as "ecosystem", "ecosystem services", "Biome", "Ecoregion", "Biodiversity" etc... are so well known to many of us, but it is possible that many people in administrative level could hear (and see) such words for the first time. Therefore, I humbly suggest that "Glossary" section should cover as many "terms" in the field as possible.	Glossary is now part of the Appendix to the final report with extensive coverage of all terms.

Samuel Nshutiyayesu	<b>Chapter 4</b>	83	2420	107	3703	There's need to thoroughly harmonize the references list (e.g. some not listed authors cited in the text, some incomplete references, citation style	The Bibliography was harmonized across for the final submission
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