Comment No	From Page	From Line	To Page	To Line	Comment	Response
24332	0	0	0	0	General comment for Chapter 3. It is (very) strongly recommended that the authors of Chapters 3 and 4 coordinate to ensure consistency in definitions and clarity on what each of these chapters delivers which is relevent and unique. Of course, some overlap is necessary, but the "mission" of each chapter needs to be clear so that maximum impact can be achieved. [Barron Joseph Orr, Germany]	Accepted. The authors working on corresponding sections from each chapter have been in contact throghout the SOD wiriting process to ensure consistence, clear division of roles and to avoid duplications.
24334	0	0	0	0	General comment for Chapter 3. Based on the definitions given for land degradation and desertification in chapter 2 (which seem to be those taken from the UNCCD convention text), it is clear that desertification is land degradation in drylands. Therefore it is extremely important that this chapter attempt to capture the extent of desertification AND its possible expansion by global warming. The very recently published World Atlas for Desertification (WAD3) ((https://wad.jrc.ec.europa.eu/landproductivity) will be an important source for this purpose. [Barron Joseph Orr, Germany]	Accepted. We have covered these topics, also have carefull assessed the information in the World Atlas of Desertifiction (2018).
21278	0	0	0	0	Aforestion studies is good but selection of tree species is crucail mostly very common species that are exotic to environment are used. This may cause invasion of alien species in problem area. [Erhan Akca, Turkey]	Noted.
3410	0	0	0	0	The issue of immigration and its causes in such reports, given its role in international politics, needs to be carefully and carefully addressed so that appropriate solutions can be found for its consequences [Hanieh Zargarlellahi, Iran]	Noted. This chapter does not have migration as its core topic. However, we do discuss our assessment of the literature on the impacts of desertification-climate change interactions on migration, and also on the role of migration as a socio-economic response to climate change-desertification.
20176	0	0	0	0	Distinction between land degradation and desertification should be articulated. A clear distinction should be made between land degradation and desertification. Is desertification irreversible land degradation? Many people confuse land degradation with desertification, still many others use these two terms interchangeably. Desertification in previous reports of IPCC should be mentioned under a subtitle. Desertification criteria and indices may be discussed in depth and how different criteria and indices are used in evaluation of desertification in different cases may be exemplified. Degradation of surface and groundwater should be credited in the context of desertification. Desertification criteria and indices may be discussed in depth. Desertification should not be confined to drylands. Also, in the drylands, the vegetation (biomes and anthromes) is relatively stable (more resilient) compared to humid and semi-humid areas, which may suggest that effect of climate change would be more serious in the latter. [Sabit Erşahin, Turkey]	Noted. This comment actually contains several specific sub-comments. We agree with some, and reject some others. Namely, we use the widely accepted definition of desertification which says that desertification is land degradation in arid, semi-arid, and dry sub-humid areas resulting from many factors, including human activities and climatic variations. Hence, desertification is a subset of land degradation. The difference between the terms desertification and land degradation is now also explained the Frequently Asked Questions. We consider that both chapter on desertification and the chapter on land degradation now provide a clear distinction between these two (along geographic lines of drylands vs. outside drlyands). So we reject the definition that desertification is an irreversible form of land degradation, we also reject that desertification can occur outside drylands. Outside drylands this is called land degradation. However, we accept the suggestions about the need to cover more on surface and groundwater, more explicit links to previous IPCC reports providing statements on desertification, information about indicators and criteria of desertifiction. The last statement about the effect of climate change being stronger in humid areas rather than drylands is very broad and needs to be quaified. We consider the impacts to be context-specific, also depending substantially on local socio-economic vulnerabilities. So we also reject this last statement for its ambuguity and broadness.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10132	0	1	119	45	The Authors did a great job with extensive reading. It has however been impossible to track some of the references used in the text especially where there are presumably more than one citation for a particular author in the same year. The use of a, b, c etc. has not been properly applied throughout the chapter. There is need for complete revision of references in text and in the ref list (too many repetitions in the reference list). Reference sources should be ordered by year of publication with the oldest first and/or alphabetically in the case same year publications. Consistency is important throughout the chapter. Some references in text are not in the list and vice versa. Issues of community/participatory forest management not coming out clearly as critical in reducing desertification. This could be added to the section on natural resource management. Policy responces may need to include international policy responses to desertification under a changing climate. [Lizzie Mujuru, Zimbabwe]	There are three separate comments here, we accept all three. We checked and corrected the references accordingly. The references are manageed through Mendeley software, we are taking a careful look, but sometims formatting issues are automatically repeated when the references are refreshed. Will continue working on this. We also discussed on community and participatory forest management and international policy responses to desertification (e.g. green wall initiatives (3.8.2), decentralized NRM management (3.7.1) Land degradation neutrality framework as it applies to drylands(3.7.1). We note that LDN as a concept is mostly discussed in Chapter 4 as per our coverage division.
2950	0				execitive summary is good and could be a model for Chapter (1) executive summary [Cordula Ott, Switzerland]	Noted. Thank you.
2956	0				no discussion of Zero Net land degradation. But thuis comes up in 7.4.2.2.; Land degaradtion Nuetrality is taken up. Is it the same? [Cordula Ott, Switzerland]	Accepted. Land degradation neutrality and zero land degradation are the same. We included more discussion on relevant aspects of land degradation neutrality (LDN). LDN is also covered more broadly in Chapter 4, whereas Chapter 3 provides practical examples relevant to LDN from drylands.
25744	0				please refer to IPCC style guide regarding use of acronyms [Hans Poertner and WGII TSU, Germany]	Accepted, revised accordingly.
25780	0				The point of departure from previous IPCC reports (AR5) needs to be included, how was desertficiation assessed? What were the conclusions? [Hans Poertner and WGII TSU, Germany]	Accepted, information included.
25784	0				Please ensure IPCC calibrated uncertainty language is applied to assess key messages and statements throughout the text [Hans Poertner and WGII TSU, Germany]	Accepted, the text revised accordingly
26296	0				Well done for remaining within the prescribed page limits for this chapter. Moreover, it is good practice to integrate these bullet points in chapter headings to make sure that a) they are covered and b) they are easily located within the chapter. [Hans Poertner and WGII TSU, Germany]	Noted, thank you.
20516	0				2. I think that 3.2 and 3.3 should be merged here to form a part that mainly reflects the characteristics, attributes and mechanisms of desertification. 3.4 and 3.5 are combined to describe the interaction between desertification and climate change. Such a structure can be adapted to the previous chapter. [Huai Jianjun, China]	Rejected. This structure of the chapter was reached after long and very informed debates among the authors. We think the current chapter structure serves better our purpose.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20520	0				4. Many of the policy analysis in Section 3.7 is almost an industrial policy analysis. It is effective for solving the negative impacts of land degradation and climate change, but it seems to lack certain pertinence. [Huai Jianjun, China]	Rejected. You indicate that those policy responses we wrote about are "effective for solving the negative impacts of land degradation and climate change". If effective, in this case, they are also very pertinent by definition. We empahsized on their links to climate change and desertification further.
25474	0				A very promising assessment. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Thank you.
17138	0				In general,I found the report somewhat unfocussed in what refers to climate change. In many instances, and being appropriate, climate change was very much ignored. For example, the case studies most of them did not make a connection to this. I also found that in many intances, many sentences, at times whole paragraphs, with important messages lack references supporting it. The references must be checked one by one in relation to the message that they are supposed to support. In many instances, references did not backed up the message. There was also some repetition of concepts, like if whoever wrote a section had not read the whole the text. CLAs must do that and avoid such repetitions. For intances, droughts are defined in section 3.8.5 when a lot had already been written about drought. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Thank you. There are have several comments here: 1) we linked further all elements to climate change, we admt that this is an ongoing process, 2) some paragraphs serve as introductions to the section, where we did not always need references, but we still included some references now, 3) we contest your statement that there were "many" instances where the cited literature did not support the statement. There were a couple of cases when the text phrasing was awkward, so we addressed those cases. 4) we defined now drought right at the beginning. We dont agree that there were several cases of repeated concepts, but readily aknowledge that there were terms used in many parts of the chapter. Drought is one of them. Each section covered aspects of the drought relevant for the discussion in that section. If we dicussed everything related to droughts in one place, and similarly for other frequently repeated terms (dust storms, etc) it would have become a very poorly structured text.
17140	0				In the executive Summary there are several "likely". It was unclear to me whether this was calibrated untertainty language or no. Please, check and clarify as apprpropriate [Jose Manuel Moreno Rodriguez, Spain]	Noted. The text revised as/when needed.
552	0				Also this chapter seems already in quite good shape. Thanks to the authors for their hard work [Klaus Radunsky, Austria]	Noted. Thank you.
2320	0				After having fully revised the whole chapter I can say that all its contents are very pertinent. I found very interesting the study cases section. Nevertheless, I have made some comments that you can find above and hope you find them useful to improve the chapter. [María Almagro Bonmatí, Spain]	Noted. Thank you.
5490	0				Desert dusts, although extremely important, are very poorly addressed in this chapter. It is highly recommended to address this important element in the next version. Due to the lack of experts in this particular area in the chapter author list, contributing authors should be invited to overcome this huge gap. [Noureddine Yassaa, Algeria]	Accepted. Desert dust/sand stroms/dust storms are in fact extensively covered in our sections on desertification-climate change feedbacks, and also on socio-economic impacts. Now we further expanded the discussion of desert dust impacts and related processes, also in other sections.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14374	0				The extent of desertification and it possible expansion by global warming must be assessed in the context of quantitative changes in the following ecosystem parameters: energy balance, components of water balance, elemental budget (C, N, P, S, Ca, Mg etc.), the surface area covered by vegetation, and the net primary productivity. Quantitative alterations in these parameters, measured by remote-sensing techniques and validated by ground truthing, must be related to site-specific biophysical and socio-economic/cultural factors. Quantifiable changes in these parameters must also be measured upon adoption of best management practices (BMPs) viz., changes in albedo, air/soil temperature, ecosystem C budget, and components of the hydrologic cycle by afforestation of desertified lands. Additional comments by members of UNCCD-SPI are listed below: [Rattan Lal, United States of America]	Noted.
7002	0				Please check: In the Executive Summary please elaborate comprehensive discussion on the observed and projected impacts of desertification on natural and human systems under the anticipated changed climatic scenario. This will have impact on ecosystem services, for example, soil water-nutrient-carbon content-biodiversity nexus will be adversely affected by desertification, leading to further faster deterioration of soil quality and hence poor crop productivity. Soil carbon content in surface and subsurface soil profiles will be reduced, potential for carbon seuestration will be hampered and macroscopic and microscopic soil biota, instrumental in nutrient cycling will be diminished. As an outcome, there will be food insecurity in dryland areas. People who are already vulnerable and food insecure are likely to be first affected. Low-income group people might be at risk of food insecurity indirectly by losing their assets, livelihoods, lack of support systems and adequate insurance coverage. This may also lead to shifting vulnerabilities. Food systems will also be affected through possible migration, resource-based conflicts and civil unrest. Taking preventive and conservation measures can help improve the condition if sustainable land use management policy (for achieving short-mid-long term goals) is adopted towards ecosystem sustenance. Site-specific SLM along with Judicious adoption of conservation agriculture practices can prove to be effective. [Suvadip Neogi, India]	Noted. This is consistent with our writing.
7004	0				Please check: Discussion on technological, socio-economic and policy responses to desertification under changing climate should focus light on economic diversification, enabling conditions, co-benefits as well as limits to adaptaion. Presently the coherence in discussion is weak. This discussion should be illustrated in context of impacts (observed and projected) of desertification on natural and human systems in changing climate incorporating impacts on ecosystem services and socio-ecological systems. Strategies to mitigate desertification comprise technologies for sustainable land management (SLM) coupled with a suitable approach that supports adoption and implementation of these technologies. The SLM technologies should focus on agronomic, vegetative, structural, economic and management measures. Implementing SLM by selecting appropriate combinations of technologies and approaches is crucial. Identifying, assessing, testing and validating SLM technologies in line with the stakeholders interest involved will help enhance feasibility, and applicability. [Suvadip Neogi, India]	Accepted. We strengthened the coherence between different parts of the chapter, als differentiating between observed and modelled impacts.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6946	0				Very well written. Desertification is well discussed and exposed. [Talal Darwish, Lebanon]	Noted. Thank you.
3084	2	5	2	5	In the framework of the nature of desertification, two points need to be considered: 1- the cause of the desertification; 2- the source of sand dune and dust, especially in sand dune movement. [Mostafa Jafari, Iran]	Accepted, we already discuss both these aspects in the chapter. In the nature of desertificaton we emphasized that desertification is all forms of land degradation in drylands. We got the impression that there is also a perception among some readers that desertification is expansion of deserts. We did not want to reinforce that mistaken impression by discussing about sand dunes in the 3.2.1 while ignoring about other forms of desertification.
1572	2		2		Desertification chapter may need to be after land degradation chapter or it can be merged with land degradation. Because desertification is the ultimate and irreversible degradation stage [Rajesh Chintala, United States of America]	Rejected. This sequence of chapters and report outline was mandated by Governments. This chapter uses the internationally accepted UNCCD definition of desertification as land degradation in arid, semi-arid and sub-humid areas.
11046	3	2	3	2	It is recommended that confidence/uncertainty statement be defined in a footnote on the first page. This will give your reader an understanding of what these mean. In addition, use curly brackets for references to sections of the report referenced in the ES. [Debra Roberts, South Africa]	Accepted, footnote included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3856	3	2	3	3	The first two lines of the report state: “Dryland areas are expected to expand and become more vulnerable to desertification under climate change due to increasing aridity (high confidence).” This is supported by section 3.6.1 (page 31/line37 to page 32/line 17). However, the first two lines of the report are completely inconsistent with statements made later in the same part of the text (page 32/line 18 to page 32/line 28). To retain the opening statement that drylands are expected to expand you need to explain why the inconsistent text (page 32/line 18 to page 32/line 28) has been completely disregarded. See points 4 and 5. In summary, the opening sentence that asserts a projected increases in the area of global drylands is in direct conflict with climate model outputs (Roderick et al. 2015, Greve et al 2017, Leomordant et al 2018). To retain the opening statement you need to explain why you have discarded climate model projections. REF: Roderick, M. L., P. Greve, and G. D. Farquhar (2015), On the assessment of aridity with changes in atmospheric CO2, Water Resources Research, 51(7), 5450-5463, doi:10.1002/2015wr017031. Greve, P., M. Roderick, and S. Seneviratne (2017), Simulated changes in aridity from the last glacial maximum to 4xCO2, Environmental Research Letters, 12(11), 114021. Lemordant, L., P. Gentine, A. S. Swann, B. I. Cook, and J. Scheff (2018), Critical impact of vegetation physiology on the continental hydrologic cycle in response to increasing CO2, Proceedings of the National Academy of Sciences. [Michael Roderick, Australia]	Accepted, the text revised accordingly.
104	3	2	3	3	It is not true, that prognoses generally predict increasing aridity globally. Here one needs to differentiate between areas that get drier and areas that get wetter. Both types of areas occur. An increase in rainfall is prognosed e.g. for Ethiopia, e.g. Wagena et al. 2016: doi 10.1007/s10584-016-1785-z. Bathiany et al. (doi.org/10.1175/JCLI-D-13-00528.1) suggest a further greening of the Sahel. Previously it was feared that "drier areas become drier, and wet areas become wetter". This is not necessarily true as works by e.g. Donat et al. 2016 (https://www.nature.com/articles/nclimate2941) shows. Global warming is expected to lead to an increased amount of moisture in the atmosphere. This will generally provide a greater amount of moisture for rainfall. The most important chages will probably be regional shifts in rainbelts. Some areas get wetter, other drier. This is a well known phenomenon that has always occurred, e.g. in Africa in Medieval times (Lüning et al. 2018, https://doi.org/10.1016/j.palaeo.2018.01.025). [Sebastian Luening, Portugal]	The issue addressed.An elaborate discussion is given in section 3.3 Observations of desertification and attribution

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26844	3	2	3	14	This paragraph mixes historical impacts and future projections. As in previous IPCC reports, separating historical impacts and future projections provides a more accurate summary of the scientific findings, since historical impacts are based on actual measurements while future projections come from modeling with higher uncertainties. Therefore, separate the text into one paragraph quantifying the historical changes and a different paragraph summarizing the future projections. [Patrick Gonzalez, United States of America]	Accepted.Text revised
18984	3	3	3	3	...increasing aridity (aridity is not increasing everywhere, even though global warming is generally detectable) [Azziz Hirche, Algeria]	Accepted, the text revised accordingly.
9606	3	3	3	4	I suggest to to qualify this statement of 10% of drylands affected by desertifaction more cautiously and add "low evidence; medium agreement"). The source mentioned in chapter 3.2.1. (Le et al 2016) is only an abstract from a conferene and appears not to be peer reviewed.The other source by le et al 2016b does not deal with desertification. So we have only one source which gives this 10% value, whereas many other references from previous years had other results. It may also be necessary to refer to and discuss the statement in the new Desertifcation Atlas that cautions against global measurment of desertification. "it is asserted that 'desertification' or 'land degradation' cannot be captured in global maps in a way that satisfies all stakeholders. Instead, WAD3 illustrates the geographic distribution of coincident patterns of issues that may indicate potential land degradation." Cherlet et al 2018. [Markus Giger, Switzerland]	Accepted, the text revised accordingly.
24166	3	4	3	7	change "mediterrebnian area" to mediterreninan bassin [Heggy Essam, United States of America]	Corrected
24168	3	4	3	7	The list of areas where desert are extending is long, I would focus on this short list on desertification occuring in highly populated areas : I would add the southwest of the United State and eastern africa. [Heggy Essam, United States of America]	Added to the text
5130	3	4	3	7	Central Asia is missed [Oksana Lipka, Russian Federation]	Added to the text
25078	3	4	3	7	Expansion of dryland in middleeast and specially in I.R.Iran is so widespread that is unique among other regions. It can be mentioned because nowadays it is a calamity in the middle east. [Sayed Masoud Mostafavi Darani, Iran]	Added to the text

Comment No	From Page	From Line	To Page	To Line	Comment	Response
102	3	4	3	7	Drylands have NOT expanded recently in all of these mentioned areas. Authors need to be very throrough and need to check facts before generalizing. The Sahel droughts were most frequent and intense in the 1960s to 80s. Since then the Sahel is much wetter. There is a vast body of literature about these trends which needs to be honoured, e.g. Park et al. 2016: doi:10.1038/nclimate3065, Brandt et al. 2014: doi:10.3390/rs6032408. Statement needs to be checked and backed up by references for all other mentioned regions. According to Shen & Tafolla 2014(doi.org/10.1175/JAS-D-13-0301.1) the frequency of droughts has globally not even increased during the past 100 years. How does this match with the statement in the FOD? [Sebastian Luening, Portugal]	Accepted, the text revised accordingly. We indicated that drylands as measured by aridity index have expanded, but aridity index is an imperfect measure under changing CO2 environment.
18986	3	5	3	5	to refine sentence: for example, most studies by remote sensing speak of "regreening" in the Sahel [Azziz Hirche, Algeria]	Accepted.Sentence refined.
18988	3	7	3	7	Human activities generally take precedence over climate change, except in a few regions, where the opposite is true, such as the Sahel. [Azziz Hirche, Algeria]	Noted. Thank you.
10796	3	7	3	7	The use of the term 'relative' in the sentence seems to muddy the point being made. The sentence has meaningful without it. [Debra Roberts, South Africa]	Acepted. Revised.
10800	3	7	3	7	Consider inserting 'of human and ecosystem' after 'vulnerability' [Debra Roberts, South Africa]	Accepted.Text revised
10804	3	7	3	7	Confidence language required [Debra Roberts, South Africa]	Accepted. Confidence language assigned
6884	3	7	3	8	Not sure what is meant by: " The relative attribution of desertification to climate variability and change and human activities is context-dependent"? [Wilfran Moufouma Okia, France]	Noted. The sentence revised following the comment 10148.
25746	3	7	3	14	the attribution section of the executive summary statement could form a separate executive summary statement, this is an important point [Hans Poertner and WGII TSU, Germany]	Accepted, the text revised accordingly.
18990	3	10	3	10	I do not agree. In North Africa, where is located the largest desert in the world, all authors agree that human activities are far more important than climate. [Azziz Hirche, Algeria]	Accepted. We do indicate that attribution is context-dependent.
10798	3	10	3	10	Confidence language required [Debra Roberts, South Africa]	Accepted. Confidence language assigned
17142	3	10	3	10	.. Previously understood is awkaward. Previously estimated? [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Revised accordingly.
18992	3	10	3	12	A fairly recent study on climate change in nature (DONAT et al, 2016, DOI: 10.1038 / NCLIMATE2941) showed that even if the rains would be more frequent, their total would be larger, which would not necessarily have disastrous consequences. [Azziz Hirche, Algeria]	Accepted.Information incorporated

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18994	3	10	3	12	I suggest to refine : In addition, paleoclimatology shows us that, overall, the increase in temperature leads to wetter conditions. [Azziz Hirche, Algeria]	Rejected. Statements in the Executive Summary need to be based on the text within Chapters. We did not cover paleoclimatology in order to focus on policy-relevant timeframes. Moreover, the reviewer does not provide and reference to support his statement.
18996	3	10	3	12	The Sahara was "green" when the temperature was about 2 ° C higher than today ! [Azziz Hirche, Algeria]	Accepted. Relevant literature discussed.
17144	3	11	3	11	To what kind of extreme events are you referring to? Please, be more specific [Jose Manuel Moreno Rodriguez, Spain]	Accepted.Text revised
17146	3	12	3	13	How about other important drivers (e.g., overgrazing) [Jose Manuel Moreno Rodriguez, Spain]	Accepted.Addressed in a different section of the executive summary
25080	3	12	3	14	Lack of land-use management and lack of water management specially in agriculture that is consumer of more than 80% of water resources in some areas like middleeast and Iran, are major human drivers of desertification and in my opinion, poverty and migration are consequences of desertification not drivers. [Sayed Masoud Mostafavi Darani, Iran]	Accepted.Confidence language assigned
10482	3	13	3	13	unsustainable agricultural practices and deforestation also are major human drivers of desertification [Zitouni Ould-Dada, Italy]	Accepted.We discuss on these drivers.
9608	3	13	3	14	expansion of rangelands and overgrazing should also be mentioned. For this there is some robust evidence. See Cherlet et all, 2018, E. C. Ellis, Ecology in an anthropogenic biosphere. Ecological Monographs. 85,287–331 (2015), DOI: 10.1890/14-2274.1. [Markus Giger, Switzerland]	Addressed.Confidence language assigned
9610	3	13	3	14	There is little evidence or agreement that migration is a main driver of desertification. As correctly stated in chapter 3.2.3.2) [Markus Giger, Switzerland]	Addressed.Confidence language assigned
17148	3	15	3	18	Please, clarify since when has this occurred. Additionally, specifiy the scenario under which this is supposed to occur [Jose Manuel Moreno Rodriguez, Spain]	Accepted. text added to clarify
25748	3	15	3	26	These sentences on controls of CO2 release and net carbon uptake are not clear to an uninformed reader, please reword [Hans Poertner and WGII TSU, Germany]	Accepted. clarifying text added
24170	3	15	3	26	an additional effect of dust that it increase the reflectivity of snow hence cutting snow melt on the top of mountains. Snow melt is the main source of aquifers recharge notably in California, Morocoo and Swiss alpes and other snow covered areas. It was found that Desert soil blown onto mountain snow controls how fast snowmelt feeds downstream rivers regardless of how warm it is. Results has been reported in Painter et al., GRL, 2018 [Heggy Essam, United States of America]	Accepted. text on this added to section 3.4.1.1
17150	3	19	3	19	Unclear sentence. What do you men by others [Jose Manuel Moreno Rodriguez, Spain]	Acepted, text added for clarification
18998	3	22	3	25	The relationship between dust and climate is not very obvious……. [Azziz Hirche, Algeria]	Noted
19000	3	22	3	25	…….especially, some models consider that the dust winds will decrease in the next century [Azziz Hirche, Algeria]	Accepted, text is added in 3.6.2

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19022	3	22	3	25	The past, present and future of African dust. Amato T. Evan, Cyrille Flamant, Marco Gaetani & Françoise Guichard. Nature. 24 mars 2016. doi:10.1038/nature17149 [Azziz Hirche, Algeria]	Accepted, text is added in 3.6.2
10802	3	25	3	25	Delete 'through serving' [Debra Roberts, South Africa]	Accepted. Revised accordingly.
3386	3	27	3	35	According to changes in precipitation patterns and temperature variations to explain this in detail, from the past to the present in long-term timescales is essential. [Hanieh Zargarlellahi, Iran]	Rejected: not supported by the peer-reviewed published literature
14378	3	28	3	28	Replace "....losses in biodiversity" with "... losses in ecosystem health". Biodiverity is a narrow concept here [Rattan Lal, United States of America]	Accepted: this sentences we rewrote as: ...dryland ecosystem services and lowers ecosystem health, including losses in biodiversity.
19002	3	28	3	29	Desertification processes coupled with climate change . I PROPOSE : Desertification processes, and among them climate change [Azziz Hirche, Algeria]	Rejected. Climate change is not a component within desertifiction processes.
10806	3	28	3	29	Insert commas before and after 'coupled with climate change' [Debra Roberts, South Africa]	Accepted, the text revised accordingly.
17152	3	28	3	30	Specifiy scenario and temporal framework [Jose Manuel Moreno Rodriguez, Spain]	Accepted: we add: in Latin America, Caribbean and sub-Saharan Africa by 2055.
19670	3	28	3	31	The pharantehis should be complete. [Sabit Erşahin, Turkey]	Accepted, the text revised accordingly.
10808	3	30	3	30	in livestock diseases prevalence' is a contributing factor to reduced productivity of livestock mentioned earlier in the sentence. This should be deleted. [Debra Roberts, South Africa]	Accepted: deleted
26300	3	30	3	31	“case studies (…) intrusion). This part of the sentence makes no sense, please revise [Hans Poertner and WGII TSU, Germany]	Accepted: deleted
10810	3	31	3	31	Consider deleting the following 'case studies on soil erosion, on invasive plant species, and on salinisation due to sea water intrusion)". What is contained here has already been addressed in the preceding parts of the sentence. [Debra Roberts, South Africa]	Accepted: deleted
20514	3	31	3	31	1. The brackets at the end of the sentence are superfluous. [Huai Jianjun, China]	Accepted: deleted
17154	3	31	3	31	this parte of the sentence "... case studies....) is unclear and out of context. [Jose Manuel Moreno Rodriguez, Spain]	Accepted: deleted
10812	3	33	3	33	Is it possible to provide some indication/quantification of wildlife lost because of desertification? Near and long term projections could also add value to the point being made here. [Debra Roberts, South Africa]	Rejected: we are not aware of any global quantification of wildlife lost because of desertification.
554	3	35	3	35	Trophic cascades is a specific term which should be further explained in the glossary. [Klaus Radunsky, Austria]	Accepted: Perhaps a better and more encompassing term would be “ecological cascade”, which is a series of secondary extinctions as a result of the extinction of a key species within an ecosystem.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19004	3	36	3	36	I suggest : climate deterioration rather than climate change : [Azziz Hirche, Algeria]	Rejected. We feel climate change is a more accurate and well-known term rather than climate deterioration.
17156	3	36	3	37	Specifiy scenario and temporal framework [Jose Manuel Moreno Rodriguez, Spain]	Rejected. We cannot do this, because this statement is not based on some uniform modelling with consistent scenarios and timefarmes, but this is based on a big number of socio-economic studies, some which use modelling frameworks projecting future impacts (e.g. on food security), some others are observational studying past and current impacts of desertification and climate.
3388	3	36	3	45	In order to accurately document this, we need the long-standing information of each region and its climate. [Hanieh Zargarlellahi, Iran]	Noted. Wherever available, we provided examples from different regions in the corresponding section 3.5.2.
19006	3	38	3	38	I suggest to replace : The combination of pressures coming from climate change and desertification by The combination of pressures like climate change on desertification [Azziz Hirche, Algeria]	Rejected. We think that the original wording reflected our intention more accurately.
26504	3	39	3	40	“Growing evidence” is misleading when used in conjunction with IPCC calibrated language. Please rephrase for clarity, e.g., “Migration is increasingly used as an adaptation strategy…” [Hans Poertner and WGII TSU, Germany]	Accepted.
17618	3	39	3	41	Adpatation strategy is misleading. There is no strategy in it, but simply response. So it seems more and unplanned autonomous response [Jose Manuel Moreno Rodriguez, Spain]	Accepted, revised as "adaptation reponse"
24174	3	43	3	45	the health effects of dust storms are a subsject to debate and site dependent, it all depend on the type of dust and size of the partticle and several other factors. As of now the link of dust storm to health issues is weakly established on a global scale. I would suggest using a more cautiois tone on this part. [Heggy Essam, United States of America]	Accepted, we revised the text in a more cautious manner.
26500	3	1	4	48	Good attempts at using IPCC confidence language in the ES were made. Please include IPCC likelihood qualifiers as well, and italicise terms such as “very likely/likely/…” wherever used to express a degree of likelihood throughout the ES (and the chapter) [Hans Poertner and WGII TSU, Germany]	Accepted, the text revised accordingly.
10814	3	36	4	2	These are all very good. What is missing, however, is the quantification of the impacts mentioned here. For instance, how many people have been forced to migrate due to the interactions and what does the picture looks like for the future? In addition, it will also be good if you could quantify the economic loss due to infrastructure damage. [Debra Roberts, South Africa]	Noted. We provided quantification whenever available. We noted that in many cases there has been very little research in quantifying the related economic costs, which we highlighted as research gaps.
14376	3	1	5	2	One of the essential things is not reflected: that desertification is not something particular but the land degradation in drylands. This is the reason why climate change is considering as a possible driver for further desertification. The drylands are vulnerable to climate changes, and also many people depend on there livelihoods in drylands, so such a big attention is given to desertification issue! This should be clearly stated in the Summary [Rattan Lal, United States of America]	Accepted. We have extensively covered these aspects in the main body of the chapter. We have now also briefly included the relevant information in the executive summary.
6570	3	43	16	45	provide expansion rates for years 1990-2000 & 2000-2015. [Shrinidhi Ambinakudige, United States of America]	Rejected. The comment does not correspond to page and line no. shown.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10936	3	1	65	21	Besides the ES, confidence language was hardly used in the chapter. The authors should consider going through the chapter, assess the literature where relevant and use appropriate confidence language. The authors should also consider linking this chapter more strongly to AR5 and then build on that report with the new knowledge that has emerged since AR5 [Debra Roberts, South Africa]	Accepted, the text revised accordingly.
1594	3		65		There are a lot of spelling corrections needed all over the chapter [Rajesh Chintala, United States of America]	Noted, corrected.
8954	3	5			(Lavauden, 1927). Put comma after author check whole document [Amanullah Amanullah, Pakistan]	Rejected. No such reference on that line. Where it is cited, it is Lavauden (1927) ....
25818	3	11			this case study is repeated in chapter 4, section 4.11.19, please consider how to deal with overlapping material [Hans Poertner and WGII TSU, Germany]	Accepted.Include here for coherence(degradation driver both in drylands and drylands
26298	3	18			6% increase since when? please provide reference time [Hans Poertner and WGII TSU, Germany]	Accepted. Timeline added
8956	3	22			(Herrmann and Hutchinson, 2005), put comma after authors [Amanullah Amanullah, Pakistan]	Rejected. No such reference on that line. Where it is cited, it is Herrmann and Hutchinson (2005) ....
8958	3	23			Put comma after author check whole document [Amanullah Amanullah, Pakistan]	Noted.
8960	3	28			(UNEP, 1992; Le Houérou, 1996). Put comma after author and separate different citation by putting ; in brackets, please [Amanullah Amanullah, Pakistan]	Rejected. No such reference sequence in that line or in the entire chapter.
26302	3	33			Please use terms such as “negatively affected”, or “physiologically challenged”, rather than “stressed” as this term has a psychological connotation that cannot be assessed in wildlife. [Hans Poertner and WGII TSU, Germany]	Accepted: changed stressed by negatively affected
26502	3	35			could you specify whether this low confidence stems from literature limitations or from low agreement, or both? [Hans Poertner and WGII TSU, Germany]	Accepted: we add limited evidenced after low agreement
24172	4	1	4	2	additionally sand dune movements and sand storms can alter wetland equilibrium as burial of Sbkhas in Qatar and Tunisia and the Southern California [Heggy Essam, United States of America]	Rejected. We think this text would rather fit inside the chapter, rather then in the Executive Summary. The reviewer did not provide any references to support this statement.
25082	4	1	4	2	damages to infrastructures [Sayed Masoud Mostafavi Darani, Iran]	Accepted.
5012	4	3	4	25	The lead statement refers to 'dryland population ingenuity'. However, it is not clear from the body of the paragraph to what extent this is the case (some examples could be given to strengthen this). Alternatively the leading sentence could simply be removed - starting instead with 'Site specific technological solutions..' which would be more reflective of the paragraph text that follows. [Eamon Haughey, Ireland]	Accepted. Text Changed.
25084	4	5	4	5	traditional knowledge .....change to ....Indigenous science [Sayed Masoud Mostafavi Darani, Iran]	Accepted, consistently using the term indigenous and local knowledge across the entire report.
6966	4	7	4	9	Benefits to the SDG achievement shloud be described, taking into account direct and direct interlinkages with specific targets. [Anna Luise, Italy]	Noted. Further discussion of the relationship with SDGs appears in the cited sections

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17544	4	9	4	10	Strongly agree with the statement "Investments into land restoration and rehabilitation have positive economic returns". Consider including in the references of this chapter the very postive experience and the important results achieved by the GEF supported and World Bank administered (with aignificant FAO cooperation) " Badia Ecosystem and Livelihoods Project" , in Jordan, which was satisfactorily completed in June 2017. See: http://documents.worldbank.org/curated/en/405611515169586473/Jordan-Badia-Ecosystem-and-Livelihoods-Project [Turi Fileccia, Italy]	Noted. Thank you.
10816	4	11	4	11	Consider deleting 'were shown to' [Debra Roberts, South Africa]	Accepted.
19008	4	12	4	25	SLM are effective in specific ecological contexts. They can not often be effective at the scale of the rangelands (as example) … [Azziz Hirche, Algeria]	Rejected. SLM is a broad concept and could mean sutainable grazing land management and not clear why it would not be effective in all types of ecosystems
19010	4	12	4	25	because it would require an exorbitant economic cost and their relevance questionable,The solution to the problem of desertification is less technical than economic. In Algeria you have on average, 3 to 5 times more sheep than there should be… [Azziz Hirche, Algeria]	Rejected. Again, sustainable management is not necessarily expensive
19012	4	12	4	25	...No serious SLM measurement is possible in an ecosystem with such an imbalance. It requires a reorientation, even a total socio-economic refoundation. [Azziz Hirche, Algeria]	Noted. No scientific evidence/publications provided to support the suggestions made by the reviewer.
19014	4	12	4	25	Remote Sensing is a controversial tool , because several papers do not sufficiently take into account data from afield (In situ) sampling and an ecosytem monitoring. [Azziz Hirche, Algeria]	Rejected. We do not believe remote sensing is a "controversial tool" in general, but moreover, it is not mentioned in this section of the document. No scientific evidence/publications provided to support the suggestions made by the reviewer.
19024	4	12	4	25	See Hannelore Kusserow 2017, Desertification, Resilience and Re-greening in the African Sahel – A matter of the observation period?doi:10.5194/esd-2017-4, 2017 [Azziz Hirche, Algeria]	Noted. Thank you for the interesting paper. We are not sure how it relates the response options listed in the identified paragraph and have therefore not included it.
10396	4	14	4	14	"Combined use of salt-tolerant crops, improved irrigation practices, and chemical remediation measures were effective in reducing salinity-induced desertification (medium)." The list should include good land management and cultural practices such as mulching, composting, water use efficiency [Zitouni Ould-Dada, Italy]	Accepted, appropriate compost and mulch (i.e. low in salts) has been added to the text
10818	4	15	4	15	Consider replacing 'were' with 'are' to reflect your assessment of the literature instead of reporting on the literature [Debra Roberts, South Africa]	Accepted. Done
10820	4	17	4	17	Replace 'n helped to increase' with 'increases' [Debra Roberts, South Africa]	Accepted. Done.
10822	4	18	4	18	Consider deleting 'were shown to'. It is recommended that authors go through the entire chapter to address phrasing of this nature as such phrasing could obscure the fact that this is an assessment of the literature not a literature review. [Debra Roberts, South Africa]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
556	4	21	4	21	Aeolian desertification is a specific term which should be further explained in the glossary. [Klaus Radunsky, Austria]	Accepted.
10824	4	22	4	22	Consider deleting 'terms of' [Debra Roberts, South Africa]	Accepted.
19672	4	26	4	36	Creating a more stabil rural community to reduce emigration. Decrasing agricultural production cost by adapting low-cost intuts such as farmyard manure, green fertilizers, new techniques of plant protection, and conservation tillage systems. Decreasing price fluctuation to reduce the risk of grower's loss. Incresing grower's satisfaction to achieve an optmisitic and stabil rural community. Establishing a sustainable rural development stradegy to decrease emigration. [Sabit Erşahin, Turkey]	Noted.
25858	4	28	4	28	Please clarify what co-benefits are referred to here (benefits for what and/or whom?) [Hans Poertner and WGII TSU, Germany]	Accepted, clarifying text inclded.
26306	4	33	4	34	"Promoting schemes that provide payments for ecosystem services allows internalisation of some of the social benefits of SLM helping accelerated adoption of SLM practices " I do not understand what this statement means… could jargon be avoided here? [Hans Poertner and WGII TSU, Germany]	Accepted, jargon removed.
17546	4	37	4	40	The above cited project is also a good example of what stated in the refered lines. FAO has trained in Rome the Supervisor of the Drought Monitoring Unit (Eng.Muna Saba) of the Jordanian institution NCARE (National Centre of Agriculture Research and Extension) on an FAO developed tool (Collect Earth, http://www.openforis.org/tools/collect-earth.html). This allowed to correlate the Normalized Difference Vegetation Index (NDVI) with the total Dry Matter productivity data. If required further information and references will be made available. [TURI FILECCIA, Italy]	Noted. Thank you.
14380	4	38	4	38	Repalce ".satellite-based" with "remote sensing-based". satellite-based based is just one of the remote sensing components. [Rattan Lal, United States of America]	Accepted.
9612	4	42	4	44	I would challenge the view that there is a high agreement that land degradation neutrality effectively leads to land balancing of ecosystem performance and land improvement. It can potentally lead toward this, but this has not yet been really demonstrated. [Markus Giger, Switzerland]	Rejected. Our calibrated language "low evidence, high agreement", we think accurately captures what you are saying. Indeed, there is not much evidence, but available papers discussing LDN point towards this.
21262	4	47	4	47	Please do not invent terms that are big but has no effect such as "citizen science". Science is for all. What is citizen what is urban what is moıuntain science then…. [Erhan Akca, Turkey]	Rejected. This is a widely known and accepted term. We included a definition of citizen science in the Glossary.
2494	4	47	4	47	When mentioning citizen science, the authors could indicate concerns about the quality of these data. [William Lahoz, Norway]	Accepted, relevant text inclded.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19674	4	37	5	2	Conceptualizing the land degradation neutrality (LDN) to assess interactions and feedbacks among its components and set strategies to determine instruments and methods needed for its achiement in different climate, socio-econnmy and landscape conditions. [Sabit Erşahin, Turkey]	Noted. LDN is covered in more detail in Chapter 4.
25792	4	3			where are limits to adaptation? Will their success in adapting continue under climate change? [Hans Poertner and WGII TSU, Germany]	Noted. Limits to adaptation are addressed in previous paragraph. We indicated in Section 3.7.2. that this may be problematic in future.
8962	4	9			acacia species). [Amanullah Amanullah, Pakistan]	Rejected. This does not fit the cotext in that line.
5414	4	12			Conservation agriculture contributes to carbon sequestration in dryland cropped areas (low confidence). Could this be classified as medium confidence if adequate data is analaysed, whereas, the following discussion very much related to this is high confidence [Daniel Danano Dale, Italy]	Accepted.Comment taken, makes sense. Text revised accordingly.
8964	4	13			graminiforme plants (for example: 1, 2 etc.) give few example [Amanullah Amanullah, Pakistan]	Rejected. Please can you provide further details on your comment? We don't understand how it relates to the text at that point.
5416	4	14			Combined use of salt-tolerant crops, improved irrigation practices, and chemical remediation measures were effective in reducing salinity-induced desertification (medium). The list should include good land management and cultural practices such as mulching, composting, water use efficiency in irrigating [Daniel Danano Dale, Italy]	Accepted, appropriate compost and mulch (i.e. low in salts) has been added to the text
8966	4	17			Put comma after author check whole document [Amanullah Amanullah, Pakistan]	Accepted.
26304	4	21			avoid jargon, e.g., write “wind-driven” instead of “aeolian” [Hans Poertner and WGII TSU, Germany]	Rejected. It is widely used terminology
5418	4	23			SLM practices are not widely adopted due to insecure property rights, lack of access to credit and agricultural advisory services, and insufficient private incentives. Yes, these are very importnat points worth to be mentioned in the mitigation and restoration of degraded lands and halting desertification. Sufficient discussions and elaborations on these important aspects will be required to justify how these affect render solution to the problem. Nothining or very little is discussed on these vital strategic issues in Chapter 4 on Land degradation [Daniel Danano Dale, Italy]	Noted. It is not clear if the reviewer felt that discussion was not sufficient in this Chapter 3, but still we expanded the discussion. Comments on Chapter 4 need to be provided in Chapter 4 referring to Chapter 4 text.
5420	4	34			Promoting schemes that provide payments for ecosystem services allows internalisation of some of the social benefits of SLM helping accelerated adoption of SLM practices. Another viable strategic direction in fighting desertification. An important aspect in this regard would be the special consideration that needs to be attached to restoring ecosystem services in dry areas. It is avery daunting task and therefore the norms or standards to be developed for evaluating the achievements should see the difficulties to be encountered to achieve this in the drier araes. [Daniel Danano Dale, Italy]	Noted. Thank you.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10826	5	1	5	2	The ES is well written. However, what is currently missing is hard facts on the impacts of desertification on human and the ecosystems. Economic impacts are also absent in the current version. In addition, there is very little information on future projections of the impacts as well as adaptation and mitigation measures. In other reports, the RCP scenarios are used in projections. I have not seen any such in this ES. [Debra Roberts, South Africa]	Accepted, whenever such information is available we included.
3086	5	4	5	4	In the framework of the nature of desertification, two points need to be considered: 1- the cause of the desertification; 2- the source of sand dune and dust, especially in sand dune movement. [Mostafa Jafari, Iran]	Accepted, we already discuss both these aspects, in varous sections of the chapter.
17622	5	4	5	14	The term "Potential evapotranspiration" or "Evapotranspiration" are not in the glossary. When they are included, it would be important to mention how PET is calculated to the effects of this classification, since there are different methods of calculating PET. [Jose Manuel Moreno Rodriguez, Spain]	Accepted, included into the Glossary.
19676	5	6	5	8	I belive that desertifcation should not be confined to dryland areas. The climate change and human activities are effective everywhere in the world; from greenland to trophics. The report says that "Desertification is, thus, a persistent negative trend in land condition causing long term reduction or loss of the biological productivity". Therefore, what if climate change or human activieties decrease biological productivity of land in a humid area? Can anybody gurantee that the region may not be desetirtified ultimately if the reduction in biological productivity continues? [Sabit Erşahin, Turkey]	Rejected. Desertification is land degradation in drylands, that is why we focus on drylands. Chapter 4 covers land degradation outside drivers.
17620	5	8	5	8	It is most unfortunate that this reference (UNEP 1992) is not publicly available. Being so fundamental to this report, I would appreciate if other references containing the basics of it could be provided, so that officials anywhere could consult it. [Jose Manuel Moreno Rodriguez, Spain]	Noted,. A review of WAD1: Barrow (1992) World atlas of desertification (United nations environment programme), edited by N. Middleton and D. S. G. Thomas. Edward Arnold, London, 1992. isbn 0 340 55512 2, £89.50 (hardback), ix + 69 pp. In the text, we kept only UNEP, 1992, as these categorization of drylands is now widely accepted and well-known.
26308	5	12	5	14	I find it difficult to follow where hyper-arid areas are included, where they are they excluded. Perhaps this sentence should directly follow the very first sentence of this paragraph for clarity [Hans Poertner and WGII TSU, Germany]	Rejected. We understand the concern. However, currently at the beginning of the paragraph we are explaining the difference between desertification and land degradation (which quite a few of our readers are confused about). So if we put this sentence there, it will be more confusing. However, we checked again the text to make to remove any lack of clarity what is included in drylands and what is not. Hyper-arid areas are included in drylands, but are not included in the definition of desertification.
3342	5	14	5	14	According to a lanz (1977), the wood desertification has more than 100 definitions, which is a testimony of the complexity of the problem and the variety of stakeholders involved. Generally , all the definitions agree that desertification is viewed as an adverse environmental process , the negative descriptors used in these definitions of desertification includes , deterioration of ecosystems, degradation of decay of a productive ecosystem reduction of productivity alteration in the biomass, intensification of desert conditions improverishumental of the ecosystem. [Nagla Hamadain, Sudan]	Noted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3344	5	14	5	14	Ecosystem in dry lands around the world appear to be undergoing various processes of degradation commonly described as desertification (hillel and Rosenzweig, 2002) one should be able to differentiate between true climatic desert areas, which have always been deserts and desert resulting from land degradation that have been caused by different factors and are concerned with the creep of desert – like conditions into these areas. On the other hand , there is low evidence about climate change impacts on wind. [Nagla Hamadain, Sudan]	Noted.
10134	5	14	5	15	Improper use of citation in text [Lizzie Mujuru, Zimbabwe]	Accepted. Corrected.
5132	5	17	5	19	The map contains mistakes: some places in Russian Arctic near the Barents Sea are marked as Dry Subhumid. This is nonsense. It means, that authors didn't know climate of that region - look at any Köppen-Geiger map. Please do not include into the report wrong information, especially wrong maps [Oksana Lipka, Russian Federation]	Noted and we have changed this map with our own original map. A map based on the Aridity Index can not be the same as the one produced based on the Köppen-Geiger methodology. Cold but semi-arid and dry sub-humid climates can occur over the region. The region mentioned is characterised with a rain shadow mechanism, due to the non-suitable exposition and topographical barriers to the rain bringing mid-latitude or sub-polar frontal cyclones.
10828	5	18	5	18	The font size of the texts in figure 3.1 should be increased to make it more readable [Debra Roberts, South Africa]	Noted. The map replaced following other comments.
2190	5	19	5	19	Map of aridity index is very old. Figure 1 in Zaninelli et al. (Clim. Dyn. 2018; DOI: 10.1007/s00382-018-4225-0) presents an updated map for South America. [Andrea Fabiana Carril, Argentina]	Rejected. Thank you for the paper suggestion. However, we need to have a global map, and we think that the one now displayed (we replaced the previous one following other comments) is still very up-to-date and relevant.
26310	5	20	5	24	please revise this paragraph to improve language understandability [Hans Poertner and WGII TSU, Germany]	Accepted. The text revised following this and other related comments.
17158	5	25	5	25	Unclear. Are deserts equaly to hyperarid areas? Please, clarify [Jose Manuel Moreno Rodriguez, Spain]	Accepted, explained.
14382	5	26	5	26	Would be good to explain the "other land" cover type [Rattan Lal, United States of America]	Accepted, explained.
10830	5	4	6	14	A revision of the introduction should be considered. Possibly include in the introduction, the storyline being followed in the chapter. It could also be helpful to indicate the theoretical framing/approach that guides the chapter. [Debra Roberts, South Africa]	Accepted, included.
19678	5	22	6	3	The "other land" in Fig.3.2 should be explained in the text. [Sabit Erşahin, Turkey]	Accepted, explained.
8968	5	7			Put comma after author check whole document [Amanullah Amanullah, Pakistan]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8970	5	16		17	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
1730	5	19			Fig 3.1 light grey shading needs caption [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. The map replaced following other comments.
1732	5	19			Fig 3.1 dark grey shading caption does not make sense [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. The map replaced following other comments.
8972	5	30			correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
8974	5	37			correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
11410	5				Figure: the Dry-subhumid category colour is too similar to the 'Excluded presumed drylands'. [Debra Roberts, South Africa]	Noted. We replaced the previous map with another without this problem.
3184	6	1	6	1	Figure: the other land compartment should be specified. There is quite a body of literature addressing this FAO category, and maps that allow to scrutinize the nature of this category. There are strong arguments that in these areas sporadic grazing prevails, as "Grasslands" by FAO refers to permanent pastures and meadows used continuously for more than 5 years - in drylands, transhumance etc. often leads to non-permanent pasture systems. Literature: Ramankutty N, Evan AT, Monfreda C, Foley JA (2008) Farming the planet: 1. Geographic distribution of global agricultural lands in the year 2000. Global Biogeochemical Cycles 22:GB1003, Fetzel T, Havlik P, Herrero M, et al (2017) Quantification of uncertainties in global grazing systems assessment. Global Biogeochem Cycles 31:2016GB005601. doi: 10.1002/2016GB005601, Erb K-H, Fetzel T, Kastner T, et al (2016) Livestock Grazing, the Neglected Land Use. In: Haberl H, Fischer-Kowalski M, Krausmann F, Winiwarter V (eds) Social Ecology. Springer International Publishing, pp 295–310; Fetzel T, Havlik P, Herrero M, et al (2017) Quantification of uncertainties in global grazing systems assessment. Global Biogeochem Cycles 31:2016GB005601. doi: 10.1002/2016GB005601) [Karlheinz Erb, Austria]	Accepted, text revised accordingly.
14386	6	1	6	3	The graph is fine but it should be more informative if it can also reflect the global percentage of hyper-arid, semi-arid and sub-humid ecosystems. [Rattan Lal, United States of America]	Accepted, included.
18652	6	4	6	5	The range in the extent of desertification is too wide. This is not helpful for this report. Delete the sentence. [Julius Daka, Zambia]	Rejected. This is the range and uncertainty related with measuring desertification in the literature, deleting this would be equal to hiding an important aspect, which we dont think is a good idea.
10484	6	5	6	5	4 to 70% is a very wide range [Zitouni Ould-Dada, Italy]	Noted. This relates to methodological differences which need to be acknowledged.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
290	6	6	6	7	Refer to sentence: More recent estimates, based on remotely sensed data, found that about 24%-29% of the global land area experienced a negative change in vegetation (Bai et al., 2008; Le et al., 2016): There is need to specify the time frame to which the word More recent estimates refers to. [Santosh Kumar Mishra, India]	Acepted, included.
5014	6	7	6	7	Not clear what the 'negative change in vegetation is' - loss of biomass or species richness or land cover? [Eamon Haughey, Ireland]	Accepted. Changed to "reduction in vegetation".
17160	6	7	6	7	The word "vegetation" is unclear. What negative change was observed? Le et al. measure biomass productivity. Bai et al also indirectly measured plant productivity. Please, specifically mention what it might be appropriate based on the papers you cite. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Changed to "biomass productivity".
25750	6	8	6	8	global areas? [Hans Poertner and WGII TSU, Germany]	Accepted, yes.
17162	6	8	6	8	Confunsing. Is not vegetation loss but a loss in productivity [Jose Manuel Moreno Rodriguez, Spain]	Accepted.
25476	6	8	6	10	the statement is not very meaningful unless the unit "dryland" of which 10% is taken, is defined [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, done.
25752	6	9	6	9	please explain/define desertification hotspot [Hans Poertner and WGII TSU, Germany]	Accepted, paraphrased as areas which experienced significant declines in biomass productivity.
19680	6	18	6	18	We may substitude "approximately" for "about" here and similar places throughout the report. [Sabit Erşahin, Turkey]	Accepted.
14384	6	18	6	27	This is a bit confusing text, because two different things are mixed in one paragraph: desertification affected population and those number of people affected by land degradation. It should be clarified that in this context there is no contradiction between figures, because desertification does not cover all degdaded/degrading lands. The text should be refined to make it easier reading or transferred into one graph representing different sources of information [Rattan Lal, United States of America]	Accepted, clarified.
6886	6	18	6	27	There are large uncertainties in the number of people directly affected by the desertification. Could the authors provide a clear estimate which helps understand the ratio of the dryland population facing desertification (e.g 1/5 or 1/4 of the 2.7 billion people) [Wilfran Moufouma Okia, France]	Accepted, clarified.
10486	6	21	6	21	The population growth rates in drylands are projected 20 to increase about twice as rapidly as those in non-drylands - explain why [Zitouni Ould-Dada, Italy]	Accepted, this because of higher annual population growth rates in dyralnds.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10138	6	23	6	23	Reynolds et al 2007, not in ref list Could this be the one refered to as 2007a and what about the other 2007b in the text? [Lizzie Mujuru, Zimbabwe]	Accepted, clarified.
26314	6	23	6	24	Perhaps this specific example for land degradation might be better-placed in Chapter 4, or perhaps a corresponding section in Chapter 4 could be included here. [Hans Poertner and WGII TSU, Germany]	Accepted, deleted from here, transferred to Chapter 4
10832	6	25	6	27	Is it possible to also add those that are indirectly affected as was the case in Reynolds et al? [Debra Roberts, South Africa]	Rejected. Unfortunately, this is not possible to calculate with Le et al. (2016) data.
17164	6	26	6	26	Vegetation loss is confusing. Please, refer to loss of plant productivity, as measured by these authors. [Jose Manuel Moreno Rodriguez, Spain]	Accepted, referred to as loss in biomass productivity.
1576	6		6		In figure 3.2, what is other land comprised of?. The explanation needs to be provided either as footnotes to figure or in actual text [Rajesh Chintala, United States of America]	Accepted, included.
5492	6	27	9	8	Section 3.2 "Nature of desertification" in Chapter 3 "Desertification" is devoted to defining the phenomenon of desertification, considering its distribution and the factors of formation, as was provided for in chapter 3 outline in document IPCC-XLV / INF. 7 (page 13). In paragraph 3.2.2, "Dryland Populations: Vulnerability and Resilience to Desertification and Climate Change", the problems of the dryland population are discussed, with emphasis on its vulnerability to the harsh conditions of these territories. However, aspects of the possible impact of the population on the processes of desertification are not considered here. Apparently, this text should be placed in that part of Chapter 3, which will address the problems of the population in the zones of desertification. [Anatoliy Mandych Anatoliy, Russian Federation]	Rejected. We do discuss the impacts of population on desertification, under anthropogenic drivers of desertification, section 3.2.4.2.. However, we should note that since this report is about climate change-desertification intercations, it is not within our scope to make a comprehesive listing of all anthropogenic drivers of desertification, but only those also affected by climate change.
1734	6	1			Fig 3.2 last column should be DRY subhumid? [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, revised.
8976	6	3		6	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26312	6	17			What is PBL? Please write out all acronyms in full at first mention [Hans Poertner and WGII TSU, Germany]	Accepted.
8978	6	24			correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
8980	6	46		47	comma, China (Zhang and Li, 2011 and Li et al., [Amanullah Amanullah, Pakistan]	Rejcted, no such line exists on that page.
11412	6				Figure: very interesting information. Can this be broken down by continent please? [Debra Roberts, South Africa]	Figure showing dryland categories by continent has been added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17166	7	1	7	1	Figure lablel: Population growth is a confusing term. You are referring to projected population. Please, correct as appropriate. Additional: indicate that population in drylands refer to projections [Jose Manuel Moreno Rodriguez, Spain]	Accepted. The comment does not actually refer to the figure label, but to the text, we revised the text accordingly.
19682	7	1	7	2	Figure quality may be improved. The term "pbl.nl" in the second y-axes is confusing. [Sabit Erşahin, Turkey]	Accepted, and a corrected and more quality improved figure was added to the text.
19684	7	8	7	8	Shold't read "…….on agriculture; one of the most……? [Sabit Erşahin, Turkey]	Accepted.
17168	7	9	7	9	Pay et al. (800 million):I did not find this figure in the reference cited. See also the comment I made in the reference. Suggestion is a rather ambigous term. If a figure like this is provided it must be based on some solid evidence. [Jose Manuel Moreno Rodriguez, Spain]	Rejected. It is stateted in the article one third of the 2.5 Billion people living in the drylands depend on agriculture, which comes up to roughly 800 million
18654	7	9	7	9	Replace the word "suggested" with the word "estimated". There must have been an assessment to come up with the value. [Julius Daka, Zambia]	Accepted. "suggested" changed to "pointed out". The author didn't personally estimate he referred to other sources
10834	7	11	7	12	Consider deleting 'including pastoral, agropastoral, rainfed, tree-based and irrigated' since they fall under 'all types of agricultural livelihoods and systems' [Debra Roberts, South Africa]	Accepted. "suggested" changed to "pointed out". The author didn't personally estimate but obtained the figure from other sources
26526	7	12	7	13	The Swift definition is fairly widely accepted, but if you want further discussion of definitions, Devendra, C., Morton, J., Rischkowsky, B., & Thomas, D. (2005). Livestock systems. Livestock and wealth creation: improving the husbandry of animals kept by resource-poor people in developing countries, 29-52, Nottingham University Press, is useful. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted.
21266	7	13	7	15	The reference is dated back to 2006 and talke dabout 120 M people but global population increased so much and this figure should be updated [Erhan Akca, Turkey]	Noted. Unfortunately, we dont have the more up to date estimates. Even as such, if we consider that global population gre by 15% between 2006 and now, a 15% linear increase in the number of pastoralists will mean the figure would be 138 million, instead of 120 million. But 120 million figure is by itself a crude approximation. So we consider referring to this older figure is better, than lineraly and arbitrarily updating it now by ourselves.
25478	7	16	7	18	Krätli, S., & Schareika, N. (2010). Living off uncertainty: the intelligent animal production of dryland pastoralists. The European Journal of Development Research, 22(5), 605-622 could usefully be cited here, to show that pastoralism is also a positive adapatation to spatial heterogeneity of feed resources and animal nutrients [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included.
10836	7	18	7	18	Do you need to add 'footnote' to footnotes? [Debra Roberts, South Africa]	Accepted, the word footnote dropped.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17170	7	18	7	18	Foot note 2: Speculative is rather inappropriate term. Please use uncertainty as a more appropriate term to refer to estimates that may be rather variable depending on whom or who are calculated [Jose Manuel Moreno Rodriguez, Spain]	Accepted, wording revised.
1578	7		7		need footnotes about dryland classes for figure 3.3. for instance what does hyper arid mean? [Rajesh Chintala, United States of America]	Rejected, these categories are already explained in the first paragraph of the chapter and in figure 3.1.
19534	7	1			Figure 3.3 does not mention Mediterranean Africa. [Ibouraïma Yabi, Benin]	There is a MENA region in the Figure 3.3 including the Northern Africa (Mediterranean Africa).
8982	7	4			mm yr-1, -1 must be super script check whole document [Amanullah Amanullah, Pakistan]	Noted. To be addressed during copy-editing
11414	7	5			(see Glossary…) There should be consistency in style. This is the first time in the report that there is a reference to the Glossary. Either all or none of the terms that appear in the Glossary should be marked somehow – preferably all. [Debra Roberts, South Africa]	Acccepted, revised.
11416	7	9			800 million poor people depend on agriculture – directly? Are these subsistence farmers? Or does this figure include people who depend on food produced in drylands?+I323 [Debra Roberts, South Africa]	Yes, these are nomadic, semi-nomadic, transhumant and sedentary small holder farmer populations directly drawing their livelihood from agriculture (The total population in drylands is estimated at 2.5 Billion)
26316	7	9			Please specify, is this number a worldwide estimate? [Hans Poertner and WGII TSU, Germany]	Yes, it is global estimate. Statement revised to address comment
8984	7	23			(Modified from Marshall, 1973). Remove bracket and put comma [Amanullah Amanullah, Pakistan]	Rejected, no such line exists on that page.
8986	7	26		27	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
2282	8	1	8	3	may be to promote the adoption of "integrated systems" could be a solution for this problem. Please add a comment if you consider this pertinent. [María Almagro Bonmatí, Spain]	Noted. Solutions, responses are given later in Section 3.7.1., We would rather keep such a structured presentation.
25480	8	3	8	6	It is not the environmental processes that have led to marginalisation, but geographical location, ethnic differences, perceived security threats, misunderstanding of pastoral rationality, desire for control etc. etc. Morton, J. (2010). Why should governmentality matter for the study of pastoral development?. Nomadic Peoples, 14(1), 6-30, might be useful. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted, added.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19398	8	4	8	6	Is it possible to estimate the loss of productivity derived from inadequate soil management? [José João Souza, Brazil]	Rejected. This question has no connection to the text in the lines cited by the reviewer. The question is very ambiguous, productivity of what ? Impacts of desertification-climate change on crop productivity is assessed on section 3.6.1 and Chapter 5.
3346	8	6	8	6	Desertification causes such as growing population in fragile semi arid ecosystem and irrational or wise land management by nomadic pastoralists (man-made desert). We identified typical pathways of dry land change, defined as particular chains of events and sequences of cause and effect resulting in specific out comes include degrees in vegetation cover, exposure of bare, rocky ground, increase in sand cover, and Stalinization pathways are made up of initial conditions, causes and feedback. The environmental and land use history of each region defines the initial conditions for each subsequence round of land use and ecosystem change (foster et al, 2003). (Lambin et al 2003). [Nagla Hamadain, Sudan]	Noted.
15884	8	6	8	8	Are there regional differences in the vulnerabilities? [Debra Roberts, South Africa]	Accepted, we emphasized on higher vulnerability due to poverty in Sub-Saharn Africa and India.
24176	8	7	8	7	I would define the term "very poor" with a GDPP range [Heggy Essam, United States of America]	Noted, sentece dropped during text revision,
23796	8	7	8	8	the very poor (population?) …. [Abdellatif Khattabi, Morocco]	Noted, sentece dropped during text revision,
10136	8	7	8	8	No need to write it was found as its obvious that the report is based on findings. Suggest that it should read" Globally, 42% of the very poor ----------" [Lizzie Mujuru, Zimbabwe]	Accepted, revised.
25754	8	7	8	9	how do these numbers compare to each other eg is 42% of very poor half or twice the numbers of 15% of non-poor? How much of the global population lives in degrading lands? [Hans Poertner and WGII TSU, Germany]	Noted, sentece dropped during text revision,
10838	8	8	8	8	Your assessment of the literature should conclude if this is a legitimate claim. If it is, then you should state what the study found. The current phrasing gives the impressions that this is a literature review instead of an assessment of the literature. [Debra Roberts, South Africa]	Accepted, we used this word exactly because we could nto properly assess the quality of the figure since no information was given on how it was calculated. Further to other comments, we dropped this figure.
17624	8	8	8	8	Nachtegaiele et al. 2010: I did not find this refenrece, nor even in the Researchpage of the author. See the comment in the reference list. In any case, a paper with a similar title does not include this figure, and neither the reserach carried out corresponded to any such calculation. Please, revisit this. [Jose Manuel Moreno Rodriguez, Spain]	Noted, sentece dropped during text revision,

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17626	8	8	8	8	Payne 2010 (16%): I did not find such figure in the cited reference. See not in the reference list [Jose Manuel Moreno Rodriguez, Spain]	Accepted, This figure came from CGIAR drylands program proposal document, and was wrongly referenced as Payne (2010) which is a later report by the same program. After further assessment, we decided to drop this figure as we cannot assess the quality of this figure due to lack of any information how it was calculated.
17628	8	11	8	11	Liu et al 2017: I read this reference but I do not find anything to support this claim. That is, that areas that suffered a desertification process in the past where more striken by poverty. Please, revisit this reference to accomodate your text with their findings. [Jose Manuel Moreno Rodriguez, Spain]	Noted. We revised the text to make our point clearer.
10398	8	11	8	11	"desertified areas have higher levels of poverty and unemployment than the rest of the country." How is desertified areas defined in this context? Is it to mean lands on the verge of being desert or lands that are at the final stage of land degardation or desertication process? if desertified areas here indicate desert areas then it is not expected that people would live in deserts but in some pockets of deserts often called as oasis. [Zitouni Ould-Dada, Italy]	Noted. Desertified area here meands an dryland area affected by any form of land degradation. We revised the text to avoid confusion.
25482	8	16	8	18	lack of access to land could be included here [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Access to land is not included in this multi-dimensional index that we are referring to.
10140	8	21	8	22	Reynolds et al 2011 not in ref list [Lizzie Mujuru, Zimbabwe]	Accepted, included.
24178	8	24	8	26	the statemt that dry areas are the poorest even in developped countries is not correct. For instance Southern California (los Agnegels & San diego) is the highest income area in the US (world largest) economy and yet it is a desert !! The sentence need to be re-phrased. [Heggy Essam, United States of America]	Rejected. Our statement is based on overall picture, of course, always exceptions and outliers apply. More fundamentally, California's wealth has little to do with is being dry.
17172	8	26	8	27	This sentence needs support from the literature [Jose Manuel Moreno Rodriguez, Spain]	Accepted, included.
25484	8	26	8	30	a) This section which is the main mention of gender as part of the problem space, could be expanded b) the cross-reference should be to 3.7.3 c) while not peer-reviewed, the synthesis and three thematic papers at http://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/empowerment-of-dryland-women.html may be useful (decalration, I am a co-author) [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, cross-referenced. Recommended paper findings included in the section on policy responses (part on gender empowement)
19400	8	27	8	30	Unhappily this is common around the world. Can we estimate the higher rate in these areas? [José João Souza, Brazil]	Noted. These references are given as examples of such gender-based differences in vulnerability, indeed these are unfortunately common-place, we emphasied on this commonoality aspect.
23798	8	33	8	33	Traditional knowledge may also include agricultural practices [Abdellatif Khattabi, Morocco]	Accepted, text revised.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5134	8	38	8	40	For today overgrzing is the largest ecological problen in Mongolia, leading to land degradation and desertification [Oksana Lipka, Russian Federation]	Noted. This is not in contradiction with what we write. We emphasized on the losses of traditional knowledge and difficulty to maintain resource use sustainability even with traditional knowledge appraoches due to growing pressures in section 3.7.2.
25086	8	40	8	40	In Iran indigenous knowledge of water conservation in arid and semi arid climate has led to qanat. A qanāt is a gently sloping underground channel to transport water from an aquifer or water well to surface for irrigation and drinking and prevent water from evaporation. This is an old system of water supply from a deep well with a series of vertical access shafts. The qanats still create a reliable supply of water for human settlements and irrigation in hot, arid, and semi-arid climates. The qanat technology was developed in ancient Iran by the Persian people sometime in the early 1st millennium BC, and spread from there slowly westward and eastward. [Sayed Masoud Mostafavi Darani, Iran]	Noted.
10840	8	40	8	41	Consider replacing 'will increase' with 'is increasing' since this is already a reality and not just a future possibility. [Debra Roberts, South Africa]	Accepted, revised.
26528	8	31	9	8	While I haven't yet read it, the recent book by Zeremariam Fre (UCL Press) may be useful: http://www.ucl.ac.uk/ucl-press/browse-books/knowledge-sovereignty-among-african-cattle-herders [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. We cited this reference later when discussin on traditional knowledge as part of responses.
19018	8	41	9	42	Fundamental divergence. The main problem in major part of the world is plethoric livestock and overgrazing. In South America, North Africa, Some parts of Asia...) [Azziz Hirche, Algeria]	Rejected. The lines you refer to do not exist. The comment does not match the context referred to. Morever, numerous evidence points that the situation with overgrazing and desertification is not as simple as the reviwer suggests.
26318	8	9			can this decrease be quantified? [Hans Poertner and WGII TSU, Germany]	Accepted, included what as possible to quantify.
5422	8	11			desertified areas have higher levels of poverty and unemployment than the rest of the country. How is desertified areas defined in this context? Is it to mean lands on the verge of being desert or lands that are at the final stage of land degardation or desertication process? if desertified areas here indicate desert areas then it is not expected that people would live in deserts but in some pockets of deserts often called as oasis. [Daniel Danano Dale, Italy]	Noted. Desertified area here meands an dryland area affected by any form of land degradation. We revised the text to avoid confusion.
8988	8	12		13	Put comma after author check whole document [Amanullah Amanullah, Pakistan]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5424	8	19			multidimensional poverty in drylands are rapid population growth, fragile institutional environment, lack of infrastructure, geographic isolation and low market access, insecure land tenure systems, low agricultural productivity. In the list of the factores, bad governance, lack of incentives, policies and national economy and low investment could be seen. [Daniel Danano Dale, Italy]	Noted.
8990	8	21			Na+, K+, Ca2+, Mg2+ and Cl–. As the Na+ (+ or - superscript for all) [Amanullah Amanullah, Pakistan]	Rejected. No such text in the page and line being referred to. In fact, no such text in the entire chapter. Reviewer perhaps mixed up the chapters.
26320	8	25			in this specific context it is unclear whether “subsistence farmers” here refers specifically to females or to all sexes? Please clarify [Hans Poertner and WGII TSU, Germany]	Accepted, clarified. Refers both to female and male subsitence farmers.
8992	8	29		30	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26642	8	30			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. We refer to other sections when it is warranted.
8994	8	33		38	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26322	8	33			Kindly ensure that terms such as “traditional knowledge” are used consistently between IPCC Reports, esp. between this report and the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) [Hans Poertner and WGII TSU, Germany]	Accepted, using the term indigenous and local knowledge consistently across the report.
1508	8	36			All "traditional" pastoral systems had governance (institutions) that addressed drought conditions. The chapter in several sections references individual cases as if they are rare or singlual eamples. [Billie Turner II, United States of America]	Noted. We emphasized on that aspect. Our initial text already pointed to your suggestion, those case we gave we clearly marked as examples.
8996	8	39		46	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26324	8	43			What exactly does such “inability to cope” entail - what are the consequences? Please specify [Hans Poertner and WGII TSU, Germany]	Accepted, clarified.
10842	9	1	9	3	It is not clear as to why 2010 was singled out. Is there something particular about that year's drought? Were these people able to cope with droughts in other years? [Debra Roberts, South Africa]	Accepted, clarified.
23800	9	2	9	2	Cervigni et al., (2016): eliminate comma after al. [Abdellatif Khattabi, Morocco]	Accepted, revised.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23802	9	4	9	4	Moderne science? May be to be replaced by modern practices [Abdellatif Khattabi, Morocco]	Rejected. We think the term "science" more accurately reflects our intention.
23804	9	6	9	7	can contribute to climate change adaptation and mitigation, addressing desertification, with co-benefits for attaining other Sustainable Development Goals.. May be to be replaced by: can contribute to attain climate change adaptation and mitigation Sustainable Development Objectives (SDG), addressing desertification, with co-benefits for attaining other SDG [Abdellatif Khattabi, Morocco]	Rejected. We think our phrasing more accurately conveys our message.
9614	9	7	9	8	Liniger, H., Critchley, W., Gurtner, M., Schwilch, G., & Mekdaschi Studer, R. (2007). Where the land is greener: Case studies and analysis of soil and water conservation initiatives worldwide. World Overview of Conservation Approaches and Technologies (WOCAT). Liniger, H., Mekdaschi, R., Moll, P., & Zander, U. (2017). Making sense of research for sustainable land management. Centre for Development and Environment (CDE), University of Bern and Helmholtz-Centre for Environmental Research GmbH–UFZ. [Markus Giger, Switzerland]	Accepted. Thank you. Due to time period under focus, we included the more recent reference.
9616	9	7	9	8	Schwilch, G., Liniger, H. P., & Hurni, H. (2014). Sustainable land management (SLM) practices in drylands: how do they address desertification threats?. Environmental management, 54(5), 983-1004. [Markus Giger, Switzerland]	Accepted, included.
18656	9	8	9	8	Replace the word "claimed" with the word "indicated". [Julius Daka, Zambia]	Accepted, revised. (there is no such word in this page, but we understood that the reviewer refers to the previous page, the same line)
3088	9	10	9	10	In the framework of the nature of desertification, two points need to be considered: 1- the cause of the desertification; 2- the source of sand dune and dust, especially in sand dune movement. [Mostafa Jafari, Iran]	Accepted, we already discuss both these aspects, now also included abput sand dunes in the introduction.
14388	9	12	9	12	It is not clear what is meant under "direct mechanisms". Why processes of desertification cannot be "indirect"? [Rattan Lal, United States of America]	Accepted, the word direct dropped.
14390	9	13	9	14	"These processes are classified under broad categories of physical, chemical and biological degradation." - Bad style to name degradation as physical or chemical and biological. It is better to discuss physical, chemical and biological processes, or better yet, about degradation of physical, chemical or biological properties of terrestrial ecosystems. See also "Provisional Methodology for Assessment and Mapping of Desertification; FAO: Rome, Italy, 1984" [Rattan Lal, United States of America]	Accepted, revised accordingly.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19686	9	14	9	19	"Soil structure degradation" may be included under physical processes [Sabit Erşahin, Turkey]	Accepted, included.
5494	9	14	9	20	Rich text, the compound sentence. [Anatoliy Mandych Anatoliy, Russian Federation]	Noted, Simplified by breaking into two.
10144	9	16	9	19	add reference [Lizzie Mujuru, Zimbabwe]	Noted, corrected.
17174	9	18	9	18	"biophysical processes":The processes listed, however, refer to biological processes. Moreover, this is in aligment with figure 3.4. Please, clarify and reconcile [Jose Manuel Moreno Rodriguez, Spain]	Accepted, done.
2194	9	19	9	20	Reference source not found [Andrea Fabiana Carril, Argentina]	Noted, corrected.
7544	9	19	9	20	The words "error Reference source not foungr" should be canceled, It's need to be corrected [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Noted, corrected.
10844	9	19	9	20	Check and correct reference. Endnote seems to have malfunctioned. [Debra Roberts, South Africa]	Noted, corrected.
958	9	19	9	20	Please, add the refference [Jose Luis Vicente Vicente, Germany]	Noted, corrected.
2496	9	19	9	20	Broken link to reference. [William Lahoz, Norway]	Noted, corrected.
17176	9	21	9	22	Using related is confusing. Related to climate change are socioeconomic changes as well. I would just state climate change drivers [Jose Manuel Moreno Rodriguez, Spain]	Noted. Following other comments, this figure was dropped.
25486	9	21	9	23	The boxes should be underneath the ovals. Over/undergazing is an intermediate cuase rather than an observed process. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Following other comments, this figure was dropped.
14392	9	22	9	23	The picture is weak in content. It should be updated with more processes or completely deleted from the text, because it adds nothing to the content in the given form [Rattan Lal, United States of America]	Accepted, dropped.
23806	9	23	9	23	The figure mentions Drivers (are we talking about driving forces or pressures induced by the driving forces?) over grazing for example is a pressure, change in vegetation cover may include also a change in forest cover or biodiversity loss/increase, and also a change in rangelands induced by overgrazing or undergrazing... I think the graphic is not clear and explicit [Abdellatif Khattabi, Morocco]	Noted. Following other comments, this figure was dropped.
17178	9	24	9	24	"cause" desertification process is awkward. The desertification process are activated, unleashed, triggered, etc. [Jose Manuel Moreno Rodriguez, Spain]	Accepted, changed to trigger.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14394	9	24	9	25	More evidence is required for attributing socio-economic factors as causes of desertification. [Rattan Lal, United States of America]	Noted, we discuss about socio-economic drivers under anthrpogenic drivers fo desertificaton section 3.2.4.2. We now referred to this sub-section here.
1580	9		9		soil carbon losses is missing in Figure 3.4 [Rajesh Chintala, United States of America]	Noted. The figure was dropped in response to other comments.
19020	9	7	10	9	This table shows that it is proven that the main drivers are from "man" action(s); Climate influence is more controversial [Azziz Hirche, Algeria]	Rejected. The table lists very clearly the processes through which climate change will exacerbate desertification. Necessarily, climatic and anthropogenic drivers interact.
2192	9	15	10	15	Desertification for physical processes is not only soil erosion by water and wind. Land surface-atmosphere interactions could be much more complex than that. Water includes fluxes as precipitation and evapotranspiration, but also potential evapotranspiration must be considered (therefore radiation or surface temperature must be also considered). Land surface-atmosphere feedbacks could play a crucial role when analyzing physical processes, especially in climatic transition zones. Examples for South America are Menéndez et al. (2016, Climate Research, DOI 10.3354/cr01373) and Zaninelli et al. (2018, Climate Dynamics, DOI: 10.1007/s00382-018-4225-0). The last one includes a discussion about the sensitivity of aridity index to climate change over South America. [Andrea Fabiana Carril, Argentina]	Noted. Land atmosphere feedbacks are discussed in detail section 3.4
1510	9	27	10	1	Methinks the text is misleading. Two references are provided to show that desertification can be biophysical in origins, contradicting the claim that they are only anthropogenic. Two problems here. [1] "Natural" aridification is a long term process and, even longer, a wax and wane outcome. Fast-variable aridification is almost always anthropogenic. [2] the BOX demonstrating desertification has only root causes in human activity; biophysical elements constitute the responses to the anthropogenic. [Billie Turner II, United States of America]	Rejected. Our assessment of the literature shows that human and climatic drivers interact in causing desertification. Attribution is context-dependent (see section on 3.3). The table on process and drivers of desertfication we think makes the role of climatic factors in desertification and land degradation clear.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5510	9	27	12	7	In paragraph 3.2.3.1 "Processes and factors of desertification in the context of climate change," the role of the population, socio-economic factors, in their significance, comes to the fore. In the cross-chapters box 3.1 is a table (although not yet complete) of the main factors of desertification. When it is considered, it seems that the primary (initial) factors of desertification are the activity of a human. Climate change in all its aspects modifies anthropogenic impacts and, as a rule, strengthening them. Most of the contemporary scientific publications consider the phenomenon of desertification (as well as the phenomenon of land degradation in general), as occurring in the Human-Environment (H-E) systems. For example, (Geist and Lambin 2004, Reynolds, Smith et al., 2007). This allows us to draw the following conclusions: In the absence of socio-economic components in the H-E system (population, economy, infrastructure, etc.) in any dryland area desertification with its natural factors do not arise. At least from the human's stand point. Under the influence of a changing climate, natural systems are rebuilt in accordance with the ontological prerequisites of their developmental trajectory. In other words, if there are no humans there is no a phenomenon, which we called as desertification. Thus, the phenomenon of desertification in its genesis is socio-economic. It occurs when specific environmental conditions (aridity of the climate, sparse vegetation cover, highly vulnerable to external impacts soils, favorable terrain and frequent recurrence of strong winds) are supplemented by human influences. But human's impact is a primary factor. [Anatoliy Mandych Anatoliy, Russian Federation]	Noted. Your point is mostly consistent with what we have written. That human and climatic factors interact in causing desertification. Which one is primary or secondary is though context-dependent. See section 3.3. Our assessment of the literature shows that climatic factors also do play a role in desertification.
8998	9	18		19	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26644	9	20			Include source [Abiud Kaswamila, United Republic of Tanzania]	Noted. Following other comments, this figure was dropped.
26326	9	20			Figure 3.4 is very conceptual and textbook-style; it does not convey anything not already covered in the text and Cross-chapter box 3.1, not sure the figure is really necessary [Hans Poertner and WGII TSU, Germany]	Accepted, dropped.
19536	9	21			Please, sSpecify the source of the figure 3.4 [Ibouraïma Yabi, Benin]	Noted. Following other comments, this figure was dropped.
17180	10	2	10	2	See comment on the use of climate-related [Jose Manuel Moreno Rodriguez, Spain]	Noted. The figure was dropped in response to other comments.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3348	10	5	10	5	Global warming is expected to accelerate soil organic carbon turnover. Invasive plants contributed to rapid desertification and loss ecosystem services in the laser centcury.Predicted decreases in rainfall and increasing temperature across dry land areas to increase changes of wildfire. There are numerous drivers of desertification related to human activities. Some of the major forms of desertification are related to land use conversions the net effects of such global agricultural production shifts on desertification are not known. Migration issue. There are many institutional policy and socio economic drivers of desertification such as land tenure insecurity. Interaction of driver desertification syndrome versus dry lands development paradigm. Observations of desertification and attribution. The most common definition for the dry land is based on the aridity index. Depending on the definitions applied and methodology used in evaluation. [Nagla Hamadain, Sudan]	Noted.
19688	10	6	10	9	Better to include "soil alkalinization" and "soil structure degradation" as well. [Sabit Erşahin, Turkey]	Accepted, included
20630	10	7	10	7	Please consider adding the following content to cross-chapter box 3.1: "Process: Biological soil crust destruction. Focus: Soil. Proximate drivers: Overgrazing/trampling, land use conversion. Influence OF climate change: Increased temperatures and altered precipitation regimes cause decline of biological soil crusts. Influence ON climate change: Increased soil erosion and dust emissions, reduced soil fertility. References for CC->LD: Reed et al., 2012 - Nature Climate Change; Maestre et al., 2013 - Global Change Biology; Rodriguez-Caballero et al., 2018 - Nature Geoscience. References for LD->CC: Belnap et al., 2014 - Aeolian Research; Munson et al., 2011 - PNAS. General reviews of the process: Field et al., 2010 - Front Ecol Environ [Bettina Weber, Germany]	Noted, thank you. The table now is only in Chapter 4.
20632	10	7	10	7	citations mentioned above: Reed, S.C., Coe, K.K., Sparks, J.P., Housman, D.C., Zelikova, T.J., Belnap, J. (2012) Changes to dryland rainfall result in rapid moss mortality and altered soil fertility. Nat. Clim. Change 2, 752-755. Maestre, F.T., Escolar, C., Ladron de Guevara, M., Quero, J.L., Lazaro, R., Delgado-Baquerizo, M., Ochoa, V., Berdugo, M., Gozalo, B., Gallardo, A. (2013) Changes in biocrust cover drive carbon cycle responses to climate change in drylands. Glob. Change Biol. 19, 3835-3847. Rodríguez-Caballero, E., Belnap, J., Büdel, B., Crutzen, P., Andreae, M.O., Pöschl, U., Weber, B. (2018) Microbial surface communities on dryland soils endangered by global change. Nature Geoscience 11: 185-189. Belnap, J., Walker, B.J., Munson, S.M., Gill, R.A. (2014) Controls on sediment production in two U.S. deserts. Aeolian research 14: 15-24. Munson, S.M., Belnap, J., Okin, G.S. (2011) Responses of wind erosion to climate-induced vegetation changes on the Colorado Plateau. Proceedings of the National Academy of Sciences (USA) 108: 3854–3859. Field, J.P., Belnap, J., Breshears, D.D., Neff, J.C., Okin, G.S., Whicker, J.J., Painter, T.H., Ravi, S., Reheis, M.C., Reynolds, R.L. (2010) The Ecology of dust. Front Ecol Environ 8(8): 423-430. [Bettina Weber, Germany]	Noted, thank you. The table now is only in Chapter 4.
21268	10	7	10	7	Cross-chapter Box 3.1. is very small impossible to read [Erhan Akca, Turkey]	Accepted. The table will be presented only in Chapter 4 in an easily readable format for the SOD.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14396	10	7	10	8	The title should be clear that Desertification is not one of the Land Degradation process or driver. This is one of the most common mistakes occuring in many policy responses and papers. Desertification is a phenomenon of land degradation in drylands. [Rattan Lal, United States of America]	Accepted, title is revised accordingly.
10846	10	7	10	9	It is extremely difficult to read the texts in Cross-chapter Box 3.1 even at 100% zoom. [Debra Roberts, South Africa]	Accepted. The table will be presented only in Chapter 4 in an easily readable format for the SOD.
960	10	7	10	9	Please, change the box 3.1., since at this moment words are very difficult to be read. [Jose Luis Vicente Vicente, Germany]	Accepted. The table will be presented only in Chapter 4 in an easily readable format for the SOD.
2498	10	7	10	9	The font in cross-chapter box 3.1 is small. Consider the re-design of this table. [William Lahoz, Norway]	Accepted. The table will be presented only in Chapter 4 in an easily readable format for the SOD.
19402	10	7	10	10	I suggest to add "albedo change" as "influence on climate changes" of wind erosion, water erosion, salinization, sodification, drying of continental waters. [José João Souza, Brazil]	Accepted, included
19404	10	7	10	10	I suggest to add "decrease of primary production" as "influence on climate change" of wind erosion, water erosion, nutrient depletion, sodification. [José João Souza, Brazil]	Accepted, included
19406	10	7	10	10	I suggest to change "temperatures" by "evaporation tax" in "influence of climate change" of compactation. [José João Souza, Brazil]	Noted, thank you. The table now is only in Chapter 4.
19408	10	7	10	10	I suggest to add "C:N ratio disbalance" as "influence of climate change" of nutrient depletion. [José João Souza, Brazil]	Noted, thank you. The table now is only in Chapter 4.
19410	10	7	10	10	I suggest to add "decline of water retention capacity of soils" as "influence of climate change" of organic matter decline. [José João Souza, Brazil]	Noted, thank you. The table now is only in Chapter 4.
19412	10	7	10	10	I suggest to add "mangrove disturbe" as "infleunce of climate change" of infleunce of climate changes" of flooding. [José João Souza, Brazil]	Noted, thank you. The table now is only in Chapter 4.
19414	10	7	10	10	The relation of decrease of precipitation + SOC and acidification of soils is not clear. [José João Souza, Brazil]	Noted, thank you. The table now is only in Chapter 4.
7538	10	8	10	9	Box 3.1. column "Influence of Climate Change", First line: "Climate change" instead of "Climate chenge". [Abdelkader Elouissi, Algeria]	Accepted, revised.
25088	10	8	10	9	In the table influence of climate change on nutrient depletion is not considered and is remained blank. Co2 enhancement caused by climate change will increase C/N in residuals that may lead to decreasing of decomposition. In addition high temperatures increases organic matter and microbal activities. (Reference: Global climate change and agricultural production. by: Fakhri Bazzaz) [Sayed Masoud Mostafavi Darani, Iran]	Accepted, included

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25090	10	8	10	9	In the table influence of climate change on acidification is not considered. For example soils containing solfate have acidic characteristics and in dry condition their acidification will be changed. Leaching resulting from precipitation patterns has significant effect on acidification. and etc. (Reference: Global climate change and agricultural production. by: Fakhri Bazzaz) [Sayed Masoud Mostafavi Darani, Iran]	Accepted, included
25092	10	8	10	9	In the table influence of climate change on toxicity is not considered . Different case studies can be found on the web that one of them is the below link: http://agris.fao.org/agris-search/search.do?recordID=US201700137343 [Sayed Masoud Mostafavi Darani, Iran]	Accepted, included
19638	10	12	10	14	increase of intense rainfall observed in the Sahel region (Recent trends in the regime of extreme rainfall in the Central Sahel G Panthou, T Vischel, T Lebel, International Journal of Climatology 34 (15), 3998-4006) [Abou Amani, France]	Accepted, included.
14398	10	16	10	17	Salinisation can occur not only due to anthropogenic processes. Some climate change or hydrological change can cause soil salinization due to the increase of the mineralised ground water level [Rattan Lal, United States of America]	Accepted, revised.
25488	10	16	10	19	This raises the question of whether large-scale salinisation and waterlogging caused by over-irrigation and lack of drainage in the (massive) Indus Basin Irrigation System, which goes well beyond seawater intrusion, should be dealt with here or in chapter 4. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, the case study on sea water intrusion was moved to Chapter 4. Our discussion focuses on desertification-climate change interactions, and not on purely desertification,. So the issue of irrigation and poor drainage causing secondary salinization is covered only there is climate change element involved.
5496	10	17	10	17	The term "anthropomorphic" for the case is not correct, must be "antropogenic". [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted, revised
10848	10	17	10	17	It might be helpful to provide some examples of these anthropomorphic processes [Debra Roberts, South Africa]	Accepted, included: irrigation and poor drainage.
17182	10	17	10	17	anthropomorphic or antropogenic? [Jose Manuel Moreno Rodriguez, Spain]	Noted, revised as anthropogenic.
1582	10		10		In cross-chapter box 3.1: for acidification, mininig actvitiy (acid mine drainage) is one of the important cause for acidification. It needs to be added. The relaease of carbon diaoxide during liming of acidic soils can adds up atmospheric carbon [Rajesh Chintala, United States of America]	Accepted, included.
6888	10		10		Cros-Chapter Box 3.1 is difficult to read and needs improvements [Wilfran Moufouma Okia, France]	Accepted, revised
5016	10	19	11	1	Are there any references for the statement relating to transfer of C from soil to the atmosphere due to desertification? [Eamon Haughey, Ireland]	reference added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10852	10	19	11	3	This is a new idea and should be in a new paragraph. [Debra Roberts, South Africa]	Accepted.
10854	10	19	11	3	A quantification of the amount of loss as a result of these processes could add value to the point being made here. Also, try and justify the reasons for the area-specific differences. [Debra Roberts, South Africa]	We cannot find a global quantification of this. Reference to section 3.4.3 and the cross chapter box 4.1 are added - they provide details of multiple mechanisms involved and reasons for regional differnces.
964	10	19	11	3	Please, add references for that paragraph [Jose Luis Vicente Vicente, Germany]	reference added.
10850	10	16	19	17	A quantification of the amount of loss as a result of these processes could add value to the point being made here. [Debra Roberts, South Africa]	Noted. Unfortunately, we have not found a global quantification of this.
5426	10	3			most of the processes and drivers of desertification are similar with the processes and drivers of land degradation in general. This is true but there should be a description on which processes and drivers are different if exist in both cases following this assertion [Daniel Danano Dale, Italy]	Accepted, to reflect that desertification is a subset of land degradation, so the same processes.
19538	10	7		9	The contents of the table are not very readable [Ibouraïma Yabi, Benin]	Accepted. The table will be presented only in Chapter 4 in an easily readable format for the SOD.
26330	10	12			(Box 3.1, case study on soil erosion) - is this a placeholder for a box 3.1, or a link to Cross-Chapter Box 3.1? [Hans Poertner and WGII TSU, Germany]	Accepted, revised. This is cross-chapter table.
1736	10	16		17	The authors are correct in saying that saline and sodic soils occur naturally in drylands, however the process whereby the concentration of dissolved salts in water and soil is increased by anthropomorphic processes is more commonly called 'secondary salinization' to distinguish it from natural sailinization. Note that poorly managed irrigation schemes are a leading cause of secondary salinization. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, revised.
19220	10	17			salt in water and soil occurs and is increased… its not only an anthropic porocess [Pascal Podwojewski, France]	Accepted, revised
26328	10	19			Does this refer to box or cross-chapter box 3.1? [Hans Poertner and WGII TSU, Germany]	Accepted, clarified. It ferers to cross-chapter box.
9002	10	39		41	all botanical names must be italic in whole document, please [Amanullah Amanullah, Pakistan]	Acepted.
11418	10				Table: important factor missing: Loss of non-valued species, especially insects, and loss of soil fauna. Loss of insect predators and parasitoids (due to destruction of natural vegetation and pesticide use) can lead to pest outbreaks. “Insect outbreaks” should say “Insect pest outbreaks” and the cause is not as simple as poor pest management practices. Some of these insects are invasive aliens. [Debra Roberts, South Africa]	Accepted, included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14400	11	18	1	18	Expand figure caption to provide better explaination. [Rattan Lal, United States of America]	Acepted, the figure is moved to invasiv eplant species case study where more information is given.
6890	11	4	10	7	There is a number of relevant references on the influence of SST on Sahel rainfall that can be cited, including Rowel (Quaterly Journal of the Royal Met Society, 2006), Sheen et al, Nature Communication, 2017), Pomposi et al (GRL, 2016), Martin et al (J climate, 2014) [Wilfran Moufouma Okia, France]	Accepted, recent ones included.
6892	11	4	10	7	Beside warming of the tropical ocean, aeosols has also been suggested as a potential driver of the Sahel droughts (Booth et al, Nature, 2012) , Ackerley et al (J climate, 2011). This point is worth discussing in the Chapter [Wilfran Moufouma Okia, France]	Accepted, included.
19026	11	4	11	5	The paleoclimatology suggest rather the opposite. Warming of the tropical oceans provoked more evaporation, more strong monsoon and a "green" Sahara. Curious, we prefer the models to the "lessons of history" . Paleoclimatology results seems to be simply ignored. [Azziz Hirche, Algeria]	Accepted. The paragraph is rewritten and now includes reference to paleoclimate reseerach "North Atlantic sea surface temperature (SST) anomalies are positively correlated with Sahel rainfall anomalies (Knight et al., 2006; Martin et al., 2014; Sheen et al., 2017). While the eastern tropical Pacific SST anomalies have a negative correlation with Sahel rainfall (Pomposi et al., 2016). Thus a cooler north atlantic is related to a drier Sahel, with this relationship enhanced if there is a simultaneous relative warming of the south Atlantic (Hoerling et al., 2006). Huber et al. (2011) explored the relationship between SST anomalies and satellite observed Sahel vegetation dynamics finding similar relationships but with substantial west-east variations in both the significant SST regions and the vegetation response. Paleoclimate evidence concerning aridification after the early Holocene “Green Sahara” period (11,000 to 5,000 years before present) (Tierney et al., 2017) indicates that a cooling of the north Atlantic played a role (Collins et al., 2017; Otto-Bliesner et al., 2014; Niedermeyer et al., 2009) similar to that found in modern observations. Besides these SST relationships, aerosols have also been suggested as a potential driver of the Sahel droughts (Rotstayn and Lohmann, 2002; Booth et al., 2012; Ackerley et al., 2011). "

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3858	11	4	11	7	This text is hard to understand but the topic is very important given the prominence of the Sahel region. It implies that warming tropical oceans decreased the rainfall but internal variability (of temperature?) in the Atlantic increased the rainfalls. The fact is that Sahel rainfall shows a decline from the 1950s to 1980s and a subsequent increase to now. So how does warming of the tropical oceans along with internal variability in the Atlantic explain this cyclical change? It is very clear that Sahel rainfall trends show long term prominent cyclical changes that are quite unique (Sun et al 2018). The reasons for those cyclical changes in rainfall are not understood. There is a vast literature on the topic. For example, one thread investigates the role of aerosols in modifying Sahel rainfall, that starts with the work of Rotstayn and Lohman (2002). So there is something very interesting going on but the existing paragraph does not capture the complexity and nuance. Ref: Rotstayn & Lohmann (2002), Tropical rainfall trends and the indirect aerosol effect, Journal of Climate, 15, 2103-2116. Sun et al (2018), Rainfall statistics, stationarity, and climate change, Proceedings of the National Academy of Sciences. doi: 10.1073/pnas.1705349115 [Michael Roderick, Australia]	Accepted. The sentences have been completely rewritten, and the influence of aerosols is now also discussed.
15926	11	5	11	6	All references used here are based on modelling work. Would be relevant to complement these refs with the first EO based study showing the same as the models: Huber, S. and Fensholt, R. (2011). Analysis of teleconnections between AVHRR-based sea surface temperature and vegetation productivity in the semi-arid Sahel. Remote Sensing of Environment, 115 (12), 3276-3285. doi:10.1016/j.rse.2011.07.011 [Rasmus Fensholt, Denmark]	Accepted. Reference added with text "Huber et al. (2011) explored the relationship between SST anomalies and satellite observed Sahel vegetation dynamics finding similar relationships but with substantial west-east variations in both the significant SST regions and the vegetation response. "
19028	11	8	11	9	In North Africa invasive plants is anecdotic. If we have a woody encrochment in a former denuded soil, the runoff is not necessarily altered. [Azziz Hirche, Algeria]	Noted. We understand that some aspects our context-specific.
19030	11	8	11	9	Please , give somes references [Azziz Hirche, Algeria]	Accepted, referred to Section 3.8.3 which contains a detailed discussion.
19032	11	8	11	9	Not necessarily [Azziz Hirche, Algeria]	Rejected. This sentence represents our reading of the literature. We would have been very eager to nuance that message if you provided any sources showing the contrary. Still, we understand your general concern, so slightly modified the text from a general claim to a more context-specific.
23808	11	8	11	14	Lacks references. Refering to figure 3,5 which needs also a reference [Abdellatif Khattabi, Morocco]	Accepted, included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2500	11	10	11	10	Maybe I am missing something, but I can see no reference to the case study mentioned. [William Lahoz, Norway]	Accepted, the section number for the case study included.
5498	11	14	11	14	"This land conversion…", it should be more correct "This land cover conversion…". [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted, corrected.
26334	11	14	11	20	The text is nearly identical with that of the figure 3.5; the only thing missing is the loss of habitat for wildlife. Could the figure be amended to include this item? [Hans Poertner and WGII TSU, Germany]	Accepted, included.
10142	11	15	11	16	Difficult to establish the validity of the facts as the stated references were not in the list of references Pierson et al 2011 and 2013 [Lizzie Mujuru, Zimbabwe]	Accepted, included.
962	11	16	11	18	Please, change the figure 3,5, since the image is not clear (improve the definition of the image) [Jose Luis Vicente Vicente, Germany]	Accepted, done.
26332	11	16	11	20	Please provide species' scientific names at their first mention [Hans Poertner and WGII TSU, Germany]	Accepted, included.
17184	11	20	11	20	Here and throught the text of this chapter and whole report. The use of common names for organisms, plants in this case, is totally misleading. This common names have no equivalent at the global level. Please, use scientific names, as these are the only valid ones that every one can understand. Bring this issue to Bureu and adopt a general position [Jose Manuel Moreno Rodriguez, Spain]	Accepted, included.
10400	11	43	11	44	"Outmigration increases the pressure on land if higher wages that rural migrants earn in urban centres will lead to their higher food consumption." This seems to emanate from the consideration that population increeases in the cities that would lead to high demand to nutritious food that in return demands to more land for agricultural production, without the consideration on the other hand that the land that was left behind (abandoned) by the emigrants will be under production and adds to more food production. This is not considered in the equation. Particularly in developng (poor) countries with growing rural population pressure, land parcels are very small and hinder mechanized agriculture but as people migrate, the scope for having bigger plots gives the opportunity for mechniuzation and intensification of agriculture (with more production in quality and quantity). So the equation did not take into consideration this side of the balancing factors [Zitouni Ould-Dada, Italy]	Accepted, included.
5386	11	7			The distinction between drivers and processes is clear but the boundary between drivers and pressures is somewhat blurry in the literature. In the DPSIR framework, Drivers are both natural and anthropogenic driving forces (e.g. climate change, population growth), Pressures are human activities affecting the environment, resulting from drivers (deforestation, burning fossil fuels). Since there is no clear demarcation among the two, processes and pressures, it is safe to mention that drivers sometimes could be proccesses and vice versa [Daniel Danano Dale, Italy]	Noted. We do not refer here to DPSIR framework and clarify what we meen by processes and drivers.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9004	11	10		11	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
2278	11	14			Do you mean "invasive conifers" instead of "native conifers"? Within the paragraph context, I think it is a typo and "invasive" should be writen [María Almagro Bonmatí, Spain]	Accepted, corrected.
5428	11	43			Outmigration increases the pressure on land if higher wages that rural migrants earn in urban centres will lead to their higher food consumption. This seems to emanate from the consideration that population increeases in the cities, which would lead to high demand to nutritious food that in return demands to more land for agricultural production, without the consideration on the other hand that the land that was left behind (abandoned) by the emigrants will be under production and adds to more food production. This is not considered in the equation. Particularly in developng (poor) countries with growing rural population pressure, land parcels are very small and hinder mechanized agriculture but as people migrate, the scope for having bigger plots gives the opportunity for mechniuzation and intensification of agriculture (with more production in quality and quantity). So the equation did not take into consideration this side of the factors [Daniel Danano Dale, Italy]	Accepted, included.
2280	11				Write "permanent" in the last box from figure 3.5. [María Almagro Bonmatí, Spain]	Accepted, corrected.
19690	12	3	12	4	Predicted decreases in rainfall and increases in temperature across……are likely to escelate changes of wildfire…….. [Sabit Erşahin, Turkey]	Accepted, revised.
6968	12	3	12	7	Even water scarcity is reported as one of desertification drivers, no reference to effects of recurrent (and increasing) drought events and to their expanding quality and quantity. [Anna Luise, Italy]	Accepted, included
17186	12	4	12	14	The relationshipp between increases in fire danger conditions anf fire activity must be toned down, for misleading or wrong. The papers cited only refer to fire danger, but the other component needed for fires is fuels, and reduced rainfal and increased temperatures can reduce them. So, you danger can increase but fires could be limited by fuel availability if plant productiity deacreases. In fact, we know that the relationship between fire danger and fires becomes less predictable the more amenable conditions are for fires (See Urbieta et al. Environ. Res. Lett. 10 114013). [Jose Manuel Moreno Rodriguez, Spain]	Noted. The current text in fact talks about "growing chances" of fire occurence, which we think is very cautious phrasing. Changing CO2 environment makes it difficult to unequivocally predict that vegetation productivity will decline with climate change.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20634	12	7	12	7	Please consider adding the following text: "Biological soil crusts are composed of photosynthesizing cyanobacteria, algae, lichens, and bryophytes, growing together with heterotrophic bacteria, fungi and archaea. Growing within the uppermost millimeters of dryland soils they cover ~12 % (18 million km2) of the global terrestrial surface area (Weber et al., 2016; Rodriguez-Caballero et al., 2018). Biological soil crusts have been suggested to fix ~590 Tg a-1 of carbon and ~26 Tg a-1 of atmospheric nitrogen, thus fertilizing dryland soils (Elbert et al., 2012) and effectively stabilize soils against erosion by wind and water (Field et al., 2010; Bowker et al., 2008). They have been shown to be endangered by climate and land use change with RCP scenarios suggesting that ~25-40% of the current cover are lost by the year 2070 (Reed et al., 2012; Maestre et al., 2013; Rodriguez-Caballero et al., 2018). [Bettina Weber, Germany]	Accepted, incorporated into future projections section.
20636	12	7	12	7	for citations see line above and: Weber, B., Belnap, J., Büdel, B. (2016): Biological soil crusts: an organizing principle in drylands, Ecological Studies 226. Springer International Publishing, Switzerland. Elbert, W., Weber, B., Burrows, S., Steinkamp, J., Büdel, B., Andreae, M.O. & Pöschl, U. (2012): Contribution of cryptogamic covers to the global cycles of carbon and nitrogen. Nature Geosciences 5: 459-462. Bowker, M.A., Belnap, J., Chaudhary, V.B., Johnson, N.C. (2008) Revisiting classic water erosion models in drylands: the strong impact of biological soil crusts. Soil Biology and Biochemistry 40: 2309-2316. [Bettina Weber, Germany]	Accepted, thank you.
19318	12	8	12	8	Relevant to '3.2.3.2. Anthropogenic Drivers of Desertification under Climate Change' (and executive summary), it would be better to clearly mention that climate change will excerbate anthrophogenic drivers of desertification and evidences are lacking to pinpoint the extent of climate change contributions to desertificatin. Then the readers will understand relationship between cc and desertification though being direct are difficult to quantify using available advances in science. [Binaya Raj Shivakoti, Japan]	Rejected. Our assessment and definition already highlight the role of both climatic and human drivers of desertification.
14402	12	8	12	8	The lack of technical knowldege/skills and cultural/antropological drivers as dirvers of degradation/desrtification is missing [Rattan Lal, United States of America]	Noted. We included lack of technical knowledge and skills where we are listing the drivers of desertification per se (which may not be affected further by climate change). We could not find the evidence that some cultures are more likely to cause desertification than some others.
10146	12	9	12	10	The use of "adequately prodigious' may be inappropriate, just use prodigious to mean exceptional, remarkable, huge , vast, impressive etc. [Lizzie Mujuru, Zimbabwe]	Accepted, revised.
17188	12	10	12	10	prodigius probably needs not any other qualifier. With prodigious literature be inedecuate? [Jose Manuel Moreno Rodriguez, Spain]	Accepted, revised.
2502	12	10	12	10	“adequately prodigious” sounds odd. Perhaps reword. [William Lahoz, Norway]	Accepted, revised.
10148	12	11	12	11	Mirzabaev et al., 2015 where is this? [Lizzie Mujuru, Zimbabwe]	Noted, this reference was dropped.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24180	12	12	12	16	I would also add that severe groundwater extraction is one of the major sourcses of ertification as it increase the depth of the water table from the surface and drecrease soil moistures and accelerate dust emission [Heggy Essam, United States of America]	The role of groundwater in this sense is discussed in section 3.4.1
9618	12	13	12	13	add Cherlet 2018 [Markus Giger, Switzerland]	Accepted. Added.
19034	12	22	12	23	Not necessarily. If the totall rainfall increase , the phytomass production increase with the putative CO2 increase (Factor of Production). [Azziz Hirche, Algeria]	Rejected. Our statement in this line is based on the assessment of numerous literature sources. Our mandate excludes the possibility to speculate on the basis of hypothetical assumptions.
10856	12	22	12	23	A quantification of the amount of loss as a result of these processes could add value to the point being made here. [Debra Roberts, South Africa]	Noted. The numbers are given in the referred Section. We wanted to avoid repeating the same information.
14404	12	24	12	24	Add feed/fodder besides "..production of food " as "... production of food and feed" [Rattan Lal, United States of America]	Accepted.
10488	12	24	12	26	another response to increasing food demands is producing in a more efficient manner/intensification and to reduce waste and loss of food [Zitouni Ould-Dada, Italy]	Accepted.
6944	12	29	12	30	The net effects of such global agricultural production shifts on desertification are not known although the economic burden can be predicted by increased prices on imported food. [Talal Darwish, Lebanon]	Rejected. Imported food is not always more expensive than locally produced.
3350	12	30	12	30	We identified four broad clusters of proximate causes agricultural activities, infrastructure extension wood extraction (and related activities) and increased aridity. Each category of proximate causation was subdivided for example infrastructure extension included the extension of irrigation works , human settlements and road networks while agricultural activities were divided into livestock and crop production. (Lambine et al 2003). For the ecological and climatic conditions. Annual rainfall ranged from less than 50 millimeters in hyperacid basins or plains to more than 50 mm in sub humid mountain sites some sites were characterized by a uniform permafrost soil or fossil sand dung coverage while others featured loamy. Loessial sandy skelted (gravel, stone. Mantled) or clay soils, At some sites the area of eroded, bare, rocky ground cover increased gradually. At an annual rate of about 1 % while at other sites in increased for more rapidly (Geist 2004). [Nagla Hamadain, Sudan]	Noted.
3352	12	30	12	30	Agricultural activities or agrarian land uses are the leading proximate cause of desertification (95 %) they include extensive grazing nomadic grazing (pastoralism) and annual cropping . extensive livestock production , carried out under the mode of either sedentary or transhumant (seasonal nomadic)husbandry , displays low geographical variation as acause of desertification. [Nagla Hamadain, Sudan]	Noted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3354	12	30	12	30	Most of the agricultural activities lies in the arid and semi arid zones, Agriculture is the dominant tradable sector in Sudan economy. It contributes about 35- 40 % to the gross domestic products (GDP) . The contribution of the irrigated mechanized and traditional rain-fed sectors amounted to 33.8 , 44.9 and 21.2 % respectively(Anonymous, 1990) It is evident that two thirds of the output is effected by the uncertainty of precipitation and desertification , Mechanized rain-fed agriculture introduce in 1940 is practiced [Nagla Hamadain, Sudan]	Noted.
2274	12	30	12	34	The following technical report could be cited to reinforce the statement made: M.J. Sanz, J. de Vente, J.-L. Chotte, M. Bernoux, G. Kust, I. Ruiz, M. Almagro, J.-A. Alloza, R. Vallejo, V. Castillo, A. Hebel, and M. Akhtar-Schuster. 2017. Sustainable Land Management contribution to successful land-based climate change adaptation and mitigation. A Report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany [María Almagro Bonmatí, Spain]	Noted. This publication is very informative and better fits our section on technological responses and also on links to SDGs where will consider its findings, rather than on this line, about the content of which the publication does not say much.
26476	12	31	12	31	is the likely in the sentence used in terms of IPCC uncertainty language? If not, reword [Hans Poertner and WGII TSU, Germany]	Accepted, reworded.
6894	12	31	12	31	Is the use of the certainty qualifier "likeky" appropriate? [Wilfran Moufouma Okia, France]	Accepted, reworded.
23810	12	34	12	36	Poverty limits both capacities to adapt to climate change and availability of financial resources to invest into sustainable land management (SLM) (robust evidence, high agreement) (Gerber et al., 2014; Way, 2016; Vu et al., 2014). May be we need to discuss what these references have said about poverty and SLM before given the conclusion on evidence and agreement [Abdellatif Khattabi, Morocco]	Noted. More discussion is given in sections 3.6.2, 3.7.2., 3.7.3. we would rather avoid being repetitive, so we now included a reference to these sections).
3356	12	36	12	36	Desertification is the main constraint of sustainable development; Its main direct impact is the less of the productive capacity of the land resulting in food insecurity economic instability, increasing levels of poverty and political unrest through tribal conflict over scarce natural resources. Other important effects include impairment of human and animal health community displacement and overall environmental degradation through impoverishment of biodiversity loss of biomass , bio productivity and human resources , which eventually contribute to climate change . [Nagla Hamadain, Sudan]	Noted.
26478	12	37	12	37	is the likely in the sentence used in terms of IPCC uncertainty language? If not, reword [Hans Poertner and WGII TSU, Germany]	Accepted, reworded.
6896	12	37	12	37	Is the use of the certainty qualifier "likeky" appropriate? [Wilfran Moufouma Okia, France]	Accepted, reworded.
26480	12	38	12	38	is the likely in the sentence used in terms of IPCC uncertainty language? If not, reword [Hans Poertner and WGII TSU, Germany]	Noted, it is part of calibrated language. Italicized.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17190	12	39	12	39	Here and throghout the text: On the use of out-migration. Will this be included in the glossary? Why not using emigration? (Emigration: the act of leaving one region or country to live in another)(The Mrrian Webster Dictionary) [Jose Manuel Moreno Rodriguez, Spain]	Noted. However, we would rather use the word out-migration which is used in the specialized literature, rather than emigration.
2276	12	40	12	47	Rephrase to make clearer this statement. [María Almagro Bonmatí, Spain]	Accepted, revised.
17192	12	44	12	45	The excess earnings may be invested sustainably or not. For instance, avaialble money my prompt excess use of chemicals to boost production, which may negaively affect the land, or induce conversion of less productivey land. Please, weight this with some caveat [Jose Manuel Moreno Rodriguez, Spain]	Noted.
27334	12	46	12	47	Link with chapter 7 and discussion of emergent risks. [Doreen Stabinsky, United States of America]	Accepted, done.
6022	12	8	13	8	A relevant reference Few, R., & Tebboth, M. G. L. (2018). Recognising the dynamics that surround drought impacts. Journal of Arid Environments, (January), 0–1. https://doi.org/10.1016/j.jaridenv.2018.06.001 [Chandni Singh, Myanmar]	Noted. The paper is a 3-page think piece primarily on drought. So we feel this fits better in our case study on drought responses.
5500	12		13		There is no section 3.2.3.3 between sections 3.2.3.2 and 3.2.3.4. [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted, corrected.
5430	12	1			drivers of desertification, such as land tenure insecurity, lack of property rights, lack of access to markets, and to rural advisory services, agricultural price distortions, centralised management of natural resources. I am hesistant to agree with the assertion that all of the factors listed are drivers of desertification. They may contribute indirectly to the process rather. A land user may not intentionally take actions that would degrade the land that he cultivates simply because he does not own it. He may for sure not invest on SLM due to lack of security if he is aware that he does not have the titles and feels insecure but in many cases farmers do not feel they are insecure because of lack of awareness, whether owining andor using the land affects they way they invest on land. In the same way land users becuse of lack of access to market may not intend to use the land in unsustainable way but may not encouraged to make maximum effort for increasing income from land. [Daniel Danano Dale, Italy]	Accepted, we removed the word "direct."
9006	12	2		33	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
19222	12	6			Fire is maintaining the sustainability of the savannah especially when tree encroachment occurs. Some natural ecosystems are adapted to fire. Its the frequency of fires and the season of their occurrence which is a problem [Pascal Podwojewski, France]	Noted.
2266	12	13			Here and along the chapter, the reference by UNCCD 2017 is missing in the reference list. [María Almagro Bonmatí, Spain]	Accepted, included in the reference list.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1738	12	13			UNCCD 2017 is missing from ref list [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included in the reference list.
2268	12	28			delete the first "be" from the sentence [María Almagro Bonmatí, Spain]	Accepted.
6942	12	28			could be also be met [Talal Darwish, Lebanon]	Accepted.
2270	12	30			and also the associated enhancement greenhouse emissions to the atmosphere by transport sould be accounted for. [María Almagro Bonmatí, Spain]	Rejected. This is a prescriptive language which is not used within IPCC reports. Moreover, our text already points to this gap.
2272	12	30			May be it would be nice to add a comment regarding the huge amounts of food that are trough away every day because of the global production and market system. In this regard, national and regional policies avoiding this bad practice (controlling somehow that all the produced food are consumed) could help to produce food in a smarter manner. [María Almagro Bonmatí, Spain]	Noted. This particular formulation sounds prescriptive, but the topic is covered in Chapter 5.
2284	13	1	13	4	Please add "lack of economic incentives (subsidies)" [María Almagro Bonmatí, Spain]	Accepted, added.
23812	13	2	13	2	lack of access to markets… may be replace by: lack or insufficient acess to markets [Abdellatif Khattabi, Morocco]	Rejected. "lack" already implies "the state of being without or not having enough of something" (from Google Define)
23814	13	3	13	3	agricultural price distortions… may be replace by agricultural price distortions and volatility [Abdellatif Khattabi, Morocco]	Rejected. Could not find evidence on the role of agricultural price volatility in causing desertificaton.
17194	13	5	13	6	Agriculture price distortion can occur due to extreme events in the large agricutlural producers of the world. So that might be a link here to climate change. Please, consutl IPCC AR5, the relevant chapter on agriculture. [Jose Manuel Moreno Rodriguez, Spain]	Rejected. Agricultural price changes caused by extreme weather events are usually short-lived and would be relatively quickly corrected by market forces. What we mean here are structural policy-related agricultural price distortions (e.g. through goverment subcidies, taxation, tarrif barriers, etc).
10858	13	8	13	8	Delete 'on' [Debra Roberts, South Africa]	Accepted.
23816	13	11	13	14	Needs a reference [Abdellatif Khattabi, Morocco]	Accepted, included.
10402	13	12	13	12	"whereby dryland populations apply unsustainable agricultural practices leading to desertification. It can not be generalised they way it is expressed here." There are land users in the drier regions who use the natural resources base in sustaianble manner. Most pastoralist communities do this. In the same way ther are many communities in the drier areas that have traditional systems that could be considered the best management (conceious of sustainable use of water, trees and the land) [Zitouni Ould-Dada, Italy]	Accepted. What you are saying is exactly consistent with the point we are making in the text. That is why we write about the alternative drylands development paradigm in the next sentence.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6024	13	14	13	20	Relevant references for the drylands development paradigm drawing on examples from East Africa and India to show that climatic and non-climatic drivers intersect to shape local land use change: East Africa: Few, R., & Tebboth, M. G. L. (2018). Recognising the dynamics that surround drought impacts. Journal of Arid Environments, (January), 0–1. https://doi.org/10.1016/j.jaridenv.2018.06.001 India: Singh, C., Rahman, A., Srinivas, A., & Bazaz, A. (2018). Risks and responses in rural India: Implications for local climate change adaptation action. Climate Risk Management. https://doi.org/10.1016/j.crm.2018.06.001 [Chandni Singh, Myanmar]	Noted,these references are relevant to our assessment, but do not exactly fit this sentence here. We will evaluate and refer to them in other relevant sections.
5502	13	17	13	18	"Reynolds et al. (2007) indicate that drylands being non-equilibrium system there is a high temporal climatic variability" – it seems that the sentence must be edited. [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted, edited.
26530	13	20	13	24	Swift, J. (1996). Desertification: narratives, winners & losers. The lie of the land: Challenging received wisdom on the African environment, 73-90, could also be cited here [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted, included.
2196	13	45	13	47	Figure 1 in Zaninelli et al. (Clim. Dyn. 2018; DOI: 10.1007/s00382-018-4225-0) presents an updated map of aridty index and Figure 7 and 8 its climate change projections over South America. [Andrea Fabiana Carril, Argentina]	Accepted. Reference assessed,included under regional scales section
25490	13	42	14	6	There is a suggestion of false in this paragraph (desertification takes place in the drylands, drylands are defined by aridity, aridity is increasing so desertification is increasing). It might be improved if the last sentence "the expansion…" was put further up. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted.The sentences have been reorganized
18846	13	42	16	7	Please reviewd the general estimates of the extent and severity of desertification at global scale, the information should be given :over the past years,how the the extent and severity of desertification have change at global scale [Jianguo Wu, China]	Accepted. Estimates reviewed.Although there's no consistency on the figures given due to diverse set of methodologies used -For this reason synthesized information on estimates using different methodologies is given

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11422	13		18		Section 3.3.1 What about the impact of local irrigation which could affect low-spatial-resolution NDVI values because it would affect the average 'green-ness' for an area. Is this something that should be considered? In the Conclusion: possibly mention the potential of https://www.sciencedirect.com/science/article/pii/S0034425712002489 for distinguishing species composition, ecosystem complexity and thus encroachment of invasive aliens. Possibly raise this in 3.3 section conclusion also: the need for new data. A global survey? Local ground-surveys are still necessary to truth the remotely sensed data, but this could represent a leap forward in this field (which faces so many difficulties, see pg 20 line 19-26). [Debra Roberts, South Africa]	Accepted.The difficulty of interpreting satellite data at the sub-pixel level is now mentioned. The reference is added.
9008	13	2		24	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
2504	14	1	14	1	Perhaps authors could add a reference to the information from the ESA CCI for soil moisture, based on satellite data, and which spans 30+ years. This information potentially allows monitoring of the changes in size of desert regions over the globe. The website for the ESA CCI for soil moisture is www.esa-soilmoisture-cci.org. [William Lahoz, Norway]	Accepted.Thanks.Information from the Reference included
19036	14	4	14	4	In Algeria arid areas (North Africa) , a recent paper show thet there is not evidence of drier climate nd Belala et al, 2018) [Azziz Hirche, Algeria]	noted
23818	14	9	14	9	Expert judgment instead of expert opinion [Abdellatif Khattabi, Morocco]	Accepted,edited
10404	14	10	14	10	"..and inventory of abandoned land." All abandoned lands are not due to degradation and could not be taken as indicators of desertification process. Either specify why it is abandoned. Land could be abodoned for vrious resons that include infestaion by pests, diseas, civil war, migration. [Zitouni Ould-Dada, Italy]	Accepted,edited
17196	14	21	14	21	Edit. Use consistently numbers or text. In the sentence above you use numbers) 2 billion) whereas here you use text (three billion) [Jose Manuel Moreno Rodriguez, Spain]	Accepted,text edited
15928	14	24	14	26	I believe that the 3. WAD (world atlas of desertification) should be included here https://wad.jrc.ec.europa.eu/introduction [Rasmus Fensholt, Denmark]	Accepted.WAD third edition included

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15930	14	27	14	35	Consider to refer to the following book chapter in this section; Fensholt, R., Horion, S., Tagesson, T., Ehammer, A., Grogan, K., Tian, F., Huber, S., Verbesselt, J., Prince, S.P., Tucker, C.J. and Rasmussen, K. (2014). Assessment of Vegetation Trends in Drylands from Time Series of Earth Observation data. Remote Sensing Time Series revealing Land Surface Dynamics, Springer Books, Springer International Publishing Switzerland 2015. C. Kuenzer et al. (eds.), Remote Sensing Time Series, Remote Sensing and Digital Image Processing. This book chapter reviews the use of EO VI time-series for assessment of dryland vegetation and the use of different time-series analysis approaches including breakpoint detection (BFAST) and vegetation seasonal metrics for advancing the assessment of vegetation dynamics. [Rasmus Fensholt, Denmark]	Accepted.reference added
3186	14	34	14	44	Also important is the change of NPP (and obviously also NDVI) with land use which is not necessarily degradation: if a forest with a high NDVI is changed to an atrificial grassland or cropland, NDVI and NPP is changed, often reduced, but this is hardly degradation/desertification.Therefore it is important that NDVI studies are corrected for land use trends, which, however, is not often the case. This should be discussed in the passage, with more attention to uncertainty language. [Karlheinz Erb, Austria]	Accepted,NDVI weakness has been addressed
19038	14	37	14	40	Please, need of references [Azziz Hirche, Algeria]	Noted,references included
17198	14	37	14	41	There are a couple of sentences with conclusions and no reference to support them [Jose Manuel Moreno Rodriguez, Spain]	Noted,references included
15932	14	44	14	44	to complement the refs used for detection of shifts in vegetation, consider to include also Horion et al. 2016, who studied abrupt shifts in ecosystem functioning in semi-arid central Asia from time-series of EO data. Horion, S., Prishchepov, A.V., Verbesselt, J., de Beurs, K., Tagesson, T. and Fensholt, R. (2016). Revealing turning points in ecosystem functioning over the Northern Eurasian agricultural frontier. Global Change Biology, 22, 2801–2817. [Rasmus Fensholt, Denmark]	Accepted. Thanks,reference reviewed
7548	14	13	16	7	The "figure 3.6" is not refered in the text. [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Noted. Fig 3.6 is referenced in page 14 line 01
6448	14	27	16	19	greening up occures in pure deserts when it rains. In the degraded savanna part of Sudan, it becomes green when it rains, but what is green was not described by NDVI users. Grasses grow but the trees (Acacia) never came back. So, it is not true land is recovrring [Mustafa Elhag, Sudan]	Accepted.This assumption has been addressed under challenges of the use of NDVI metric
14406	14	15	18	16	The focus on land degradation but not on desertification should be improved or deleted [Rattan Lal, United States of America]	Accepted,text edited

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9010	14	2		33	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.Noted,thanks
5436	14	10			and inventory of abandoned land. All abandoned lands are not due to degradation and could not be taken as indicators of desertification process. Either specify why it is abandoned. Land could be abodoned for vrious reasons that include infestaion by pests, diseases, civil war, migration, ……..which may not lead to desertification [Daniel Danano Dale, Italy]	Accepted,edited
26336	14	23			Another important satellite-based index that allows detection of vegetation changes is the Enhanced Vegetation Index (EVI / MODIS-EVI). It should be considered here as well, since numerous studies are emerging that shift from using NDVI to EVI instead, or that complement NDVI studies. [Hans Poertner and WGII TSU, Germany]	Accepted,information on the use EVI and other vegetation indices included
1740	14	27		33	The authors should also state the simple fact that a decline in greenness, as measured by NDVI, is not necessarily an indication of desertification because it says nothing about the quality of the vegetation. It also depends on what human activities occur in the area. For example, unpalatable bush encroachment into pastures would result in a loss of utility for pastoralists (desertification), but may appear as an increase in greenness using NDVI. A comment at top of P18 goes some way to redressing the imbalance but this 'health warning' should come much earlier. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted.Weaknesses of using NDVI has been addressed
11420	14	33			It would be better to say “drylands are greening on average” since that is all that the NDVI can show. You have already mentioned the spread of invasive aliens in drylands, which represent an increase in NDVI but a degradation of the land and its ecosystems. [Debra Roberts, South Africa]	Accepted,text edited
19040	15	4	15	6	This results are in accordance with the work of Hirche et al, 2018 :The Maghreb (North Africa) Rangelands' Evolution over Forty Years: Regreening or Degradation? Nova Ed. [Azziz Hirche, Algeria]	Noted,thanks
25094	15	8	15	8	fertlizer [Sayed Masoud Mostafavi Darani, Iran]	Accepted,text edited
15934	15	13	15	14	A good reference to support that statement would be Tian et al. 2016, who studied this for the first time from the use of ground observations in a semi-arid setting. Tian, F., Brandt, M., Liu, Y.Y., Verger, A., Tagesson, T. Rasmussen, K., Diouf, A.A., Mbow, C., Wang, Y. and Fensholt, R. (2016) Remote sensing of vegetation dynamics in drylands: Evaluating vegetation optical depth (VOD) using AVHRR NDVI and in situ green biomass data over West African Sahel. Remote Sensing of the Environment, 177, 265–276. doi:10.1016/j.rse.2016.02.056 [Rasmus Fensholt, Denmark]	Accepted.Thanks,reference reviewed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15936	15	17	15	20	Please include also a reference here to the work by Tian et al. 2016, who used an approach to map trends of the nonphotosynthetic woody components (i.e., stems and branches) in global tropical drylands using VOD achieved by a novel method focusing on the dry season period to minimize the influence of herbaceous vegetation and using MODIS NDVI data to remove the interannual fluctuations of the woody leaf component. Tian, F., Brandt, M., Liu, Y.Y., Rasmussen, K. and Fensholt, R. (2016). Mapping gains and losses in woody vegetation across global tropical drylands. Global Change Biology, 23(4). [Rasmus Fensholt, Denmark]	Accepted.Thanks,reference reviewed
7546	15	21	15	21	The third word "utilise" should be replaced by "use" [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. text edited
19416	15	21	15	21	I suggest to change "soil types" by "soil groups". [José João Souza, Brazil]	Accepted. text edited
3188	15	21	15	29	needs some attention: uncertainty language [Karlheinz Erb, Austria]	Accepted.text edited
5136	15	21	15	30	Some places in Russian Arctic, in boreal forests on permafrost and in large peatlands in Siberia are marked as under productivity decline. It contradicts to published direct observation data on productivity rasing in more warm climate and as a result of permafrost thawing [Oksana Lipka, Russian Federation]	Noted, we replaced that map with another.
26338	15	22	15	24	this figure is great; however, the data presented will be >5 years old when SRCCL is published and several droughts have occurred during the past few years - could an updated figure possibly be obtained for the next draft? [Hans Poertner and WGII TSU, Germany]	Accepted.updated figure provided
19418	15	24	15	24	I suggest to change "soil types" by "soil groups". [José João Souza, Brazil]	Accepted,text edited
10406	15	27	15	27	"while marginal areas with full cropping were designated as degraded ." What does full cropping mean in this context? Not clear [Zitouni Ould-Dada, Italy]	Accepted.Text edited
6898	15	30	15	30	Figure 3.6 lacks clarity in the caption [Wilfran Moufouma Okia, France]	Accepted.Figure removed,an updated one provided
26342	15	30	15	31	This sentence is unnecessary because it merely repeats the figure legend. More interesting would be a link/reference to a section where trigger processes or the consequences of the different productivity declines are being considered. [Hans Poertner and WGII TSU, Germany]	Accepted.Figure removed,an updated one provided
25756	15	30	15	32	please specify in figure caption if white = no data or N/A (hyperarid) or other (specify). Do not show country boundaries on maps. Could the global distribution of drylands be shown on the figure so the reader can quickly see if drylands are increasing or decreasing? [Hans Poertner and WGII TSU, Germany]	Accepted.Figure removed,an updated one provided
17630	15	32	15	32	The reference is missing [Jose Manuel Moreno Rodriguez, Spain]	Accepted.Figure removed,an updated one provided
9012	15	3		9	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted,references corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5438	15	27			while marginal areas with full cropping were designated as degraded . What does full cropping mean in this context? Not clear [Daniel Danano Dale, Italy]	Accepted.Text edited
26340	15	29			“rangeland suffers” - the word "suffer" has an emotional connotation; consider replacing, e.g., with “rangeland is exposed to” or “rangeland experiences” [Hans Poertner and WGII TSU, Germany]	Accepted,text edited
19540	15	30			The figure 3.6 should be announced above. [Ibouraïma Yabi, Benin]	Accepted.Figure removed,an updated one provided
5440	15	31			the Map Global Land Productivity Dynamics between 1999 and 2013. what does the white coloured area show? Desert ? Need to be indicated in the legend [Daniel Danano Dale, Italy]	Accepted.Figure removed,an updated one provided
10860	16	1	16	4	A brief justification of the regional differences might be helpful. [Debra Roberts, South Africa]	Accepted.Addressed in the regional section
26348	16	9	16	12	Helldén & Tottrup 2008 is a rather old reference - please check for literature that considers the droughts over South / southern Africa of the past few years [Hans Poertner and WGII TSU, Germany]	Accepted.New references included
26350	16	12	16	13	why is the number of states emphasised here - would proportion of the continents’ surface area not be as or more relevant? However, if states remain here, please indicate also the total number of states of these continents as a reference, e.g., "46 out of 54 African states". [Hans Poertner and WGII TSU, Germany]	Accepted.states are referenced as that is what the paper discusses. The total number of states on each continent is added.
26352	16	13	16	21	Does salinisation only affect river basins? Moreover, salinisation is a new idea here and should be given a new paragraph. [Hans Poertner and WGII TSU, Germany]	Accepted.Reference to river basin removed from first sentence. It is given a new paragraph.
2506	16	28	16	28	Should it be “Jordan river valley”? [William Lahoz, Norway]	Accepted.change made
19640	16	31	16	36	it would be appropriate to summarize the key finding on the change of landscape in the West Africa and particularly the sahel coming from reference work done by CILSS/AGRHYMET and USGS (changes from 1975 to 2013). CILSS (2016). Landscapes of West Africa – A Window on a Changing World. U.S. Geological Survey EROS, 47914 252nd St, Garretson, SD 57030, UNITED STATES. [Abou Amani, France]	Accepted.reference to the report and its key findings has been added.
10408	16	34	16	34	humid zones where soils are more structured (Lamourdia and Ignacio, 2007). Following the paragraph 31-34, it is good to include also the severity of soil erosion in other river basins not mentioned here (in the Horn of Africa, the eastern and South African regions), that are under serious desertification process. There could also be other river basins in the other parts of the world not mentioned here. A table summarizing prone riverbasins would helkp capture the most sensitve regions [Zitouni Ould-Dada, Italy]	Accepted.More river basins from this reference are added.
10862	16	35	16	35	Sahara is derived from Arabic which translates into the great desert. It is recommended that you just have 'the Sahara' and delete 'Desert' [Debra Roberts, South Africa]	Accepted.Sentence removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3358	16	36	16	36	In Sudan, desertification process occurs to varying degrees in the areas lying between lat 10 and 18 N and traverses the country from the eastern to the western boarders. In the northern part of Sudan thirteen states , out of 26 are affected to varying degrees by desertification , namely ,Northern , ElNeil , Read Sea , North Kordofan, North Darfur, West Kordofan , West Darfur, Kassala , Gedarif, Khartoum , White Nile , Gezira, and Sennar , these states cover on area of 178 million ha , 72 % of the total area of the country . [Nagla Hamadain, Sudan]	Accepted.Noted.
3360	16	36	16	36	North of Sudan is a desert with a South wards (Anonymous 1985, Salih , 1996) Recent assessment showed that severe and very severe soil degradation cover a total area of 58 million hectares , while land degradation totaled 75 million hectares indicating that vegetation degradation 17 million hectares (UNEP / ISRIC(Glassed) 1990 , Dragnet et al 1991 , AYOUB 1998) soil degradation was highly correlated with human population density the most degraded zones were the arid and semi arid zones where 76% of the human population lives .Most of the population of the affected states is poor and relies heavily on the natural resources (cultivation of marginal sandy soils tree and vegetation cutting for fuel and construction of huts and overgrazing for subsistence poverty leads to subsistence livelihood which enhances land degradation , reduces crop yield and aggravates poverty, which loses the poverty vicious circle. [Nagla Hamadain, Sudan]	Accepted.The most recent reference mentioned is 20 years old. This is not recent, nevertheless a comment on teh Ayoub (1998) reference is added.
3362	16	36	16	36	on the heavy clay soil of the central clay plain (ElGedarif , El Damazin and Kadugli)the soils extend over large level plain favorable to mechanized cultivation and have high water holding and nutrient capacity but they are limited by the high montmoorillionitic clay content which makes they vulnerable to compaction by heavy machinery , water logging and poor greations. These soils are also vulnerable to wind erosion and hence desertification in summer particularly during the period of prolonged drought e.g 1974/ 75 / 1986/87 (the national Action Plan of Research on Desertification In Sudan / UNESCO chair of Desertification studies , University of Khartoum , Sudan . June 2007). [Nagla Hamadain, Sudan]	Noted.
10150	16	37	16	37	Is this ref the one refered to as Miao et al 2015b in the ref list? [Lizzie Mujuru, Zimbabwe]	Noted. It is Miao et al 2015a. Text ammended
18848	16	8	18	16	Please provide the general estimates of the extent and severity of desertification at regional scale,the information should be given :over the past years,how the the extent and severity of desertification have change at regional scale,the table may be good. [Jianguo Wu, China]	Accepted.Information given on the regional section
7550	16	21	18	16	In the sentence "Desertification through salinisation is a major concern in river basins across the drylands ,,,," , "RIVER BASINS"shoul be replaced by " WATERSHEDS ", and also in all the texte. [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted.This reference to "river basins" is removed.
19542	16	1		7	The how seems too generalist and does not insist enough on the desert areas [Ibouraïma Yabi, Benin]	Rejected.Information on dryland regions is given according to the report

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9014	16	1		45	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted,text edited
26344	16	9			what type of satellite data was this based on, NDVI? Please specify [Hans Poertner and WGII TSU, Germany]	Accepted.sentence removed
26346	16	11			South Africa (the republic) or southern Africa (the region)? [Hans Poertner and WGII TSU, Germany]	Accepted.changed to southern Africa
5442	16	21			Desertification through salinisation. In addition to the riverbasin areas, agricultural lands irrigated from wells are getting increasingly salinized due to sea water intrusion as a result of excessive water withdrawl from the wells in the most dry regions (the Near East and North Africa region could be cited in this regard [Daniel Danano Dale, Italy]	Noted.
2286	16	24			Insert "(" before "Lal" [María Almagro Bonmatí, Spain]	Accepted.
19544	16	31		32	It would be interesting to mention some references and numerical indications [Ibouraïma Yabi, Benin]	Accepted.percentages of moderate or more severe degradation added. reference added.
19546	16	33			Please, write 16 instead of sixteen [Ibouraïma Yabi, Benin]	Accepted.
5444	16	34			humid zones where soils are more structured (Lamourdia and Ignacio, 2007). Following paragraph 31-34, it is good to include also the severity of soil erosion in other river basins not mentioned here (in the Horn of Africa, the Eastern and South African regions), that are under serious desertification process. There could also be other river basins in the other parts of the world not mentioned here. A table summarizing prone riverbasins would help capture the most sensitve regions [Daniel Danano Dale, Italy]	Accepted.More river basins from this reference are added.
26354	16	34			jargon - replace "aeolian" with “wind-driven”. Use of this acronym (ADL) is not necessary [Hans Poertner and WGII TSU, Germany]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15938	16				I find it surprising that the is no “stand-alone” section describing the Sahel case here (the only mentioning is the ref to Hellden and Tottrup line 17(3-16) and 40(3-17), which is not a core reference for considerable amount of EO research covering the re-greening of the Sahel) as the Sahel droughts in the early 1970s and 1980s in fact triggered desertification as focal point for one of three international environmental conventions (UNCCD), emerging from the Rio conference in 1992. For a review of Sahel desertification research, the IPCC authors can find inspiration from: (1) online Oxford Research Encyclopedia of Climate Science. Desertification and Re-Greening of the Sahel. Rasmus Fensholt, Cheikh Mbow, Martin Brandt, and Kjeld Rasmussen. Subject: Climate Systems and Climate Dynamics, Future Climate Change Scenarios, Climate of Africa Online Publication Date: Oct 2017. http://climatescience.oxfordre.com/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-553 (2) book chapter: Fensholt, R., Horion, S., Tagesson, T., Ehammer, A., Grogan, K., Tian, F., Huber, S., Verbesselt, J., Prince, S.P., Tucker, C.J. and Rasmussen, K. (2014). Assessing drivers of Vegetation changes in Drylands from Time Series of Earth Observation data. Remote Sensing Time Series revealing Land Surface Dynamics, Springer Book, Remote Sensing Time Series, Remote Sensing and Digital Image Processing [Rasmus Fensholt, Denmark]	Accepted.text for the Sahel has been expanded with additional references
26356	17	3	17	9	please simplify this section and make it easier to follow - it currently jumps from Australia as a whole vs eastern Australia. Perhaps start with the entire continent, then go into detail for eastern parts. Specify acronym AVHRR and consider explaining this method similar to the NDVI-section above [Hans Poertner and WGII TSU, Germany]	Accepted.text for Australia has been moved to its own sub-section. The discussion of eastern Australia is there to highlight the difference between 2 studies of teh entire continent.
10864	17	12	17	12	Consider deleting 'In Australia,' introducing the paragraph. [Debra Roberts, South Africa]	Accepted.
20638	17	12	17	18	This section does not sound logical and thus needs to be checked regarding drought/greeing. [Bettina Weber, Germany]	Accepted.It is correct. Some futher text to clarify has been added.
19692	17	26	17	26	……Australia (Burrell et al., 2017). [Sabit Erşahin, Turkey]	Accepted.
10490	17	28	17	28	8% land degradation seems very low [Zitouni Ould-Dada, Italy]	Accepted. Text changed.
6450	17	30	17	31	soil degradation is only part of land degradation [Mustafa Elhag, Sudan]	Accepted.soil changed to land
24182	17	36	17	38	this sentence need somew clarity, I am not sure it is agrreable that topography by itself is the cause of soil erosion. The sentense may benefit from some clarifications [Heggy Essam, United States of America]	Accepted."explained by" changed to "related to"

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23820	17	37	17	38	In arid Algerian High Plateaus, desertification due to both climatic and human causes led to the loss of 39 indigenous plant biodiversity and overall loss of vegetation between 1975 and 2006 (Needs a refrence) [Abdellatif Khattabi, Morocco]	Rejected. We cannot evaluate the statement without knowing the source publication.
17200	17	44	17	45	This is not correct. As Turco et al 2017 indicate, fires in Israel are more limited by fuels rather than by flammability. In another words, more drought does not imply more fires, but the contrary. Fires may change in timing, and this is what this reference supports. [Jose Manuel Moreno Rodriguez, Spain]	Accepted.Sentence has been removed
7540	17	44	17	48	Elouissi et al. (2016) reported that most rainfall stations in the northern part of Macta watershed (Northwestern Algeria) have decreasing trends, whereas at the south, the trends are in increasing style. • Elouissi A., Sen Z. And Habi M., 2016. Algerian rainfall innovative trend analysis and its implications to Macta watershed. Arabian Journal of Geosciences. ISSN 1866-7511 Volume 9 Number 4. Arab J Geosci (2016) 9:1-12. DOI 10.1007/s12517-016-2325-x [Abdelkader Elouissi, Algeria]	Accepted.Noted
6970	17	8	18	16	More reference to Europe (southern and Eastern9 as well as North America and Australia is needed. [Anna Luise, Italy]	Accepted.Each continent now has its own sub-section. Text for all continents has been expanded.
9016	17	5		48	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.references formatted according to IPCC standards
26532	18	3	18	12	While not peer-reviewed https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1196&context=envs_facpub is useful on prosopis and its livelihod impacts in Kenya. There is also plentiful literature on encroachment of Acacia drepanalobium on rangelands in Southern Ethiopia. Articles by Stephanie Herrmann including http://www.sciencedirect.com/science/article/pii/S0140196312002911 and https://link.springer.com/chapter/10.1007/978-3-642-16014-1_5 are relevant to the point on NDVI. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted.The 2 Herrmann references are added
15940	18	5	18	5	This statement can be supported by a reference to:Mbow, C., Fensholt, R., Rasmussen, K. and Diop, D. (2013). Can vegetation productivity be derived from greenness in a semi-arid environment? Evidence from ground-based measurements. Journal of Arid Environment, 97, 56–65. doi:10.1016/j.jaridenv.2013.05.011 showing large differences between the NDVI – vegetation productivity relationships from ground observations and that these differences can be linked to differences in species composition. [Rasmus Fensholt, Denmark]	Accepted.reference added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3860	18	5	18	8	Here degradation is not related to changes in vegetation productivity but rather to changes in the derived economic output. The main point is that not all vegetation productivity has the same economic value. That is a sensible approach but the implication is that desertification is (implicitly) defined in different ways in different parts of the chapter. When using Climate Model Output, there is no species level distinction relating to the vegetation productivity. Hence it is not possible to use climate model output to make the leap to economic factors because the species are unknown. [Michael Roderick, Australia]	Noted. In the UNCCD definition of desertification the degradation can be determined a number of ways including vegetation productivity or economic productivity.
15942	18	9	18	12	It would be relevant to mention here that advances in EO-based assessment of dryland woody vegetation states and trends have been made from the separation of woody and herbaceous vegetation phenology metrics from optical EO data and VOD. Brandt, M., Hiernaux, P., Rasmussen, K., Mbow, C., Kergoat, L., Tagesson, T., Ibrahim, Y.Z., Wele, A., Tucker, C.J., & Fensholt, R. (2016). Assessing woody vegetation trends in Sahelian drylands using MODIS based seasonal metrics. Remote Sensing of Environment, 183, 215-225. Brandt, M., Hiernaux, P., Tagesson, T., Verger, A., Rasmussen, K., Diouf, A.A., Mbow, C., Mougin, E., & Fensholt, R. (2016). Woody plant cover estimation in drylands from Earth Observation based seasonal metrics. Remote Sensing of Environment, 172, 28-38. Tian, F., Brandt, M., Liu, Y.Y., Rasmussen, K. and Fensholt, R. (2016). Mapping gains and losses in woody vegetation across global tropical drylands. Global Change Biology, 23(4). Brandt, M., Rasmussen, K., Penuelas, J., Tian, F., Schurgers, G., Verger, A., Mertz, O., Palmer, J.R.B. and Fensholt, R. (2017). Human population growth offsets climate-driven increase in woody vegetation in sub-Saharan Africa. Nature Ecology & Evolution, 1(4). [Rasmus Fensholt, Denmark]	Accepted.most of these references have been added
23822	18	19	18	19	(Figure 3.4. Needs a closing bracket [Abdellatif Khattabi, Morocco]	Accepted.
10866	18	19	18	19	Close bracket [Debra Roberts, South Africa]	Accepted.
19320	18	22	18	23	Drought is not degradation as such as the land productivity may return entirely once the drought ends', same could be said to land degradation, caused by salinization such as due to sea level rise, once soil salinity could be washed away. Similart this statement on drought somehow contradicts with the Drought was suggested as the main driver of desertification'' in page 19, line 34 [Binaya Raj Shivakoti, Japan]	Noted. Drought is a common natural climatic feature of all drylands. This statement ensures that we do Noted. not interpret all drylands as constantly moving in and out of desertification due to natural drought cycles. The sentence cited on page 19, line 34 presents teh claim of one paper and is immediately followe by counter-claims of several other papers. There is no contradiction.
14408	18	22	18	23	"Drought is not degradation as such as the land productivity may return entirely once the drought ends (Kassas, 1995)". Agree, but repeating and regular drought can lead to enormous degradation. [Rattan Lal, United States of America]	Noted. Sentence added "However, if droughts increase in frequency, intensity and/or duration they overwhelm the vegetation ability to recover and cause degradation."

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3364	18	31	18	31	Climate variation is the natural variation in the main elements of climate that characterize the arid, semi – arid and dry sub – humid lands such as variation in the frequency and severty of drought periods, wind speeds, rainfall amount, frequency and intensity , while climate change is the permanent change in these elements , which results in increase or decrease in the areas of the climatic zones global warming is considered as the main direct mdicator of climate change . there is now strong evednce that significant global warming is occurring . this is indicated by the rise in surface air temperatures subsurface ocean temperatures increase in avarge global sea levels. Retreating glaciers and changes in many physical and biological systems. [Nagla Hamadain, Sudan]	noted
10868	18	41	18	41	Consider replacing 'were' with 'have been' [Debra Roberts, South Africa]	Accepted.
15944	18	42	18	42	This statement can be further supported by a reference to: Huber, S., Fensholt, R and Rasmussen, K. (2011). Water availability as the driver of vegetation dynamics in the African Sahel from 1982-2007. Global and Planetary Change. 76(3-4), 186-195. [Rasmus Fensholt, Denmark]	Accepted.reference added
26360	18	44	18	46	consider briefly stating the outcomes here - were they similar to those mentioned above? [Hans Poertner and WGII TSU, Germany]	Accepted.outcomes are stated
10870	18	41	19	9	What is your assessment of these studies? [Debra Roberts, South Africa]	Accepted.This sentence has been added "These studies represent the best regional, remote sensing based attribution studies to date, noting that RESTREND has some limitations"
26358	18	8	20	18	Recommend that this section 3.3.2 be proofread for syntax and sentence completeness. [Hans Poertner and WGII TSU, Germany]	Accepted.
9018	18	2		44	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.references formatted according to IPCC standards
9020	18	5		9	Archibald et al. (2009) found……and As Williams et al. (2009), remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted.the text referred to cannot be found.
26646	18	19			insert comma after figure 3.4 [Abiud Kaswamila, United Republic of Tanzania]	Accepted.bracket inserted
11458	18	42			When looking at time trends it is vital to consider long term data sets. Observing a greening trend in NDVI data, which only start in 1982, misses the fact that this year was at the peak of a long dry period that lasted for several decades, from which the Sahel has been gradually recovering, see http://climatescience.oxfordre.com/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-559 (Figure 4) [Debra Roberts, South Africa]	Noted
19548	18	43			Other factors like what? Be a little more specific please. [Ibouraïma Yabi, Benin]	Accepted. "non-climate" is added for clarity

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15946	19	7	19	7	This statement can be further supported by a reference to: Huber, S., Fensholt, R and Rasmussen, K. (2011). Water availability as the driver of vegetation dynamics in the African Sahel from 1982-2007. Global and Planetary Change. 76(3-4), 186-195. [Rasmus Fensholt, Denmark]	Accepted.This reference is added a few sentences earlier
18850	19	10	19	29	There are no directly relationship to Attribution of Desertification for these two paragraphs.in this section, the information should be given :over the past years,what factors have driven the change in desertification extent and severity at global and regional scale. [Jianguo Wu, China]	Noted. These paragraphs discuss studies that use alternate approaches to attribute desertification to climate, human or other sources.
26362	19	14	19	20	The message of this paragraph is not very clear - it mixes sea surface temperature, land temperature, rainfall, and aridity but does not provide a clear link between those. It also appears to be using temperature (heat) and aridity (drought) interchangeably. Please rewrite with clearer structure. [Hans Poertner and WGII TSU, Germany]	Rejected. No text to this effect was found in this location
23824	19	27	19	27	Missing a dot after : (Peter et al., 2017) [Abdellatif Khattabi, Morocco]	Accepted.
7552	19	30	19	30	The sentense " There are numerous local case studies on attribution of case studies" should be replaced by the sentense "There are numerous local case studies on attribution of desertification " [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted.
5018	19	30	19	31	Sentence meaning not clear [Eamon Haughey, Ireland]	Accepted.
26366	19	34	19	35	and what about the 20+ years since 1995? [Hans Poertner and WGII TSU, Germany]	Noted, sentence deleted
19694	19	43	19	45	Desertification by human activities is the dominant influence in the Yulin region in China between 1986 and 1995, while the role..... [Sabit Erşahin, Turkey]	Accepted.change made
9022	19	4		13	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.references formatted according to IPCC standards
26648	19	27			insert full stop after citation [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26364	19	28			For clarity, please mention very briefly what the implications of these doubled background dust loads are. Consider referring to section 3.4.1 as well [Hans Poertner and WGII TSU, Germany]	Accepted.cross referencing to section 3.4.1 added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15948	19	30			In this section it would be relevant to include the work by Horion et al. 2016. On the occurrence and drivers of abrupt change (turning points) in ecosystem functioning over the semi-arid Northern Eurasian agricultural frontier. Combining Earth observation trend shifts in rain-use efficiency, field data and expert knowledge, environmental hotspots of change are mapped and explained in relation to climate/human activities. 1/3 of the area showed significant change in RUE mainly occurring around the fall of the Soviet Union or as result of major droughts. Recent human-induced turning points in ecosystems functioning were uncovered nearby Volgograd and around Lake Balkhash, respectively attributed to recultivation and to increased salinization and increased grazing. Horion, S., Prishchepov, A.V., Verbesselt, J., de Beurs, K., Tagesson, T. and Fensholt, R. (2016). Revealing turning points in ecosystem functioning over the Northern Eurasian agricultural frontier. Global Change Biology, 22, 2801–2817. [Rasmus Fensholt, Denmark]	Accepted.reference added
10152	20	3	20	3	Replace Basis with bases [Lizzie Mujuru, Zimbabwe]	Accepted.
15950	20	9	20	18	It would be relevant to include the mentioning of the paper by Rasmussen, K. et al. (2016) who studied the generic reasons behind the overall lack of scientific agreement in trends of environmental changes in the Sahel supported by contrasting empirical evidence. The study distinguish between divergences in interpretations emerging from (1) conceptualizations, definitions and choice of indicators, (2) biases, for example, related to selection of study sites, methodological choices, measurement accuracy, perceptions among interlocutors, and selection of temporal and spatial scales of analysis. Rasmussen, K., D'haen, S., Fensholt, R., Fog, B., Horion, S., Nielsen, J.O., Rasmussen, L.V. and Reenberg, A. (2016). Environmental change in the Sahel: Reconciling contrasting evidence and interpretations. Regional Environmental Change,16(3), 673-680. [Rasmus Fensholt, Denmark]	Accepted.reference added
9620	20	19	20	26	A major conclusion from this "caladoscope" of local casesstudies should also be that it will always remain difficult to identify a set of common drivers that fit all local context. Thus adressing desertification will depend much on adequate governance systems that can effectively and sustainably address these issues. Hence adaptive goveranance with adequate participation of local stakeholders need to be promoted. Governance issues should be emphasized throughout the chapter [Markus Giger, Switzerland]	Noted. Governance issues are discussed in sections 3.5 and 3.7

Comment No	From Page	From Line	To Page	To Line	Comment	Response
106	20	19	20	26	It needs to be more clearly stated that natural drought cycles have occurred in many parts of the world over the past centures and millennia. The drivers are linked to multidecadal and longer ocean cycles as well as solar activity changes that shift wind systems and rainfall systems. A robust attribution of modern desertification can only be achieved by carefully studying pre-industrial drought cycles and their natural drivers. Only once these natural drivers are understood, there is a chance to identify anthropogenic components. A first test is always to verify whether desertification level or drought level are still witin the multi-millennial natural climate bandwidth or have already left this band of natural variability. It would be important to state this in this report more clearly. Why are pre-industrial natural climate fluctuations not more prominently being discussed here? [Sebastian Luening, Portugal]	Noted. Thank you for the comment. We note that drought and desertification are not synonymous as discussed at the begginning of section 3.3.2. Drought cycles of past centuries are not relevant to attribution of recent desertification.
19420	20	27	20	27	Are no studies in South America? [José João Souza, Brazil]	Accepted.
25096	20	39	20	39	surface energy ....change to.....energy flux [Sayed Masoud Mostafavi Darani, Iran]	Noted. This comment refers to the “surface energy balance” not to a particular flux. No Change.
19422	20	43	20	43	"limited soil moisture" is too generic. Maybe "soil moisture regime close to wilting coefficient during eight months or more" could be better. [José João Souza, Brazil]	Noted.This comment is specifically comparing soil moisture availability in drylands to that in more humid regions. “limited” provides a concise and accurat comparison. No change made.
14410	20	28	21	9	The citation is fine, but the first researchers described this effect were: Otterman J. Science. 1974, Vol.186, No. 4163; Charney, J.G. 1975. Quart. J. Royal Meteor. Soc, 101), which then has been justified in many locations [Rattan Lal, United States of America]	Noted
6972	20	28	22	28	Reciprocal effects (climate change on desertification) should be better highlighted, also to contribute to coherence with subsequent paragraphs. [Anna Luise, Italy]	Noted. This section is specifically focused on desertification feedbacks to climate. The effects of climate (and climate change) on desertification is covered in section 3.2.3
18852	20	28	24	6	How to linking the chapter 2 should be introdued. This section is about the general principle about Desertification Feedbacks to Climate, or review on the progress on Desertification Feedbacks to Climate over past years and in future at global or regional scale. [Jianguo Wu, China]	A link to chapter 2 is already present on page 20 line 35. We now expand this to read “While these feedbacks occur in all climate zones (see chapter 2) here we focus on their effects in Noted. dryland regions and assess the literature concerning the major desertification feedbacks to climate.”
9024	20	8		43	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. References formatted according to IPCC standards

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24184	21	4	21	5	The figure and the chapter in general would benefit from addition a discussion on the role of groundwater abstraction in causing desertification [Heggy Essam, United States of America]	Accepted.Text concerning the role of groundwater has been added. “Changes in groundwater can affect vegetation and the generation of atmospheric dust in dryland regions (Elmore et al., 2008). This can occur through shallow groundwater processes such as the vertical movement of salt to the surface causing salinisation, supply of near surface soil moisture, and sustenance of groundwater dependent vegetation. Groundwater dependent ecosystems have been identified in many dryland regions around the world (e.g. Lamontagne et al 2005; Patten et al 2008; Decker et al 2013; Eamus et al 2015). In these locations decreases in groundwater levels have the potential to decrease vegetation cover. “
25758	21	4	21	6	Biodiversity feedbacks not captured and vegetation are part of biodiversity [Hans Poertner and WGII TSU, Germany]	Rejected.Biodiversity feedbacks, other than those associated with structural vegetation change, are note discussed in this section. The biodiversity element is removed from the figure.
6900	21	5	21	5	From Figure 3.7, desertification only affects climate change indirectly through CO2 fluxes, albedo, cloud and radiation. What about local atmospheric circulation changes? [Wilfran Moufouma Okia, France]	Noted. As indicated in the figure there are direct effects that act through vegetation change to atmospheric CO2, albedo and sand and dust aerosols. Local atmospheric circulation changes may be caused by surface albedo changes (for instance – see Chapter 2), however we are not aware of any literature that links desertification with local atmospheric circulation changes hence it s not included in this figure.
19042	21	12	21	12	Change "by" to " Through " ? [Azziz Hirche, Algeria]	Accepted.
20640	21	14	21	14	Please consider adding the following section after "...frequency of these events": "Biological soil crusts have been shown to effectively stabilize dryland soils and thus their loss upon intense land use and climate change can be expected to cause an increase in sand and dust storms (Rodriguez-Caballero et al., 2018; Field et al., 2010)". [Bettina Weber, Germany]	Accepted. (with small amendment)
20642	21	14	21	14	citations mentioned above: Rodríguez-Caballero, E., Belnap, J., Büdel, B., Crutzen, P., Andreae, M.O., Pöschl, U., Weber, B. (2018) Microbial surface communities on dryland soils endangered by global change. Nature Geoscience 11: 185-189. Field, J.P., Belnap, J., Breshears, D.D., Neff, J.C., Okin, G.S., Whicker, J.J., Painter, T.H., Ravi, S., Reheis, M.C., Reynolds, R.L. (2010) The Ecology of dust. Front Ecol Environ 8(8): 423-430. [Bettina Weber, Germany]	Accepted.
1584	21		21		In Figure 3.7, what happens to biodiversity? Is it biodiversity loss? [Rajesh Chintala, United States of America]	Rejected. Biodiversity feedbacks, other than those associated with structural vegetation change, are note discussed in this section. The biodiversity element is removed from the figure.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19460	21	11	22	13	This section should be modified with some more effects of mineral dust: "Deposition of Fe-rich dust material enhances the primary phytoplankton production and influences the carbon cycle through biogeochemical interactions of marine ecosystems. Alkaline dust material increases the pH of precipitation and reduces the frequency of acid rains. Saharan dust addition to low-alkalinity lakes has prevented them to become acidic during the late twentieth century. Elevated particulate matter concentrations during heavy dust outbreaks affect the human health and the dust concentration often exceeds the PM10 standards of the European Union. Severe dust storms have also a large impact on economy as these events can halt oil exploration and can lead to airport and harbour closures." [György Varga, Hungary]	Accepted. We agree that dust aerosols can have many wide ranging effects, however this section is focused on aerosol feedbacks to climate. A comment has been added to page 26 line 41 “The Sahara is also a major source of dust for the Mediterranean basin (Varga et al. 2014)”
9026	21	1		43	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. citations formatted according to style chosen by IPCC. No change made
26368	21	2			Figure 3.7 is too conceptual and schematic, very textbook-like, it does not provide an assessment or indicate new information that arose from this chapter [Hans Poertner and WGII TSU, Germany]	Rejected. Figure 3.7 provides a conceptual framework for section 3.4. It visualizes the many interactions discussed in section 3.4 where they are assessed in the text. It is entirely new and was created for the chapter. No change made.
19550	21	6			Please, remember the source of the figure [Ibouraïma Yabi, Benin]	Noted. This is an original figure.
9028	21	43			31-46 t C.ha-1, -1 superscript please. -2 wrong alos space betwee t and C [Amanullah Amanullah, Pakistan]	Accepted.units kept consistent with rest of document
11424	21				Figure: in each text box please use a larger, more visible symbol for the up/down arrows↑↓(Unicode(hex) character code 2191 and 2193). There should be an additional arrow pointing from Vegetation change to Biodiversity. [Debra Roberts, South Africa]	Noted. They are the arrows being used. In order to make them larger a different font has been chosen. As biodiversity is not discussed in this chapter section it has been removed from the figure.
10872	22	3	22	13	What is your assessment of these studies? [Debra Roberts, South Africa]	Accepted. Assessment language added. There is high confidence in the negative relationship between vegetation grren-up and occureence of dust storms. High confidence that the semi-direct and indirect effects of dust would tend to decrease presipitation. But low agreement between studies that quantify the combined overall effect of dust on desertification.
11426	22	4	22	5	Please double-check apparent conflict between this text and Chapter 2, page 76, par 1-2. [Debra Roberts, South Africa]	Rejected. Chapter 2, page 76, par 1-2 discuss observed changes in dust emissions. Here we discuss the impact of desertification on dust emissions (and climate). There is no conflict.
5020	22	4	22	5	The sentence 'Desertification can decrease the amount of green cover..' is somewhat self-evident from the sentence before it. Unless an additional meaning is intended - which is not clear. [Eamon Haughey, Ireland]	Rejected. This sentence goes from the general case of the previous sentence to the specific case for desertification. No change made.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19462	22	14	22	22	There are several other important effects of mineral dust on soil formation even far from the source areas: "Saharan dust input to the Mediterranean Basin has been playing a significant geological role as a source of parent material for terrestrial aeolian deposits (e.g. loess), soils (e.g. red Mediterranean soils) and deep sea sediments. Major role of Saharan dust addition in the formation of soils have been reported from several sites around the Mediterranean: MacLeod (1980) used grain size analyses to support an aolian origin of soils in Greece; Durn et al. (1999) concluded that terra rossa in Croatia was developed from dust deposits based on clay minerals and geochemical indicators; Genova et al. (2001) investigated red soils in Sardinia to infer an aeolian origin, while Jackson et al. (1982) identified windblown dust as a parent material of soils in Italy, as did Nihlén and Olsson (1995) in Crete, Atalay (1997) in Turkey, Jahn et al. (1991) in Portugal, in Hungary by Varga et al. (2016). According to the immobile trace element analyses of Muhs et al. (2010) in Majorca, the addition of Saharan dust was a dominant factor in the formation of red soils in the area. Jordanova et al. (2013) studied relict terra rossa soils in Bulgaria and their measurements of trace and rare element content and magnetic data suggested a North African aeolian contribution during the soil formation." [György Varga, Hungary]	Accepted.This section is focused on desertification feedbacks to climate – not on soil formation. Nevertheless, a sentence is added connecting the Sarahan dust to the Mediterranean basin. “The Sahara is also a major source of dust for the Mediterranean basin (Varga et al. 2014)”
19464	22	14	22	22	Saharan dust material identified in the Mediterranean Basin occasionally spreads further north and could be observed several times in a year also in other northern parts of Europe. See in more detailed: Varga, Gy., Kovács, J., Újvári, G. (2013) Analysis of Saharan dust intrusions into the Carpathian Basin (Central Europe) over the period of 1979-2011. Global and Planetary Change 100. pp. 333–342.; Varga, Gy., Újvári, G., Kovács, J. (2014). Spatiotemporal patterns of Saharan dust outbreaks in the Mediterranean Basin. Aeolian Research 15. pp. 151–160. [György Varga, Hungary]	Accepted.Varga et al (2014) is now referred to. “The Sahara is also a major source of dust for the Mediterranean basin (Varga et al. 2014)”
10874	22	21	22	22	By how much does these contribute to ocean cooling? If there are no studies that have quantified or estimated the contributions to ocean cooling, this has to be stated. [Debra Roberts, South Africa]	Accepted.A quantitative estimate is now provided. “with the tropical North Atlantic mixed layer cooling by over 1°C (Evans et al., 2009)”
7554	22	30	22	31	In the Sentence " The hypothesis that changing surface albedo in dryland regions will feedback on the local climate has been around since at least Charney et al. (1975) ", the reference " Charney et al. (1975)" should be (Charney et al. (1975)) or (Charney et al., 1975) [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Noted. citations formatted according to style chosen by IPCC. No change made
23826	22	41	22	42	Needs a reference [Abdellatif Khattabi, Morocco]	Accepted, added.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20644	22	41	22	46	As suggested in my comments above, biological soil crusts need to be introduced much earlied within this chapter. Thus I would suggest to restructure this section in the following way: "Recent work has also found albedo in dryland regions to be influenced by widely occurring biological soil crusts, as cyanobacteria, forming a key component, contain the sunscreen metabolite scytonemin, which may cause an increase of soil surface temperatures by up to 10°C (Couradeau et al., 2016). Changing climatic conditions have been suggested to cause alterations of albedo of up to 30%, which may trigger surface albedo feedback processes (Rutherford et al., 2017). [Bettina Weber, Germany]	Noted. Biological soil crusts are now introduced earlier in this section as per your previous comments. No change made here.
20646	22	41	22	46	citations mentioned above: Couradeau, E., Karaoz, U., Lim, H.C., Nunes da Rocha, U., Northen, T., Brodie, E., Garcia-Pichel, F. (2016) Bacteria increase arid-land soil surface temperature through the production of sunscreens. Nature Communications 7: 10373. Rutherford, W.A., Painter, T.H., Ferrenberg, S., Belnap, J., Okin, G.S., Flagg, C., Reed, S.C. (2017) Albedo feedbacks to future climate via climate change impacts on dryland biocrusts. Scientific Reports 7: 44188. [Bettina Weber, Germany]	noted
2288	22	43	22	44	Complete this sentence to make clearer the statement. Incomplete. [María Almagro Bonmatí, Spain]	Rejected. Sentence is complete. No change made.
26372	22	45	23	2	the way I read this is that changed surface albedo has reduced radiative forcing - is this the message you wish to convey? Or should it be “increased” rather than "decreased"? [Hans Poertner and WGII TSU, Germany]	Noted. Yes, that is the message.
9030	22	4		34	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. citations formatted according to style chosen by IPCC. No change made
26370	22	35			Please specify where these dryland regions are [Hans Poertner and WGII TSU, Germany]	Rejected. These dryland regions are in North Africa as stated in the previous sentence. No change.
23828	23	9	23	10	Needs a reference [Abdellatif Khattabi, Morocco]	Noted, text deleted during revision.
26418	23	22	23	25	please provide references for these statements [Hans Poertner and WGII TSU, Germany]	Accepted.References added
25760	23	25	23	25	ould you give an indication of value range for low biomass in previous sentence for comparison? [Hans Poertner and WGII TSU, Germany]	Accepted.An additional sentence is added providing a range and associated references
19424	23	28	23	29	I suggest to add "from fire" after "increase of q-CO2 due to stress of soil microorganisms" after "from fire". [José João Souza, Brazil]	noted
5022	23	28	23	32	A very interesting point. But would it be fair to say that this reduction in fuel loads fulfilled by biomass prior to desertification may be replaced with increased fossil fuel use? In which case the net effect on GHG emissions could in fact be worse off. A similar argument could be made regarding food production. - It may be worth expanding this to give more balance. [Eamon Haughey, Ireland]	Noted. This chapter section is focused on the physical feedbacks of desertification to climate. Human responses are covered in section 3.7

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26376	23	30	23	35	please indicate the calendar years for these two studies to clarify over which years the "50-70 year" period took place [Hans Poertner and WGII TSU, Germany]	Accepted. Time period added. “1936 – 2001” and 50-70 years calibrated to 50-65 years
26378	23	31	23	35	tCha1 - this unit is not commonly known outside the community and should be explained at first mention or included in a list of units in the annexes if applicable [Hans Poertner and WGII TSU, Germany]	Accepted. explanation added 2 paragraphs earlier
3366	23	32	23	32	This over exploration and social pressures. Ignorance war and drought. For example the growing population of the entire rural areas is increasing and the productivity of the land is decaling. Perennial grasses shrubs and trees are becoming relatively scarce, soil erosion is common and soil fertility is decreasing. Other than population density. Socio economic and political situations showed the inadequacy of the strategies to half land degradation. [Nagla Hamadain, Sudan]	Noted. This chapter section is focused on the physical feedbacks of desertification to climate. Human responses are covered in section 3.7
3368	23	32	23	32	The consequences of desertification are land degradation in the form of depletion of vegetative cover lack of healthy crops. And less of economic and biological productivity of the arable lands. Forests rangelands, this occurs through exposure of soil surface to wind and water erosion and through Stalinization and water logging leading to deterioration of physical , chemical and biological soil properties. The people themselves begin to suffer when food and water supplies become threatened. In the worst cases they reduce famine – mass migration and poverty. Over 250 million people are directly in affected by desertification and about one billion are at risk. [Nagla Hamadain, Sudan]	Noted. This chapter section is focused on the physical feedbacks of desertification to climate. Human responses are covered in section 3.7
19426	23	42	23	42	"may be dependent on annual rainfall" is impreciselly. Beside annual rainfall, soil moisture capacity of retain water depends on clay content, porosity system, clay activity, depth and quality of organic compounds. [José João Souza, Brazil]	Accepted.dependence on soil type is added
19696	23	44	23	44	……800 mm…… [Sabit Erşahin, Turkey]	Accepted.space added
19428	23	47	23	47	I suggest to add "because C:N ratio and % of organic fractions are determinant of decomposition ratio after reference. [José João Souza, Brazil]	Rejected – it does not make sense to add the suggested text to the end of the sentence. It is not related to C:N rations or % of organic fractions.
9032	23	9			(UNCCD, 2014). Put comma [Amanullah Amanullah, Pakistan]	Rejected. There is no such reference here.
26374	23	12			I would suggest including terms such as “livestock” or “domestic and wild ruminants” in combination with enteric fermentation for better understanding [Hans Poertner and WGII TSU, Germany]	Accepted.
19698	24	4	24	5	……..is considered to be the principal determinant…… [Sabit Erşahin, Turkey]	Accepted.Corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19324	24	10	24	10	3.5.1.1. Impacts on Nature's Contributions to People in Drylands'could be change to simply 'dryland'or 'dryland agro-ecosystems'; aspect of NCP does not feature prominantly here [Binaya Raj Shivakoti, Japan]	Accepted: See the answer to the 11430 comment
19322	24	12	24	14	The ecosystem services in drylands are vulnerable to the impacts of climate change due to higher variability in precipitation and low soil fertility (Enfors and Gordon, 2008; Mortimore, 2005)'not clear because it is not mentioned how dryland ecosystems will be affected by CC impacts as precipitation variablity and low soil fertility is the natural characteristic of dryland. Similarly beginign sentence on MEA could be safely deleted. [Binaya Raj Shivakoti, Japan]	Accepted: The ecosystem services in drylands are vulnerable to the impacts of climate change due to high variability in temperature, precipitation and soil fertility
20698	24	13	24	13	I suggest higher climate (Precipitation and temparature) variability, because some species maybe rather more sensitive to temparature than rainfall [Mahamadou Laouali Amadou, Niger]	Accepted
23830	24	16	24	16	The provisionning of services OR the services of provisionning? [Abdellatif Khattabi, Morocco]	Accepted: the services of provisionning.
3190	24	16	24	30	A quantitative assessment of desertification impacts on NPP, a fundamental ES, is presented by Zika M, Erb KH (2009) The global loss of net primary production resulting from human-induced soil degradation in drylands. Ecological Economics 69:310–318. Their findings could be mentioned here. [Karlheinz Erb, Austria]	Accepted: We add the following sentences: For example, Zika and Karl-Heinz (2009) reported a rough estimation of NPP losses between 0.8 and 2.0 Pg C yr-1 due to dryland degradation, comparing the potential Net Primary Productivity (NPP) and the NPP calculated for the year 2000 estimated.
26380	24	23	24	24	reference needed [Hans Poertner and WGII TSU, Germany]	Accepted
26506	24	25	24	26	If this statement is using IPCC uncertainty language, please italicise “robust evidence” and state the level of agreement according to the guidelines for the IPCC calibrated language [Hans Poertner and WGII TSU, Germany]	Accepted
20694	24	31	24	31	Please provide these crops if possible [Mahamadou Laouali Amadou, Niger]	Accepted, examples of crops are listed in the next sentence. ps that could be affected but statement qualified for clarity to indicate that it is the rainfed crops that will be impacted most
6902	24	31	24	31	Is the use of the certainty qualifier appropriate? [Wilfran Moufouma Okia, France]	Noted. Yes, it is a widely accepted fact that the anticipated climate change induced increased temperature coupled with un-reliable and variable precipitation; and desertification will ultimately lead to reduced crop yields particularly in rainfed agriculture areas
20692	24	31	24	39	Since the paper is not specifying which element of climate change it is talking about, iI am wondering we will be talking about same climate stimuli while saying two different broad system (cc and desertification) [Mahamadou Laouali Amadou, Niger]	Noted. The papers cited here use a number of models of climate change and scenarios, specifying the details of these models in each case will make the chaoter unnecesarily cumbersome. Intereted readers are referred to the publications themselves.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20696	24	38	24	38	same comment as abov [Mahamadou Laouali Amadou, Niger]	Noted. The papers cited here use a number of models of climate change and scenarios, specifying the details of these models in each case will make the chaoter unnecesarily cumbersome. Intereted readers are referred to the publications themselves.
2294	24	40	24	45	I would mention land-use change as the most important driver of SOC losess [María Almagro Bonmatí, Spain]	Accepted: We rewrote these sentences as: Drivers of soil degradation, mainly by land-use change, include a reduction in SOC and organic matter input into soil
19430	24	45	24	45	I suggest to add "quality of organic compounds, clay content and soil strucutre" after reference. [José João Souza, Brazil]	Rejected: This suggestion has no clear context in this sentence: "and intensive grazing (Sharkhuu et al., 2016)
26382	24	34	25	10	these last two paragraphs do not correspond with the paragraph heading much - how do these effects affect people in drylands? [Hans Poertner and WGII TSU, Germany]	Acepted, the text in paragraph heading clarified.
19642	24	7	31	15	This section could benefit by inclduing a BOX on special case of SAHEL buiding on the results presented in CILSS (2016). Landscapes of West Africa – A Window on a Changing World. U.S. Geological Survey EROS, 47914 252nd St, Garretson, SD 57030, UNITED STATES. [Abou Amani, France]	Rejected: Thanks for the suggestion, but the boxes of special cases were defined in the context of complete chapter.
26846	24	7	31	32	Many parts of Section 3.5 mixes historical impacts and future projections. As in previous IPCC reports, separating historical impacts and future projections provides a more accurate assessment of the scientific findings, since historical impacts are based on actual measurements while future projections come from modeling with higher uncertainties. Therefore, keep the material on historical impacts in section 3.5 and place material on future vulnerabilities in Section 3.6. [Patrick Gonzalez, United States of America]	Accepted, relevant paragraphs moved to future imapct projections.
9034	24	4		11	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted
11428	24	6			Summary of section 3.4 The role of termites need to be mentioned. Ants and termites make up something like 25% of total animal biomass, and in the African savannah for instance they consume more than all large herds of vertebrates put together. They are responsible for transporting organic carbon material underground. [Debra Roberts, South Africa]	Rejected: not supported by the peer-reviewed published literature.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11430	24	10			Introduction: before discussing ecosystem services, a general statement would be in order, to the effect that ecosystems and the biodiversity they contain are the foundation of life on earth, within which humans exist, and that, apart from the direct benefits humans gain from them, healthy ecosystems underpin our very existence. One page (25-26) on plant and animal biodiversity seems hardly enough to do justice to this fact. Wherever possible, i.e. wherever the discussion does not focus on the specific human benefit derived from them, “ecosystem services” should be replaced with “ecosystems”, or at least “ecosystems and their services”. It may seem like a fine distinction, but this distinction is important. [Debra Roberts, South Africa]	Accepted: The title of this section was changed as the reviewer suggested: Impacts on Ecosystem and their services Services in Drylands
2290	24	17			Writte "Hopkins and Del Prado, 2007" [María Almagro Bonmatí, Spain]	Accepted: We add the following sentences: For example, Zika and Karl-Heinz (2009) reported a rough estimation of NPP losses between 0.8 and 2.0 Pg C yr-1 due to dryland degradation, comparing the potential Net Primary Productivity (NPP) and the NPP calculated for the year 2000 estimated.
9036	24	18		19	remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted
19224	24	40			In cultivated Arenosols (sandy soils) <200mm rainfall the production of biomass (wood truncks, roots) is almost equivalent to the carbon storage in a soil 80cm deep. The only way to store carbon in these environment is the production of biomass. The storage in sandy soils is really disappointing. [Pascal Podwojewski, France]	Accepted: We add to the sentence: biomass: the form of biomass and soil organic carbon (SOC). Additionally, in the dryland a soil with fine texture are founded in agriculture plots as a Calcisols and Gypsisols.
2292	24	42			I WOULD SAY "Driver of soil degradation and loss of SOC include reductions in organic matter inputs into soil". Also change the reference by Martinez-Mena et al 2008 to Almagro et al 2010, more adequate within this context, and move the reference by Martínez-mena et al 2008 to the following sentence, after the one by Laave et al 1998, since this study is focused on erosion rates and related OC lossess under different land uses. The reference by Almagro et al 2010 is: Almagro, M., López, J., Boix-Fayos, C., Albaladejo, J., Martínez-Mena, M., 2010. Belowground carbon allocation patterns in a dry Mediterranean ecosystem: A comparison of two models. Soil Biology and Biochemistry 42 (9), 1549-1557 [María Almagro Bonmatí, Spain]	Accepted
25762	25	2	25	2	Could you give some context to this figure? eg % carbon sequestration globally or anthropogenic CO2?? [Hans Poertner and WGII TSU, Germany]	Accepted. text added "which is ~37% of 2017 fossil fuel carbon emissions (Le Quéré et al., 2018)."
23832	25	4	25	4	the principal instead of the principle [Abdellatif Khattabi, Morocco]	Accepted
10154	25	4	25	4	Replace principle with principal [Lizzie Mujuru, Zimbabwe]	Accepted
19432	25	4	25	5	Soil water avaibility depends on field capacity, clay content, wilting coefficient, connectivy of pores and precipitation. [José João Souza, Brazil]	Accepted: See answer to 966 coment

Comment No	From Page	From Line	To Page	To Line	Comment	Response
966	25	4	25	17	I am not sure about these arguments. In dryland ecosystems soil moisture is the key parameter driving the CO2 emissions from soil. Higher soil moisture leads also to a higher SOC decomposition rates (since in drylands eg. Mediterranean area, the temperatures are usually relatively high). The combination of high temperatures with high soil moisture can increase the CO2 flux from soil especially in those drylands affected by high temperatures. Most of the precipitations are not regular, but are in form of storms, which lead to a CO2 emission peaks and not to a relatively high vegetation growth. Therefore, I strongly disagree with authors when saying that higher precipitations in drylands lead always to a higher C sequestration. [Jose Luis Vicente Vicente, Germany]	Accepted. The results showing in these sentences are supported by the references cited in the text. However, we are agreeing with the reviewer that the soil moisture is the key factor, which in turn it is strongly affected by rainfall patterns. Therefore, we rewrote the first sentence: “Precipitation by affecting soil moisture content rather than changes in temperature is considered to be the principle determinant of the capacity of drylands to sequester carbon.
14412	25	20	25	20	It would be good to indicate bush encroachment somewhere in this section [Rattan Lal, United States of America]	Rejected: The bush encroachment was mentioned in the study case of invasive plant species.
19326	25	25	25	27	why authors are relying on old 2002, 2005, 2007 citations as opposed to the role of the assessment to add value to AR5 . Suggested deletion or use more recent citation (at least after 2014) or no citation at all. [Binaya Raj Shivakoti, Japan]	Accepted: We add new sentences relating to R5 assesment
17202	25	31	25	31	Th use of the figures related o the number of plants species that may go extint needs some caveats owing to limitations due to the inherent uncertainty of the models used. Please, see Araujo, M.B. and A.T. Peterson, 2012: Uses and misuses of bioclimatic envelope modeling. Ecology, 93(7), 1527-1539. See also the relevant chapter in AR5 where a rather precautionary approach was taken and no number was provided for species at risk. [Jose Manuel Moreno Rodriguez, Spain]	Accepted: We add the following sentences: However, these predictions had low confidence, because these bioclimatic models predict risk of local extinctions, as well as predict no risk of local extinctions depending of model assumptions (Araújo and Peterson, 2012; Steele et al., 2014).
19700	25	31	25	31	.....that between 7% and 24% of..... [Sabit Erşahin, Turkey]	Accepted
19328	25	31	25	36	Again 2006 citation is used, better to supplement with recent fact or mention that further studies to be carried out to gain a fresh understanding. [Binaya Raj Shivakoti, Japan]	Accepted: We add the following sentence: therefore, it is required more recently studies for improve these future predictions.
25764	25	33	25	33	how does this relate to the 7-24% of species ? eg does 2000 = 2% of plant species or more or less? [Hans Poertner and WGII TSU, Germany]	Accepted: We deleted the follwing sentence: "it is estimated that between 7%-24% of the plant species", for this reason the link has no sense
7556	25	34	25	36	It should have a "," at the end of the sentence " Furthermore, it is suggested that climate change could cause the loss of 17% of species within shrubland and 8% within hot deserts by 2050 (van Vuuren et al., 2006), " [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted
18854	25	34	25	36	these section is about the Impacts of Desertification on Natural and Socio-Economic Systems under Climate Change over the past years, so "Furthermore, it is suggested that climate change could cause the loss of 17% of species within shrubland and 8% within 36 hot deserts by 2050",these should be put into section 3.6.2. Future Projections of Impacts [Jianguo Wu, China]	Accepted, moved

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19702	25	36	25	36	…….by 2050 (van Vuuren et al., 2006). A global survey……. [Sabit Erşahin, Turkey]	Accepted
6452	25	40	25	48	In central Sudan (ELRAWAKEEB Area) about 18 different seed bank species were identified of which 16 species are annuals and only 2 soecies are parenials (no seeds for trees or shrubs. This means trees may not grow again even after heavy rains [Mustafa Elhag, Sudan]	Rejected: If the trees represent a relic that settled during favorable periods on deeper soils, such as the Atlas Pistachio, in North Africa, they can not currently re-colonize the soil, even if the rainfall is more favorable. On sandy soils, however, as in the Sahel, the planting of shrubs is relatively easy, especially shrubs of poor pastoral quality, such as Leptadenia pyrotechnica which becomes even invasive. On the other hand, the installation of more noble trees like the Baobab remains more difficult but not impossible, as long as the soil has not encrusted".
26394	25	12	26	21	This section 3.5.1.2 is great and nicely structured; however, it is quite specific to Africa; could it be more regionally inclusive with literature from other continents / localities affected by desertification? The lenght of this section could also be extended [Hans Poertner and WGII TSU, Germany]	Accepted: We add the uncertainty langue in the following sentences: Page 25L14-15: These results suggest that arid ecosystems could be an important global carbon sink depending on soil water availability (high agreement with medium evidence). Page 25L31: It is high agreement that the main drivers of species extinctions are land use change, habitat pollution, overexplotation, and species invasion, while the climate change is less linked to species extinctions (Settele et al. 2014). Page 25L36: However, these predictions had low confidence, because these bioclimatic models predict risk of local extinctions.
26510	25	12	26	21	Please make use of uncertainty language in this section. [Hans Poertner and WGII TSU, Germany]	Accepted: we add the following sentence in Page 25 L29: "…(Observatoire du Sahara et du Sahel, 2013), as well as the drought and overgrazing led to loss of biodiversity, surviving only the drought-adapted species on arid rangelands in Pakistan (Akhtar and Arshad, 2006). Similarly, plant species richness decreased from1994 to 2013 in a desert steppe in Mongolia by the summer temperature increment (Khishigbayar et al., 2015)". However, the main scientific studies on biodiversity degradation concern to the African continent, because desertification is very important environmental problem in the African countries. Therefore there are few recently peer-reviewed published literature.
18858	25	19	26	28	there are no clear review on the impacts of desertification on the biodiversity under the climate change over the past years,suggesting rewrite the section by adding enough literatures [Jianguo Wu, China]	Rejected : the main drivers of species extinctions are land use change, habitat pollution, overexplotation, and species invasion, while the climate change is less linked to species extinctions (Settele et al. 2014),but these effects can exacerbate with Climate Change. Therefore, this comment is not supported by the peer-reviewed published literature.
9038	25	9			remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted. Fixed
9040	25	13			remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9042	25	13			Lei et al. (2011), put full stop after et al when out side bracket, no need of comma here [Amanullah Amanullah, Pakistan]	Rejected: We can not find this reference Lei et al. (2011)
9044	25	22			remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted.
26384	25	24			within 100 years starting when? Please specify [Hans Poertner and WGII TSU, Germany]	Accepted: We deleted this sentences, see answer to 19326 reviewer comment
26386	25	26			Please provide timeline and likelihood for this extinction projection [Hans Poertner and WGII TSU, Germany]	Accepted: We add this timeline prediction: within 100 years starting 2004
9046	25	32			Salado et al. (2012), remove first name and remove space before 2012 inside brackets [Amanullah Amanullah, Pakistan]	Rejected. this references it is not in this sentence
26650	25	36			insert full stop after citation [Abiud Kaswamila, United Republic of Tanzania]	Accepted
9048	25	43			remove first name [Amanullah Amanullah, Pakistan]	Accepted.
26390	26	1	26	21	Please avoid using the verb 'may', it hints at needing permission, and is very vague. Replace with 'can' or 'might' here and throughout the paragraph. [Hans Poertner and WGII TSU, Germany]	Accepted
18856	26	17	26	28	this paragraph should be removed, this section should be focus on the impacts of desertification on wildlife biodiversity under climate change, "opening of artificial waterholes…." is the measure of adaptation to climate change, and there is no necessary for this paragraph . [Jianguo Wu, China]	Accepted: This paragraph was deleted as reviewer suggested
7558	26	19	26	19	the term "the piosphere" may be "the biosphere" [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Rejected: This paragraph was deleted as reviewer suggested, see answer to 18856 coments
25766	26	19	26	19	what is piosphere, provide definition (maybe in brackets) [Hans Poertner and WGII TSU, Germany]	Accepted: This paragraph was deleted as reviewer suggested, see answer to 18856 coments
26392	26	19	26	21	Please specify where this was the case, e.g., “in managed conservation areas in Africa”, and over what time scale [Hans Poertner and WGII TSU, Germany]	Rejected: This paragraph was deleted as reviewer suggested, see answer to 18856 coments
24336	26	31	26	33	This section uses the framework of the SDGs but does not explain what the SDGs have to say on land degradation and desertification. We suggest that this section engages with SDG target 15.3. [Barron Joseph Orr, Germany]	Accepted. The text was revised elaborating in more depth the links to SDG target 15.3. Since this chapter is not about desertification per se, but about the interactions of desertification and climate change, our discussion is shaped by these interactions, rather than those aspects which may be particular to desertification alone. Moreover, interactions between desertifiation-climate change will have substantial impacts on the attainment of SDGs. A major purpose of this section is to assess which, how and to what extent desertification-climate change interactions affect the SDGs.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19330	26	40	26	40	Better to avoid statements like 'Naturally, this is a simplification of a myriad of relationships between and within SDGs', IPCC must be definitive on what is being written and proposed. Using vague approach and arranging SDG goals should not be the task of IPCC. [Binaya Raj Shivakoti, Japan]	There are two separate comments here. 1) the language: we accept that we need to avoid ambigous language, so the text was revised accordingly. At the same time, we remind that we cannot be definitive on each aspect we write about, but we need to use IPCC calibrated language in order to convey the associated uncertainty. 2) SDGs are the major international policy goals, and the interactions between climate change and desertification will have substantial impacts on their attainment. As authors, we feel it is our obligation, to provide to policymakers the assessment of the science on how desertification-climate change intercations affect the SDGs. So we need to reject this suggestion.
26514	26	23	31	23	section 3.5.2 needs to improve / correct use of IPCC calibrated language [Hans Poertner and WGII TSU, Germany]	Accepted. We revised the text to improve the text responding to other comments on this section. Since the reviewer did not point to the specific instance of incorrect use of IPCC calibrated language in this comment, we went through the section checking for any incorrect use fo IPCC calibrated language.
1746	26	30	31	32	Section 3.5.2. covers much ground but the authors might consider some of the many other impacts on society caused by sand and dust storms. These hazards are reviewed in Aeolian Research 24 (2017) 53–63. Of particular note for this publication is the impact on solar power potential, because of the negative effect of dust deposition on solar as a replacement for carbon-rich fuels. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. We have added a sub-section discussing on the impacts of dust stroms on solar power generation infrastructure.
9050	26	1			remove comma after et al. when outside brackets in whole document [Amanullah Amanullah, Pakistan]	Accepted. Fixed
11432	26	1			Only 4% of non-marine animals are vertebrates. Around 83% are insects, another 14% of other invertebrates. Vertebrate ‘Wildlife’ are largely insect eaters, and the plants they eat need insects for pollination. [Debra Roberts, South Africa]	Rejected: not supported by the peer-reviewed published literature. Actually, in the R5 there is no any references of CC effect on insect biodiversity in drylands (Mediterranean and Desert ecosystems).
26388	26	1			Please be specific: “Desert animal species”, not "Desert species" [Hans Poertner and WGII TSU, Germany]	Accepted
9052	26	26		37	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted. Done.
19332	27	6	27	10	Need reference for 'There is robust evidence however, that climate change is expected to exacerbate…….of conflict' [Binaya Raj Shivakoti, Japan]	Accepted. The following sections have the purpose of providing the assessment and references supporting this statement, providing all these references here supporting each of the aspects we mentioned in this sentence would take up several lines, so instead we included a reference to the following sub-sections discussing these in detail with the references for each of the nuanced element.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6008	27	10	27	13	Fig 3.8 seems oversimplified and does not reflect the rich text in the preceeding sections. Suggest rethinking the venn diagram in the centre which has desertification and climate change. As the authors write, there are a range of intereacting drivers of desertification that span social and ecological systems. All of these drivers also have impacts on the SDGs. Given this, the figure needs nuancing. [Chandni Singh, Myanmar]	Accepted, the figure was revised.
26652	27	11	27	12	Fig 3.8 needs editing. Peace, justice and strong institutions should read 6 instead as 16 [Abiud Kaswamila, United Republic of Tanzania]	Accepted, the figure was revised.
10876	27	11	27	12	The text in Figure 3.8 is quite blurry. It might be helpful to recreate each of the SDG to ensure that the texts are legible. [Debra Roberts, South Africa]	Accepted, the figure was revised.
19704	27	11	27	12	Increase the readibility of the figure contents. [Sabit Erşahin, Turkey]	Accepted, the figure was revised.
24338	27	11	27	13	In Figure 3.8, goal 6 on "clean water and sanitation" is missing and should be added to the first inner circle due to the link between desertification/land degradation and water scarcity. It should also be made explicit that, at the core of the figure, desertfication is embedded in SDG 15 (target 15.3) and that Climate Change is SDG 13. [Barron Joseph Orr, Germany]	Accepted, the figure revised, also taking into account other comments.
25492	27	11	27	13	The figure doesn't really work for me - not clear what the inner or outer circles represent or what relation is proposed between adjacent SDGs [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, the figure was revised.
5024	27	12	27	13	For more clarity the figure legend for Fig. 3.8 could explain in some detail the colour coding intended by the circles in the schematic and how they relate to the SDG goals positions. [Eamon Haughey, Ireland]	Accepted, however, the figure was revised entirely following other comments.
1586	27		27		Figure 3.8 seems incomplete and not easy to comprehend. This figure needs to be revised for easy to follow [Rajesh Chintala, United States of America]	Accepted, the figure was revised.
19552	27	13			Recall the source of the figure and improve its readability [Ibouraïma Yabi, Benin]	Accepted, the figure was revised.
9054	27	28		40	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
2296	27				The quality of figure 3.8 could be improved [María Almagro Bonmatí, Spain]	Accepted, the figure was revised.
19334	28	4	28	5	Negative impacts of climate change on agricultural productivity contribute to higher food prices, especially since food demand will grow due to growing population and incomes', I seems more of distruption in food supply chain and has nothing to do with growing population and incomes which will anyway increase food demand and eventually lead to increase in prices when supply could not be boosted any further (even without climate impact). [Binaya Raj Shivakoti, Japan]	Noted. The studies we assessed indicate that climate change impacts per se (without additional effect from population and income growth) can put upward pressure on food prices. Population and income growth will amplify this effect (hence the use of the qualifier "especially").

Comment No	From Page	From Line	To Page	To Line	Comment	Response
18860	28	5	28	8	this section should be focused on the impacts of desertification on Food and Nutritional Insecurity under climate change over the past years," The misbalance between supply and demand for agricultural products will likely increase agricultural prices in the range of 31.2% for rice to 100.7% for maize by 2050 (Nelson et al., 2010), and cereal prices in the range of a 32% increase to a 16% decrease by 2030 (Hertel et al., 2010)." , is the projection in future.So, the sentences about The misbalance between supply and demand for agricultural products will likely increase agricultural prices in the range of 31.2% for rice to 100.7% for maize by 2050 (Nelson et al., 2010), and cereal prices in the range of a 32% increase to a 16% decrease by 2030 (Hertel et al., 2010). should be removed to section 3.6.2. Future Projections of Impacts [Jianguo Wu, China]	Accepted, need revision done.
19336	28	17	28	18	need citation whenever the word strong evidence is used [Binaya Raj Shivakoti, Japan]	Accepted. Done.
25494	28	17	28	22	This section also needs to look at other drivers of food insecurity - encroachment on and fragmentation of traditionally-held rangelands by external land-users (ranches, irrigated agriculture, protected areas), inappropriate sedentarisation policies, and conflict [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. These issues related to the desertification-climate change impacts on pastoral communities were highlighted in a separate new sub-section.
10156	28	17	28	22	you could add supporting literature e.g. Mendelsohn R. (2008) The Impact of Climate Change on Agriculture in Developing Countries, Journal of Natural Resources Policy Research, 1:1, 5-19, DOI: 10.1080/19390450802495882 [Lizzie Mujuru, Zimbabwe]	Accepted. Done.
19338	28	18	28	20	need citation to specify 'which local studies' [Binaya Raj Shivakoti, Japan]	Accepted. Done.
6454	28	25	28	26	This vicious circle could be broken only by alternative livelihoods [Mustafa Elhag, Sudan]	Noted. This is also consistent with our assessment. Alternative livelihoods feature prominantly and structure our discussion of socio-economic and policy reponses later in the chapter.
19340	28	32	28	33	There is growing evidence on climate change impacts on poverty (Hallegatte and Rozenberg, 2017)' it is misleading as the readers might take it as due to desertification, suggested deletion as it is appropriate if a report on CC and poverty is written. [Binaya Raj Shivakoti, Japan]	Rejected. Being fully aware that this chapter is about the interaction of desertification-climate change, and not about desertification/climate change alone, we focus our discussion on these interactions. However, literature specifically studying joint impacts of desertification-climate change on poverty is absent. So in order to make a policy relevant assessment, we also need to look into studies of climate change on poverty. We believe our phrasing and subsequent text makes it clear that we are discussing about climate change impact, but still we revised the text accordingly to avoid any perception of being misguided.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10158	28	33	28	38	Incorect citation. The correct citation should be: Hertel TW, Burke MB and Lobell DB. 2010. The poverty implications of climate-induced crop yield changes by 2030. Global Environmental Change 20(4): 577-585. Apart from that, rephrase the statement and put it into a more meaningful form. [Lizzie Mujuru, Zimbabwe]	Acceted, corrected and text revised.
19342	28	33	28	39	Not directly relevant and could be deleted whole of 'Under Scenarios of ……..buyer or seller' [Binaya Raj Shivakoti, Japan]	Rejected. See our response to your similar comment 19340
2508	28	43	28	43	Why is this surprising? I suggest authors avoid subjective statements. [William Lahoz, Norway]	Accepted, the word "surpisingly" dropped.
9056	28	6		41	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
26508	28	10			is "robust evidence" intended as IPCC calibrated language? If so, it should be italicised and accompanied by an index of agreement. [Hans Poertner and WGII TSU, Germany]	Accepted.
11434	28	32			Please state clearly where the discussion moves from real life evidence / observations to results from modelled scenarios. Please look out for this throughout the report. Eg pg 31, line 38: should be “modelling studies”. Or pg 32, line 14: does “regional studies” refer to regional observations or regional modelling? [Debra Roberts, South Africa]	Accepted. Done. We also more clearly distributed text on observed changes, impacts (section 3.5,) and projected, modeled ones (section 3.6)
19344	29	11	29	11	A starting sentence mentioning the link between desertification and dust/health impact may be necessary under 3.5.2.3 Dust Storms and Human Health [Binaya Raj Shivakoti, Japan]	Accepted. Text revised.
14414	29	11	29	11	Add animal health besides human health [Rattan Lal, United States of America]	Rejected, no scientific evidence/publications provided to support the changes suggested by the reviewer.
9678	29	12	29	15	Atmospheric dust is a major element of the Saharan and Sahelian environments. The Sahara is the world’s largest source of airborne mineral dust, and according to some estimates, up to one billion tonnes of dust is exported from the Sahel-Sahara region annually (varying year to year), (Andreae, 1995; Duce, 1995; D’Almeida, 1986). It can be transported large distances, traversing northern Africa and adjacent regions and depositing dust in Europe, Western Asia and the Americas (Moulin et al., 1997). [Nadji Tellro Wai, Chad]	Noted. This is also in line with what we have written.
9676	29	18	29	19	and the sahara Desert (Bodele) [Nadji Tellro Wai, Chad]	Noted. In fact, we do mention the Sahara desert.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19066	29	33	29	50	please add this 2 paragraghe about health effect dust storm in Middle East:The percentage of all-cause deaths attributed to fine particulate matter in Iranian cities affected by Middle Eastern dust storms (MED) were 0.56-5.02%, while the same percentage for non-affected cities were 0.16-4.13% (Hopke et al., 2018). In case of lung cancer deaths, the percentage of deaths attributed to fine particles in MED-affected cities were between 13.74% and 26.47%, that was higher than those for cities with anthropogenic air pollution (Hadei et al., 2017). The health effects of particulates in dust and non-dust days could be different. More stronger and significant effects are reported in epidemiological studies during dust days (Ma et al., 2016; Ma et al., 2017; Neophytou et al., 2013; Perez et al., 2012). This is possibly due to the different chemical composition of particulate matter. Crustal elements such as Al, Si, Fe, Mn, Ca, and Na are the major components of PM10 and TSP on dust days (Lovett et al., 2018; Shahsavani et al., 2012a; Shahsavani et al., 2012b; Shahsavani et al., 2017). The major components of particles were crustal elements, organic carbon, total ions, and elemental carbon in dust (Ashrafi et al., 2018; Sowlat et al., 2013; Sowlat et al., 2012), secondary inorganic aerosol, followed by organic matter, and mineral dust at urban sites, and secondary inorganic aerosol, followed by mineral dust and sea salt at an industrially influenced site (Hama et al., 2018). Toxicological studies about the effect of dust and non-dust particles shows inconsistent results (Ghio et al., 2014; Jalava et al., 2016; Naimabadi et al., 2016), and more evidences are required for conclusion. References Ashrafi, K., et al., 2018. Source Apportionment of Total Suspended Particles (TSP) by Positive Matrix Factorization (PMF) and Chemical Mass Balance (CMB) Modeling in Ahvaz, Iran. Archives of Environmental Contamination and Toxicology. 75, 278-294. Ghio, A. J., et al., 2014. Biological effects of desert dust in respiratory epithelial cells and a murine model. Inhalation Toxicology. 26, 299-309. Hadei, M., et al., 2017. Estimation of gender-specific lung cancer deaths due to exposure to PM2.5 in 10 cities of Iran during 2013 - 2016: A modeling approach. International Journal of Cancer Management. 10, 13-21. Hama, S. M. L., et al., 2018. Chemical composition and source identification of PM10 in five North Western European cities. Atmospheric Research. 214, 135-149. Hopke, P. K., et al., 2018. Spatial and Temporal Trends of Short-Term Health Impacts of PM2.5 in Iranian Cities; a Modelling Approach (2013-2016). Aerosol and Air Quality Research. Jalava, P. I., et al., 2016. Chemical and microbial components of urban air PM cause seasonal variation of toxicological activity. Environmental Toxicology and Pharmacology. 40, 375-387.	Rejected, but thank you. We feel the informaton provided already covers the topic.
19346	29	41	29	41	In summary, there is high agreement on the negative health effects of dust storms on human health'not a new thing but is there a high agreement on increased dust storms and health due to climate change? [Binaya Raj Shivakoti, Japan]	Noted. The next sentence gives the answer to this question.
19348	29	42	29	42	I think this is the first time authors are using the statement ''...view of growing intensity, frequency and scale of dust storms due to climate change-desertification...'under this sub-heading. Reference also missing for such a strong statement. [Binaya Raj Shivakoti, Japan]	Accepted. References added.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19350	29	47	29	47	Under '3.5.2.4 Conflicts and Migration' in the first sentence it is better to clarify that 'climate change, with its interactions with desertification, is only a contributing factor to some conflicts in some regions' [Binaya Raj Shivakoti, Japan]	Noted. Our current phrasing is already consistent with your suggestion.
24340	29	48	30	27	Important references missing in this section: Mehta, V.M. (2017): Natural Decadal Climate Variability: Societal Impacts. CRC Press, Boca Raton, U.S.A., 326 pages; and Almer et al. 2017, Journal of Environmental Economics and Management, Water scarcity and rioting: Disaggregated evidence from Sub-Saharan Africa [Barron Joseph Orr, Germany]	Accepted. Included.
9058	29	4		40	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted, text revised.
19554	29	11		45	Independently of dust storms, desertification itself will have direct or indirect effects on health (modification of comfort indicators, appearance of pathogenic species, disappearance of species used for care, etc.). [Ibouraïma Yabi, Benin]	Noted. However, we could not find related literature, even though the points you are raising seem plausible. We will continue looking for related literature.
1742	29	12			The statement that 'The frequency of dust storms is increasing due to land use and climatic changes' is true for some parts of the world, but not all [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text revised.
1744	29	27			I think it is misleading to simply say that meningitis is common throught Africa. The Molesworth reference cited states clearly that 'the “meningitis belt” of Africa’s Sahel region has the greatest incidence of the disease' and this is the dustiest part of the continent. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text revised.
19466	29	31			Following the dust storm phenomena in IRAN, the number of people referring to hospitals has been increased in some days. Since 7 February 2016 more than 1346 people were taken to hospitals because of cardiovascular diseases, While 81 patients were admitted in medical ward. 22 cases were taken to CCU and 1089 were out patiently treated. 215 were taken to hospitals and 132 were treated just in site and at home. [Azadeh Khaman, Iran]	Noted. We can not include this particular information since the reviewer did no provide any sources, but this is consistent with our writing on health impacts of dust storms. We included another source on health impacts of dust storms in Iran.
2510	30	7	30	7	Unless a specific probability distribution can be associated with this phenomenon, I suggest replacing “probability” with “likelihood”. I suggest authors apply the same criterion elsewhere, e.g., Page 3-60, L. 11. [William Lahoz, Norway]	Accepted.
25768	30	12	30	13	Also, see Box 3.2, chapter 3 of the Special Report on global warming of 1.5C [Hans Poertner and WGII TSU, Germany]	Accepted. Relevant information included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25496	30	12	30	13	Say more, but also cross-check with Chapter 5 [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Additional informaton included, we also referred to the correspondign section in Chapter 5.
26512	30	16	30	19	A confidence statement using IPCC calibrated language could be appropriate here [Hans Poertner and WGII TSU, Germany]	Accepted. Done.
7560	30	20	30	20	this : " (Verhoeven, 2011) and Syria (De Châtel, 2014) ", should be "((Verhoeven, 2011) and Syria (De Châtel, 2014)) [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Rejected. We consider the brackets are well-placed.
26534	30	23	30	27	Various books by John Markakis, in particular "National and class conflict in the Horn of Africa" (reprinted 2012, but originally from the mid-80s) support this view. As does Adano, W. R., Dietz, T., Witsenburg, K., & Zaal, F. (2012). Climate change, violent conflict and local institutions in Kenya's drylands. Journal of Peace Research, 49(1), 65-80. For the Horn of africa, the sheer availability of small arms has been cited as a facilitator and trigger of conflict, specifically dating back to the end of the Amin regime in Uganda, see Mkutu in African Affairs https://academic.oup.com/afraf/article-abstract/106/422/47/194922. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Relevant information from recent sources incorporated.
6026	30	29	31	15	References linking migration and natural resource degradation: Singh, C., Rahman, A., Srinivas, A., & Bazaz, A. (2018). Risks and responses in rural India: Implications for local climate change adaptation action. Climate Risk Management. https://doi.org/10.1016/j.crm.2018.06.001 [Chandni Singh, Myanmar]	Rejected. The suggested reference does not fulfill our criteria. In the report, we include references that focus specifically on the link between climate change or land degradation and migration. In the suggested reference, only two paragraphs are devoted to migration. Also, these two paragraphs are purely descriptive, and the authors assume that migration is undertaken as a response to climate change - however, no care is taken to disentangle the impacts of climate change on migration from migration as a simple economic livelihood strategy.
6028	30	29	31	15	Key references on migration as adaptation: Scheffran, J., Marmer, E., & Sow, P. (2012). Migration as a contribution to resilience and innovation in climate adaptation: Social networks and co-development in Northwest Africa. Applied Geography, 33(1), 119–127. https://doi.org/10.1016/j.apgeog.2011.10.002 Gioli, G., Hugo, G., Costa, M. M., & Scheffran, J. (2016). Human mobility, climate adaptation, and development. Migration and Development, 5(2), 165–170. https://doi.org/10.1080/21632324.2015.1096590 Singh, C., & Basu, R. (2018). Moving in and out of vulnerability: interrogating migration as an adaptation strategy along a rural urban continuum in India (under review). The Geographical Journal. Jha, C. K., Gupta, V., Chattopadhyay, U., & Amarayil Sreeraman, B. (2017). Migration as adaptation strategy to cope with climate change: A study of farmers' migration in rural India. International Journal of Climate Change Strategies and Management, IJCCSM-03-2017-0059. https://doi.org/10.1108/IJCCSM-03-2017-0059 [Chandni Singh, Myanmar]	Rejected. Out of the suggested references, one (Singh & Basu, 2018) is not available online. The remaining three do not fulfill our criteria: Scheffran, Marmer & Sow (2011), even though tey mention migration as adaptation in the conceptual framework, they analyze only the role of migrants and remittances in local development projects, and the link between migration and climate change is not addressed in a straightforward way; Gioli et al. (2015) is not an original research article, but only an introductory article to a special issue; finally, Jha et al. (2017) uses only the descriptive statistics to estimate the relation between climate change and migration, which does not produce evidence strong enough to include in the report.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9060	30	1		43	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
1516	30	1			Considerable debate in PNAS on climate-drought-conflict-migration: See Hsiang and Meng 2014. [Billie Turner II, United States of America]	Accepted. Reference 'Hsiang & Meng, 2014' added.
9062	30	34			Fu et al. (2016), don't start sentence from brackets [Amanullah Amanullah, Pakistan]	Rejected. Reference Fu et al. not included in the text. Also, there is no sentence starting from brackets here.
10160	31	13	31	13	add ref to the ref list [Lizzie Mujuru, Zimbabwe]	Accepted. Included.
19706	31	25	31	25	.....north-western China and Lanzhou-Xinjiang..... [Sabit Erşahin, Turkey]	Accepted, revised.
25498	31	27	31	32	And East Africa - LAPPSET [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included.
26396	31	32	31	37	the second statement makes it seem as though all references here depend on the single ref in the previous sentence although that reference is newer than some of the second sentence. Was this intentional? [Hans Poertner and WGII TSU, Germany]	Rejected. It is not clear what the reviewer meant as the cited pages and lines (page 31 line 32 to page 31 line 37) do not contain such statements
2512	31	40	31	40	Perhaps authors could mention the role of Earth Observation, reanalyses and other long-term datasets (e.g., from the ESA CCI for soil moisture) in studies of the future evolution of desertification. [William Lahoz, Norway]	Rejected. The datasets mentioned do not include projections for the future which is the focus of this section.
25098	31	46	31	46	Asadi Zarch, 2017 was not found in the references.....it is one reference for 2015 [Sayed Masoud Mostafavi Darani, Iran]	Noted. It was listed in the text and references (page 68 line 37)
26398	31	28	32	36	There appears to be a regional imbalance here with China/Asia being the main representative - could you add more examples for other regions to increase regional balance. [Hans Poertner and WGII TSU, Germany]	Accepted. There are only few studies of future projections of desertification. We have included literature and examples of several places around the world, highlighting what specific region are they covering
14416	31	35	32	8	This should be shortly reflected in the Summary [Rattan Lal, United States of America]	noted
5504	31	37	32	14	It is noted that it is difficult to assess the impact of climate change on desertification, as several natural and anthropogenic variables interact with each other, causing its dynamics. That's correct! However, further (page 32, lines 1-14) it was claimed that due to climate change, the area of dry-lands should increase by about 10% by the end of this century. Accordingly, the risk of expanding the area of desertification increases. How to understand this conclusion: is it a characteristic of the contribution of a changing climate to the overall nature-human effect, or separately, the influence of the climate itself on the processes of desertification? [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted. The dryland expansion conclusion was based on faulty assumptions. This now pointed out in the text.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26848	31	34	34	6	Since Section 3.6 describes future projections, it should use the conditional voice and identify the emissions scenario of the projections. It should not use the definitive verb "will". Delete "will" and edit the text to say something like, "Under RCP8.5...temperatures would be ..." [Patrick Gonzalez, United States of America]	Accepted. Change made where appropriate
3862	31	35	37	17	It is true that the papers cited in this text claim that potential evapotranspiration will increase. So based on the extensive literature it is reasonable to assert high confidence in this statement. The key question is the impact of this change on desertification. The studies cited here all assume that desertification is projected to increase (also see point 1) because potential evapotranspiration increases faster than rainfall. This statement is not a prediction from climate models. Rather, the claim that desertification will increase is a prediction from an external off-line impact. Roderick et al (2015) first pointed out the divergence between estimates of future dryland expansion and the reality that the climate model output predicts greening over most of the world. The underlying cause is that the off-line impact models do not account for the increase in water-use efficiency of photosynthesis that is caused by an increase in atmospheric CO2. In contrast the direct climate model output does account for that effect. For example, direct climate model output projects greening of the drylands over the coming century (Greve et al 2017, Leomordant et al 2018). The same climate model output also predicts greening of many parts of the global drylands since the 1980s in agreement with satellite observations. So to retain the opening sentence of the Executive Summary (see point 1) you will need to explain why you have discarded satellite observations that show greening over the historic period (in agreement with climate model projections) (Donohue et al 2013, Zhu et al 2016) along with climate model outputs that project greening to continue over the coming century. REF: Roderick, M. L., P. Greve, and G. D. Farquhar (2015), On the assessment of aridity with changes in atmospheric CO2, Water Resources Research, 51(7), 5450-5463, doi:10.1002/2015wr017031. Greve, P., M. Roderick, and S. Seneviratne (2017), Simulated changes in aridity from the last glacial maximum to 4xCO2, Environmental Research Letters, 12(11), 114021. Lemordant, L., P. Gentine, A. S. Swann, B. I. Cook, and J. Scheff (2018), Critical impact of vegetation physiology on the continental hydrologic cycle in response to increasing CO2, Proceedings of the National Academy of Sciences.	Accepted. The offending sentence in the summary has been removed. The addditional references and related discussion is now included.
9064	31	3			Grunzweig et al., 2003, use small letters [Amanullah Amanullah, Pakistan]	Accepted.
25782	31	34			The risk section is sparse, where is the risk assessment under different scenarios? Limits to adaptation? [Hans Poertner and WGII TSU, Germany]	Noted. A short introduction explainig the key risk conceptts was added to this section
20750	32	4	32	6	Does this have implications whit what Europe is experiencing currently in terms of high canucules [Mahamadou Laouali Amadou, Niger]	Rejected.
10162	32	10	32	10	Cook et al 2014b?? [Lizzie Mujuru, Zimbabwe]	Noted. and corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23834	32	12	32	12	(Huang et al. 2016a) claim ...: may be : Huang et al. (2016a) claim [Abdellatif Khattabi, Morocco]	Accepted.
7562	32	12	32	12	This : " (Huang et al. 2016a) " should be " Huang et al. (2016a) [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted.
10164	32	12	32	12	Improper use of citation in text [Lizzie Mujuru, Zimbabwe]	Accepted.
19708	32	12	32	12	Huang et al. (2016a) claim that the..... [Sabit Erşahin, Turkey]	Accepted.
19710	32	29	32	29	Miao et al. (2015b) used a linear..... [Sabit Erşahin, Turkey]	Accepted.
25100	32	29	32	29	use ....change to used [Sayed Masoud Mostafavi Darani, Iran]	Accepted.
3866	32	29	32	33	Why use a correlation with rainfall and temperature to make projections of vegetation? This seems crude since the climate models actually do make projections about vegetation productivity? [Michael Roderick, Australia]	Accepted.
26400	32	29	32	36	Please ensure that the information presented here is streamlined with Chapter 4 (Degradation), to minimise thematic overlap. [Hans Poertner and WGII TSU, Germany]	Noted
19712	32	30	32	30	They then estimated future..... [Sabit Erşahin, Turkey]	Accepted.
10878	32	32	32	32	First RCP scenario is being used in this chapter. It is recommended that this is introduced very early on in the chapter and where possible, used to explain projections. [Debra Roberts, South Africa]	Rejected. Emission scenarios are introduced in chapter one.
6456	32	38	32	45	salt migrationmight be due due to increasing water table on salty bedrock [Mustafa Elhag, Sudan]	Noted
9066	32	3			correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. references formatted according to IPCC standards
11436	32	34			What is “Aeolian desertification”? [Debra Roberts, South Africa]	Noted. wind erosion driven desertification. "Aeolian" has been replaced
9068	32	39			(Huang et al. 2017). Full stop [Amanullah Amanullah, Pakistan]	Rejected. no such reference here
9070	32	40			Miao et al. (2015), remove comma [Amanullah Amanullah, Pakistan]	Rejected. no such reference here
19046	33	1	33	2	But this models forget the ocean's evaporation , which implies a wetter climate and more monsoons (ITD or ITCZ more septentrional) as the paleoclimmatology shows. [Azziz Hirche, Algeria]	Rejected. not relevant to the text here
5506	33	2	33	2	The number of the section must be 3.6.1.1. [Anatoliy Mandych Anatoliy, Russian Federation]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1588	33	7	33	18	what do RCP and CMIP stand for?. There are a lot of abbreviations in the chapter which need to explained somewhere as table or text [Rajesh Chintala, United States of America]	Noted. These are introduced in Chapter 1.
17204	33	9	33	9	See the IPCC AR5 glossary for consistency. Here you refer only to meteorological droughts, but exclude megadroughts, which last langer periods and are very relevant for this chapter [Jose Manuel Moreno Rodriguez, Spain]	Noted
19714	33	9	33	9	...respectively (IPCC, 2013). Droughts are… [Sabit Erşahin, Turkey]	Accepted.
7564	33	9	33	10	There should have " a space " in the begining of the sentence " Droughts are extreme meteorological events that also increase vulnerability to land degradation in arid zones. " [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted.
17206	33	23	33	23	The larger vulnerability of dry ecosystems to changes in precipitation is unclear. This needs supporting. in fact, while dry ecosystems might be sensitive to changes in water, it is well known that they are more resistant and this is also a part of vulnerability. I wonder if you could clarify this. [Jose Manuel Moreno Rodriguez, Spain]	Accepted.
26536	33	28	33	29	Lopez- i-Gelats et al. 2016 already cited elsewhere is relavant here [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted.
10166	33	30	33	31	Not clear improvement in what sense [Lizzie Mujuru, Zimbabwe]	Accepted. "decreased vulnerability" text added
7566	33	40	33	41	It should have a "," at the end of the sentence: " In northern Australia, a decrease or an increase in rainfall post 2030 will influence the erosion rates and erosion patterns (Serpa et al., 2015), " [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. Period added
7568	33	41	33	41	The term "RIVER BASIN" should be " WATERSHED " [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. sentence deleted
19716	33	41	33	41	(Serpa et al., 2015). In Narmada river basin,….. [Sabit Erşahin, Turkey]	Accepted. Period added
17208	33	41	33	42	"wil influence… Yes, bu how (positively, negatively?). Please, clarify [Jose Manuel Moreno Rodriguez, Spain]	Accepted. yes - depending on whether the change is a decrease or an increase in rainfall as stated in the first part of the sentence.
10168	33	43	33	44	Values of what? Erosion? And how is that linked to the second part of the sentence. Revise the sentence and make the two parts of the sentence more compatible [Lizzie Mujuru, Zimbabwe]	Accepted. sentence deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20648	33	44	33	44	Please consider adding the following sentence at the end of this section: "Rodriguez-Caballero et al. (2018) analyzed the cover of biological soil crusts under current and future environmental conditions utilizing an environmental niche modelling approach. Their results suggest that biological soil crusts currently cover ~16 million km2 in drylands. According to different RCP scenarios, 25-40 % of this cover will be lost by 2070 with climate and land use being equally relevant in this process. The predicted loss is expected to substantially reduce their contribution to nitrogen cycling and to enhance dust emissions." [Bettina Weber, Germany]	Accepted.
20650	33	44	33	44	citation: Rodríguez-Caballero, E., Belnap, J., Büdel, B., Crutzen, P., Andreae, M.O., Pöschl, U., Weber, B. (2018) Microbial surface communities on dryland soils endangered by global change. Nature Geoscience 11: 185-189. [Bettina Weber, Germany]	Accepted.
17210	33	45	33	47	Support for this. The paper cited below (Huand et al. 2017) describes only changes along succesion in a desertification process. This is only one site, too few to generalize [Jose Manuel Moreno Rodriguez, Spain]	Noted. More references have been added to support this
18862	33	34	34	6	the section about 3.6.2. Future Projections of Impacts should focus on the impacts of desertification on the Natural and Socio-Economic Systems under climate change in future, the assessment is not enough, the impacts of desertification on the Natural and Socio-Economic Systems in future should be given, not only the impacts of desertification on soil carbon, there are other things. [Jianguo Wu, China]	Noted
11438	33	2			Please include a projection for Africa. [Debra Roberts, South Africa]	Noted. We are happy to consider any literature you would like to suggest.
9072	33	30		35	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
19226	33	35		44	Its more important to explain why does future climate change influence soil erosion ? This developed in the box 3.1 cross chapter, page 10. Variation of rainfall intensities, change in soil cover and change in land-use. Very steep slopes (line 43) - unless tillage erosion- are not relavant fo rhigher rates for hydric erosion, many publications about it. [Pascal Podwojewski, France]	Noted
26654	33	42			between project and increase insert to [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
17212	34	1	34	1	Reference is needed [Jose Manuel Moreno Rodriguez, Spain]	Noted. reference is present on next line
19718	34	4	34	6	The content contradicts the information given in Page 5 P5-L16. According to the information in Page 5 P5-L16 desertification does not happen in humid regions. [Sabit Erşahin, Turkey]	Accepted. sentence deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10170	34	9	34	10	Safriel and Adeel 2008 check ref list [Lizzie Mujuru, Zimbabwe]	Accepted.
24342	34	9	34	23	This section could be greatly enriched by mentioning the new impetus given by the adoption of the SDGs - and SDG target 15.3 in particular - to combatting desertification/land degradation and related policy interventions to achieve Land degradation neutrality. In particular the land degradation neutrality scientific conceptual framework (Orr et al 2017 https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf; Cowie et al 2018 https://doi.org/10.1016/j.envsci.2017.10.011) and its response hierarchy (avoid > reduce > reverse) should be mentioned (Starts on page 61 in the LDN framework, and explained further in Figure 7). [Barron Joseph Orr, Germany]	Noted, thanks
26404	34	12	34	14	"Agriculture is likely to remain the principle source of food production and the foundation of livelihoods across the drylands. In addition, drylands provide vital ecosystem services to downstream urban economies and industry." In SROCC, the term "downstream" has a specific meaning, please reconsider the use of this term here. [Hans Poertner and WGII TSU, Germany]	Accepted - "downsteam" removed
26402	34	22	34	26	Please provide corresponding section numbers [Hans Poertner and WGII TSU, Germany]	Rejected - We are not sure which section should be referred to by this sentence. It does not reference other sections
23836	34	24	34	24	The principle may be the principal is more suitable [Abdellatif Khattabi, Morocco]	Accepted - done
10880	34	24	34	24	Replace 'principle' with 'principal' [Debra Roberts, South Africa]	Accepted - done
10172	34	24	34	24	Replace principle with "principal" [Lizzie Mujuru, Zimbabwe]	Accepted - done
17214	34	24	34	26	Reference is needed [Jose Manuel Moreno Rodriguez, Spain]	Rejected - the reference in the sentence before (Thomas 2008) provides a citation
9622	34	27	34	27	Liniger, H., Critchley, W., Gurtner, M., Schwilch, G., & Mekdaschi Studer, R. (2007). Where the land is greener: Case studies and analysis of soil and water conservation initiatives worldwide. World Overview of Conservation Approaches and Technologies (WOCAT). [Markus Giger, Switzerland]	Reference added - the book by Liniger and Critchley with the same title.
10882	34	37	34	37	Consider replacing 'side effects' with 'tradeoffs' [Debra Roberts, South Africa]	Accepted - done
14418	34	40	34	40	Add silvo-pastural paractices as a technology- the tree component is missing. [Rattan Lal, United States of America]	Accepted - added to the section
6458	34	40	34	42	one of the best examples is experience of Elrawakeeb dryland research stationn in Sudan [Mustafa Elhag, Sudan]	Rejected. Thank you for the comment. However, we are unaware of how to address it in the heading or section

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24344	34	41	34	42	Should read: "...potentially avoid, reduce and reverse land degradation (i.e. land degradation neutrality response hierarchy) across the dryland areas of the world." (Orr et al 2017 https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf; Cowie et al 2018 https://doi.org/10.1016/j.envsci.2017.10.011) and its response hierarchy (avoid > reduce > reverse) should be mentioned (Starts on page 61 in the LDN framework, and explained further in Figure 7). [Barron Joseph Orr, Germany]	Noted - The LDN framework is introduced at length in Chapter 4. Here the intention is not to describe the LDN framework, we are merely introducing a set of response options that will be assessed in the subsequent sub-sections.
4994	34	44	34	45	The term 'anthrome' is explained in more detail in Chapter 6 (and also mentioned in Chapter 4). It might strengthen the report if a reference is made in the text to the analysis done in the other chapters. [Renee van Diemen, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - Thank you for the comment, clear reference in made to Chapter 4 and 6.
3192	34	40	35	2	This passage, including the figure 3.9, while interesting, is too generic and should be revised towards uncertainty language and desertification [Karlheinz Erb, Austria]	Noted - The intention of this section is to provide an introduction to the set of responses assessed in 3.7.1.1 - 3.7.1.5. It is general by nature and does not require certainty language.
25500	34	40	42	13	There is a slight problema of sequencing in 3.7.1 and 3.7.2 in that some autonomous technical responses are discussed only under the heading of traditional knowledge, itself coming under "socio-economic responses", on p.40. So the reader looking for mention of zai as a technical response (which it is, and a widely discussed one) only finds it under "socio-economic responses" [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Thank you for the commentm information included. In 3.7.1 we soley assess the biophysical nature of response technologies and practices and their success. Social and economic considerations are included in the next section (3.7.2).
18864	34	8	47	42	there is no clear linkage to adaptation and mitigation options and response to desertification under climate change past ,current and in future. [Jianguo Wu, China]	Rejected. The whole section about technology, socio-economic and policy related adaptation and mitigation measures. What is missing should have been specified by the reviewer
6904	34	8	47	42	This section looks more like a text book and can be shortened [Wilfran Moufouma Okia, France]	Noted - thank you. The section has been shortened

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3518	34	8	47	43	Section 3.7 here deals with responses to desertification under climate change. At its very beginning, the text acknowledges that "increasing population pressures and potentially unprecedented nature of climatic changes could push dryland populations beyond their resilience thresholds". Althoug the sentence goes on with softening inflexions, the part just quoted, taken in isolation, cannot be contested. In this context, common sense tells us that using the responses presented in this section (which of course I find valuable and helpful), while they may not allow the whole population existing before the deseertification to stay there, might allow some reduced popultion to do so. Therefore one major response to desertification consists in getting the concerned human population to become less numerous., Of cours this will not necessarily slow down the desertification trend (although it may contribute) ; however I gather that, anyway, softening and/or getting around the raw consequences of desertification is a major concern in this chapter. [Philippe Waldteufel, France]	Noted - thank you for the comment
9074	34	1			Chirwa et al. (2015), need full stop [Amanullah Amanullah, Pakistan]	Rejected. cannot find this here
9076	34	19		26	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted - done
27338	34	24			principal [Doreen Stabinsky, United States of America]	Accepted - done
11440	34	46			Re “by no means exhaustive”: is it possible to attempt a semi-exhaustive list? Examples from around the world of what local people are doing? Or point to systematic reviews of the same? This would be a valuable addition. [Debra Roberts, South Africa]	Noted - the text has been changed to "not exhaustive". Following your comment, we did seek a systematic review of dryland response options, but none is available. The broad list of activities we have is beyond semi-exhaustive and covers the principle response activities in drylands. But there are some that readers may identify and therefore we have included this sentence.
6010	35	3	35	5	Fig 3.9 is very interesting and useful for policymakers. However, the text above the figure "The assessment of each action is twofold: firstly, to assess the ability of each action to address 4 desertification and enhance climate change resilience, and secondly, to assess the potential impact of 5 future climate change on the effectiveness of each action." doesn't match. How have the authors assessed the efectiveness of each action? What are the metrics and how will these be been shown in the figure? There will also be tradeoffs asscoiated with each action (eg land requiements for agroforestry may take away from ability of smallholders to grow food crops). [Chandni Singh, Myanmar]	Noted - The assessment is based levels of success reported in the literature. The intention of Fig. 3.9 is to illustrate the relative position of response options within biomes and anthromes, not to illustrate their success - it would make the illustration too complicated.
10174	35	7	35	7	Not sure if the arrow is giving the correct information [Lizzie Mujuru, Zimbabwe]	Noted - Arrow removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26538	35	7	35	9	Source for figure? [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted - the figure was compiled by the authors of this chapter
7570	35	9	35	9	Tthe word "THE" in the begining of the title of the Figure 3.9, should be deleted [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Rejected - the title reads better with "the" at the beginning.
5026	35	9	35	9	This figure provides a very useful visualisation. However there is overlap with content in Ch4. Is there a case for a cross-chapter box dealing with this? [Eamon Haughey, Ireland]	Noted. The ideas was discussed at length, but it was decided to keep consideration of anthromes separate in each chapter. It is introduced here and explored further in Chapter 4 and 6.
17216	35	12	35	13	Refererece is needed [Jose Manuel Moreno Rodriguez, Spain]	Noted - references added
10176	35	13	35	13	what about biochar? [Lizzie Mujuru, Zimbabwe]	Noted - Biochar is considered at length in Chapter 4.
17218	35	15	35	16	Reference is needed [Jose Manuel Moreno Rodriguez, Spain]	Rejected - this is an introductory sentence to the paragraph, a reference is provided at the end of the next sentence.
25502	35	10	36	29	Mention should be made of semi-permeable stone bunds (often referred to by the French term "digue filtrante") [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - the use of semi-permeable stone structures has been added to the text.
968	35	11	36	29	I think that most of the measures highlighted in the section belong to the so called "agroecology techniques", mainly used by indigenous farmers. I miss a paragraph talking about the importance of the agroecology to create resilient ecosystems to fight against desertification (you can use many references form Altieri and colleagues) [Jose Luis Vicente Vicente, Germany]	Noted - thank you for the comment. Indeed, many of the listed response options do fall within the domain of agroecology. We have decided on the classification / dissaggregation we have adopted as it clearly separates out activities that would occur in different land-use and land-types.
1590	35		47		As per Figure 3.9, the description for agroforestry seciton is missing (in 3.7 section). Figure 3.9 is not easy to comprehend. This figure needs footnotes about the classes of biome and anthrome. [Rajesh Chintala, United States of America]	Noted - Agroforestry was considered but it viewed as an intervention that will principally implemented in more mesic areas and may therefore be better located in Chapter 4.
9078	35	5			(Acacia senegal) botanical names in italic only [Amanullah Amanullah, Pakistan]	Noted - Ammended accordingly
19228	35	8			Figure 3.9 because the source of organic carbon as wastes is more mportant in the cities (dense settlements) than in croplands or rangelands in dry areas, fluxes of organic matter wastes towards villages and croplands could be emphisized to improve SOC storage. [Pascal Podwojewski, France]	Rejected - The comment is unclear and one is unsure which particular sub-section is applies to.
2298	35	21			It would be valuable to explain in 2-3 words what "intercropping" and "relay cropping" mean to facilitate understanding to a broader audience. [María Almagro Bonmatí, Spain]	Accepted. A couple of phrases added to explain the concepts
2300	35	22			add "soil" inbetween "maintain" and "cover"; change "fraction of the year" to "portion" or "percentage" [María Almagro Bonmatí, Spain]	Rejected - It should be maintain vegetation cover and the use of the word "fraction" is correct in this context.

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17220	36	2	36	3	Refererece is needed [Jose Manuel Moreno Rodriguez, Spain]	Noted - reference added
17222	36	4	36	9	Reference is needed [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Whole statement rephrased with new references
17224	36	20	36	21	Reference is needed [Jose Manuel Moreno Rodriguez, Spain]	Rejected - the reference is included at the end of the previous sentence. I believe it is clear that it pertains to this sentence.
10410	36	22	36	24	"A further prominent problem within dryland agriculture is increasing salinisation that at present covers approximately 995 million hectares in the arid and semiarid region." This is very important issue to be addressed under desertification. Salt affected lands/ soils are increasing in extent and severity. substantially large number of land users are being forced to abandon their land due to decline in productivity. this is contibuting to increase in desertification. Technologies and practices alone will not solve the problem and there has to be policy and incentive suppport to land users for increasing investing in the amnagement and or reclamation of salt affected lands. Mulching and incorporation of residues and various cultural parcties [Zitouni Ould-Dada, Italy]	Accepted. Thank you for the comment. A new sub-section has been added on the revegetation of saline lands
17226	36	22	36	29	A whole paragraph without supporting references [Jose Manuel Moreno Rodriguez, Spain]	Noted. This paragraph has been removed. A new, well referenced section on the revegetation of saline lands has been included.
2312	36	26	36	27	Rewrite. Not clear [María Almagro Bonmatí, Spain]	Noted - the sentence has been ammended accordingly.
14420	36	30	36	30	The title is a bit ambitious. The section mentions fire management only on rangelands, not the entire issues such as forest fire, peatlands fire, etc. [Rattan Lal, United States of America]	Accepted - Changed to Grazing and fire management in drylands
970	36	34	36	38	You should explain a bit why a loss of ecosystem servicess after ovegrazing. Please, do not forget that the compactation of the soil is a key process in grazing. [Jose Luis Vicente Vicente, Germany]	Accepted. Additional explainatory text has been added.
20652	36	38	36	38	Please consider adding the following section after "…loss of ecosystem services.": "Also biological soil crusts, that widely occur in rangelands, stabilizing the soils and fixing nutrients, have been shown to cope with light and moderate while being destroyed by intense grazing pressure (Weber et al., 2016; Pointing and Belnap, 2012)." [Bettina Weber, Germany]	Accepted. An ammendment has been made to the text.
20654	36	38	36	38	citations: Weber, B., Bowker, M., Zhang, Y., Belnap, J. 2016. Natural Recovery of Biological Soil Crusts After Disturbance. In: Weber, B., Büdel, B., Belnap, J. (eds) Biological soil crusts: An Organizing Principle in Drylands, Ecological Studies 226, Springer International Publishing Switzerland, pp 479-498. Pointing, S.B., Belnap, J. (2012) Microbial colonization and controls in dryland systems. Nature Microbiology 10: 551-562. [Bettina Weber, Germany]	Accepted. An ammendment has been made to the text.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17228	36	38	36	42	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Rejected - the last sentence is explaining what sustainable grazing management is. It is merely informative, not an opinion or data.
10492	36	38	36	42	"through herd management it is possible to improve efficiency, better use of nutrients by animals." Consider also gender issues (often women, children take care of animals and because of time and security issues use grazing areas that are convenient, even if they are overgrazed) [Zitouni Ould-Dada, Italy]	Noted - we believe that the essence of this statement is included in the text.
25504	36	30	37	14	Mention should be made of "Holistic Resource Management" or holistic grazing (essentiall very-short term rotational grazing with heavy stocking rates), as promoted by Allan Savory, if only because it has been very heavily pushed in development and semi-scholarly literature. A review with negative conclusions can be found in Carter et al. https://www.hindawi.com/journals/ijbd/2014/163431/abs/ [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. An additional paragraph has been included on the topic.
2302	36	1			"as a climate-smart and profitable practice" compared to… [María Almagro Bonmatí, Spain]	Noted - text ammended accordingly.
9082	36	2		40	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted - changed accordingly
19230	36	2			production of maize in drylands is irrelevant due to high water needs - unless water harvestion (positive use of runoff) and irrigation (often no surface water available in drylands). [Pascal Podwojewski, France]	Rejected. Maize is part of for e.g. the 18 major dryland cereal legume farming systems (Refer - Hyman et al. 2018: Priority regions for research on dryland cereals and legumes)
19232	36	10			Surface runoff can also have positive effects: controlled surface runoff is a necessity in many areas using waterharvesting (lines 8). However this system is much less efficient in mediterranean environments because the rains are less concentrated than in tropical dry areas. Surface runoff is also responsible for the occurrence of banded vegetation which is a run- off-run-on ecosystem which is controlling soil erosion (see Valentin et al., 1999, Catena 37, 1-24). [Pascal Podwojewski, France]	Accepted. Statement qualified to accommodate review comment
19234	36	11			NO, the canopy cover doesnt control runoff. Its the soil cover related to the decrease of the kinectic energy of rain drops responsible of the soil aggregates sealing that controls runoff. In case of teak plantation canopy cover can increase dramatically erosion if the soil cover is absent. [Pascal Podwojewski, France]	Accepted - ammendment made to the text
2304	36	13			Rewritte the sentence to be clearer in the statement. I guess you mean 17% reduction of soil loss by runoff. [María Almagro Bonmatí, Spain]	Noted - sentence changed accordingly
2306	36	14			There are many references that could be added to reinforce this statement. [María Almagro Bonmatí, Spain]	Accepted. some new references added
2308	36	20			write "reported" instead of "reportedly" [María Almagro Bonmatí, Spain]	Rejected - "Reportedly" is correct.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5446	36	22			A further prominent problem within dryland agriculture is increasing salinisation that at present covers approximately 995 million hectares in the arid and semiarid region. This is very important issue to be addressed under desertification. Salt affected lands/ soils are increasing in extent and severity. substantially large number of land users are being forced to abandon their land due to decline in productivity. This is contibuting to increase in desertification. Technologies and practices alone will not solve the problem and there has to be policy and incentive suppport to land users for increasing investing in the management and or reclamation of salt affected lands. Mulching and incorporation of residues and various cultural parcties have shown to be effective in managing salt affected lands for instance in Oman and other countries in the Gulf [Daniel Danano Dale, Italy]	Accepted. Thank you for the comment. A new sub-section has been added on the revegetation of saline lands
2310	36	24			also because of water extraction. [María Almagro Bonmatí, Spain]	Noted - water extraction added
19236	36	24			I dont see erosion as a cause of salinity but probably the opposite because the higher clay dispersion in a salty environment [Pascal Podwojewski, France]	Noted. The paragraph has been removed
26656	36	27			should read response measures include and not including [Abiud Kaswamila, United Republic of Tanzania]	Noted - Ammended accordingly
25506	37	3	37	3	Switching between grazing and browsing species is relevant [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - we have included "type of livestock and balance of grazers and browsers " in the text.
25508	37	8	37	14	Shaking or lopping of foliage from trees is another response. Devendra, C., Morton, J., Rischkowsky, B., & Thomas, D. (2005). Livestock systems. Livestock and wealth creation: improving the husbandry of animals kept by resource-poor people in developing countries, 29-52, Nottingham University Press, mention in passing on the first page. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Silvo-pastoral practices have been noted.
25102	37	15	37	15	Utilization monitoring.... [Sayed Masoud Mostafavi Darani, Iran]	Noted - we have however changed it to "Monitoring the utlisation" which is easier to read
3194	37	15	37	27	This passage needs more specific info and qoutes to sustain the assessment. Uncertainty language could be improved. [Karlheinz Erb, Austria]	Noted - the section has been updated accordingly.
10494	37	15	37	27	apart from the mentioned monitoring systems, gender issues should also be considered (often women, children take care of animals and because of time and security issues use grazing areas that are convenient, even if they are overgrazed) [Zitouni Ould-Dada, Italy]	Accepted, we have a section dedicated to gender in 3.5.2 and 3.7.3
5028	37	29	37	30	To what regions does this apply? (Does the statement only refer to drylands?) [Eamon Haughey, Ireland]	Noted. The phenomenon of bush encroachment is not only limited to dryland systems but often occurs in more mesic grasslands and savannas.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25510	37	44	38	16	There is anecdotal evidence that a blanket ban on trade in charcoal acts as a disincentive for prosopis control in Ethiopia - sorry, no propoer reference [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted.
6460	38	17	38	25	Available underground water could be a potential source for irrigation [Mustafa Elhag, Sudan]	Noted.
292	38	18	38	19	Refer to first sentence under 3.7.1.4. (Rainwater Harvesting: In situ rainwater harvesting (RWH) provides a means of increasing the amount of water available for agriculture and livelihoods.): This sentence is meaningless. The words In situ are confusing, needing clarification. [Santosh Kumar Mishra, India]	Noted - We have removed the words "in situ" in this early broad introductory statement.
17230	38	33	38	34	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Rejected - the reference (Bouma et al., 2016) is included at the end of the previous sentence.
10412	38	39	38	39	"However, at a catchment scale, it may reduce runoff and important flows to wetlands and downstream urban economies (Meijer et al., 2013)." No quantifiable information as evidenceof how much it will reduce is given. RWH measures are seen to improve the baseflow of a river or stream on the other side of the story. [Zitouni Ould-Dada, Italy]	Rejected. The authors of the study use two approaches, both of which indicate a reduction in stream flow. Could the reviewer please provide references to the contrary and we will ammend the text accordingly?
5030	38	41	38	42	This sentence seems in conflict with the statement on line 21 - 25 that 'RWH…is widely implemented'. Some additional information on how widely RWH is currently implemented would be helpful. [Eamon Haughey, Ireland]	Rejected. The sentence doesn't conflict with the earlier message, but rather notes that its early adoption and sustainability over the long-term may be inhibited by a number of factors.
5448	38	4			The long-term success of woody biomass clearance and improved fire and grazing management remains to be evaluated, especially restoration back towards an ‘original state’ . Evaluation is good in the general sense but if the objective is to restore back towards the órigional state and if that is possible, this may be documented. Evalauation may take time and involves cost. the experience from past work in many coutries could be taken as evalaution done in this regard [Daniel Danano Dale, Italy]	Rejected. There is little literature documenting the long-term success of bush encroachment clearance. For this reason, we state that 'it remains to evaluated".
9086	38	18		44	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted - we have checked this section and remaining document.
5450	38	18			In situ rainwater harvesting (RWH) provides a means of increasing the amount of water available for agriculture.. How does insitu RWH provide for livelihoods other than agriculture? Yes, but through improved agricultural production. Hoping that this type of RWH does not include exitu RWH sytems (collecting, storing and spreading) it may fall short of fullfilling the objective. Insitu is understood as water stored in the soils for crop growing. If it includes underground cisterns and storages then it has to be explicitly discussed. [Daniel Danano Dale, Italy]	Noted - We have removed the words "in situ" in this early broad introductory statement.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5452	38	27			implementing RWH is to improve agricultural output and resilience. RWH should include flood water harvesting and runoff harvesting as essential for the drier areas that heavily depend on the runoff / flood water coming from upper cathments ? [Daniel Danano Dale, Italy]	Accepted. Additional text has been added to the first sentence of the section "though the capture and storage of of runoff and peak flow"
5454	38	39			However, at a catchment scale, it may reduce runoff and important flows to wetlands and downstream urban economies (Meijer et al., 2013). No quantifiable information as evidence of how much it will reduce is given. RWH measures are seen to improve the baseflow of a river or stream on the otherside of the story [Daniel Danano Dale, Italy]	Rejected. The authors of the study use two approaches, both of which indicate a reduction in stream flow. Could the reviewer please provide references to the contrary and we will ammend the text accordingly?
17232	39	8	39	8	typeo: climes [Jose Manuel Moreno Rodriguez, Spain]	Rejected. Climes is correct
19720	39	8	39	8	water in warm climes can [Sabit Erşahin, Turkey]	Noted - the text is as suggested
25104	39	8	39	8	climate [Sayed Masoud Mostafavi Darani, Iran]	Rejected. Climes is correct
17234	39	10	39	14	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Noted, thanks.
24346	39	15	39	30	The terms sustainable land management (SLM) and restoration seems to be used interchangably in this section however the definitions of SML and restoration (and rehabilitation) differ. Furthermore, SML and restoration play a different role in the land degradation neutrality response hierarchy, with SLM aimed to avoiding and reducing new degradation and restoration and rehabilitation aimed at reversing past degradation (Orr et al 2017, Cowie et al 2018). (Orr et al 2017 https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf; Cowie et al 2018 https://doi.org/10.1016/j.envsci.2017.10.011) and its response hierarchy (avoid > reduce > reverse) should be mentioned (Starts on page 61 in the LDN framework, and explained further in Figure 7). [Barron Joseph Orr, Germany]	Noted - Thank you for the comment. the heading has been changed to SLM and restoration
24348	39	15	39	30	For a discussion on barriers for SLM adoption and implementation see M.J. Sanz et al 2017. Sustainable Land Management contribution to successful land-based climate change adaptation and mitigation. A Report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany. https://www.unccd.int/sites/default/files/documents/2017-09/UNCCD_Report_SLM_web_v2.pdf [Barron Joseph Orr, Germany]	Noted, included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10496	39	15	39	30	apart from promoting SLM, it is important to also promote income generating activities that generate direct/fast returns. For example planting pinapple or fodder grasses in contour lines. [Zitouni Ould-Dada, Italy]	Noted. Taken into account. In many cases, SLM practices do provide with immediate benefits, otherwise, they will not be promoted by extension services. Still, adoption is low due to other barriers.
972	39	16	39	30	A good example of a need for changing the policy framework is the Common Agricultural Policy (CAP) in the European Union, which now it only incetivises increasing the cropping surface without taking in consideration the management practices. [Jose Luis Vicente Vicente, Germany]	Noted. CAP stimulates intensification of production, hsitorically led to abandonment of farming in low potential areas. Extreme intensification could have negative envronmental impacts, but we could not find evidence that CAP discourages the adoption of SLM practices. Although our reading also agrees with yours is that CAP also has very insufficient measures to encourage SLM. CAP is relevant for this chapter inasmuch as it affects desertificiation in dryland areas in Europe and outside. We covered this in ther parts of the chapter. We included text on policies that provide subcidies for SLM adoption.
9624	39	18	39	18	another meta study on succcessful SLM technologies also showed percieved postive cost/benefit ratios in the long term but identified short term investment costs as a main barrier for broad implementation. Giger, M., Liniger, H., Sauter, C., & Schwilch, G. (2015). Economic Benefits and Costs of Sustainable Land Management Technologies: An Analysis of WOCAT's Global Data. Land Degradation & Development. [Markus Giger, Switzerland]	Accepted. Thank you for the reference. An additional sentence on the inhibitory nature of upfront costs has been added to the text.
10180	39	18	39	24	Nyakonya et al 2016 which is which, a,b, or c. The same applies to Nyakonya et al 2015 has 2 refs in the list which is which in the text. Correct this throughtthe document [Lizzie Mujuru, Zimbabwe]	Noted. Addressed.
10178	39	19	39	19	Mirzabaev et al 2016 which is which in the ref list, you have 2 references for same year [Lizzie Mujuru, Zimbabwe]	Noted. Addressed.
17236	39	33	39	40	A whole paragraph without supporting references [Jose Manuel Moreno Rodriguez, Spain]	Accepted, included.
10498	39	42	39	42	there is a need to identify and promote local varieties, which often are resilient to drought [Zitouni Ould-Dada, Italy]	Accepted, included.
6462	39	48	40	7	community forests should be encouraged [Mustafa Elhag, Sudan]	Accepted, mentioned.
9088	39	8		46	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted - Ammended accordingly.
26658	39	26			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26660	39	28			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.
26662	39	30			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.
26664	39	33			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.
26666	39	48			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.
26540	40	9	40	29	As above, while I haven't yet read it, the recent book by Zeremariam Fre (UCL Press) may be useful: http://www.ucl.ac.uk/ucl-press/browse-books/knowledge-sovereignty-among-african-cattle-herders [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included.
974	40	9	40	29	The use of traditional knowledge is often called "agroecology techniques". It would be great if authors can included also this nomenclature in the text. [Jose Luis Vicente Vicente, Germany]	Accepted, included.
7572	40	17	40	17	The reference " (Enfors and Gordon 2008) " should be " (Enfors and Gordon, 2008) [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted, done.
23838	40	20	40	20	Some other refernces to consider: Ilahiane, H. (1999). The Berber Agdal Institution: Indigenous Range Management in the Atlas Mountains. Ethnology, 38(1), 21-45. doi:10.2307/3774085 ; Auclair, L., P. Baudot, D. Genin, B. Romagny, and R. Simenel. 2011. Patrimony for resilience: evidence from the forest Agdal in the Moroccan High Atlas Mountains. Ecology and Society 16(4): 24. http://dx.doi.org/10.5751/ES-04429-160424 [Abdellatif Khattabi, Morocco]	Accepted, we have included the recent one. Skipped Ilahiane, H. (1999) since it was published almost 20 years ago.
5032	40	22	40	29	Very important and eloquently made point - should this (or is it currently) be a point in the executive summary? [Eamon Haughey, Ireland]	Noted, relevant text included into Executive Summary.
26668	40	5			consistence in inclusion of section or exclusion e.g. section 3.5.2 as at times section is not included [Abiud Kaswamila, United Republic of Tanzania]	Rejected. Section 3.5.2. is about socio-economic impacts of desertification-climate change interactions, and does not fit this context here. We are referring to other sections of the chapter when readers may find related information to this statement in that section.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9090	40	6		35	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
25512	41	8	41	21	Interesting paragraph, but shouldn't be under "collective action" [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included under the new heading "Farmer-led innovations".
10414	41	22	41	22	"Despite the ingenuity, innovation and collective action by dryland agricultural populations, their adoption of SLM practices remains low." This may hold true in some cases but in general the adoption of SLM is higher in drier areas as compared with in subhumid areas and araes receiving adequate rains. Since most SLM parctices tend to favour rainwater harvesting (increase soil moisture) agricultural production increases.This is observd in countries such as Ethiopia, Kenya and also in other several African countries (SLM - Terrafrica, and World Bank reports of 2010 and 2011). SLM database in WOCAT.net also provide such information [Zitouni Ould-Dada, Italy]	Noted. Here we are not comparing between dry and humid areas. Even if SLM adoption is higher in drier areas in relative terms to humid areas, it is still low in absolute terms.
9626	41	23	41	23	this is a broad statement that needs better qualification.There are still many millions of small scale farmers that maintain their livelihood despite difficult conditions and have adapted sustainable SLM measures. Often, some of the proposed SLM technologies by external agents (projects, governments) are not really adapted to their needs. Many successful technologies are documented in the UNCCD-WOCAT database. https://www.wocat.net/en/global-slm-database. [Markus Giger, Switzerland]	Accepted, paraphrase "low" to "insufficient to address desertification"
10500	41	28	41	28	should consider values/cosmovision of indigenous people, gender issues [Zitouni Ould-Dada, Italy]	Accepted, gender issues included. We need to stay focused on the topic of desertification-climate change, so included informaton on traditional and indigenous knowledge inasmuch as it concerns the topic, but delving into the values and belief systems of indigenous populations is out of scope for this chapter.
20518	41	30	41	30	3. The subtitle should be better to "Socio-economic responses towards to livelihood diversification" [Huai Jianjun, China]	Rejected. "economic diversification" is the key word given by the scoping document for this chapter, so we prefer to keep it.
10502	41	42	41	42	there should be a differentiation between long term and short term migration, and internal/international migration [Zitouni Ould-Dada, Italy]	Accepted, included.
25106	41	46	41	46	In agricultural regions that almost all incomes of the farmers are based on agriculture, desertification caused by climate change is an important factor for migration. Otherwise it is impossible for them to live so this isssue must be considered.A related paper about Iran can be found in the below address(page5) :http://dx.doi.org/10.1080/00210862.2016.1259286 [Sayed Masoud Mostafavi Darani, Iran]	Noted, included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11442	41	42	42	13	There is some repetition in this paragraph from a previous section. [Debra Roberts, South Africa]	Noted. The the earlier section, we discussion about the impact of desertification-climate change on migration, here were are focusing on migration as a response to these. Naturally, these are the two sides of the same coin, and difficult to separate completely. Still, we revised the text in a way to make the division clearer.
9092	41	10		40	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
10416	42	1	42	1	"with 1% reduction in rainfall associated with 0.45% increase in urbanisation." Very crude information. Factors for increase in urbanization are many. How could only this be considetred as an important factor? Environemental degardation is perhaps the most influential in this regard. [Zitouni Ould-Dada, Italy]	Noted. The paper we cited does not claim that rainfall is the only driver, it considers and controls for various other factors. In our writing we also had clearly stated that and written that it is only one of many factors.
19722	42	6	42	6	.....reduce out-migration among the poorest agricultural..... [Sabit Erşahin, Turkey]	Accepted, revised.
10504	42	15	42	15	there is a need to articulate social, environemental and production policies [Zitouni Ould-Dada, Italy]	Noted. We do discuss all of these categories of policies, but we would prefer to keep the current structuring framework in this section.
24350	42	27	42	27	Should read "...avoinding, reducing and reversing it;..." (Orr et al 2017 https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf; Cowie et al 2018 https://doi.org/10.1016/j.envsci.2017.10.011) and its response hierarchy (avoid > reduce > reverse) should be mentioned (Starts on page 61 in the LDN framework, and explained further in Figure 7). [Barron Joseph Orr, Germany]	Accepted, included.
3370	42	28	42	28	Among the institutional and policy factors that underlie 65% of the reported cases of desertification modern policies and intuitions' are as much involved as are traditional in institutions, growth oriented agricultural policies , including measures such as land distribution and redistribution , agrarian reform sector development projects diffusion or agricultural intensified methods , and market liberalization polices , are as important in driving desertification as one are institutional aspects of traditional land tenure , such as equal sharing of land and splintering of herds because of traditional succession law. [Nagla Hamadain, Sudan]	Rejected. Many of the ideas you presented are contrary to the evidence in the literature. Any reference or citation to support them would have been useful.
3372	42	28	42	28	The introduction of new land tenure system, whether under private) individual) or state (collective) management. it another important factor associated with desertification there are distinct regional variations in these factors, and the impact of policy is comparatively low in the dry land areas of different countries where agriculture is only a minor sector of the national economy. [Nagla Hamadain, Sudan]	Noted. Although we dont agree with your suggestion that agriculture plays a minor role on dryland areas. Often, this is the opposite.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3374	42	28	42	28	Desertification is a worldwide phenomenon which causes the earth's ecosystems to deteriorate. In affects about two – third of the countries of the world. And one – third of hearths of the earth's surface. On which one billion people live namely. one fifth of the world population (kochhann-1996) therefore , the livelihoods of over one billion people in more than 100 countries are also jeopardized by desertification as farming and grazing land becomes less productive . in earlier times, the in habitants in the arid and semi- arid zones. Particularly farmers and herders had effective strategies to sustain their livelihood without deteriorating their environment too seriously to the level of desertification. Now many changes have occurred making these strategies inadequate to protect the land from degradation. Dry land from continent are being degraded by over – cultivation, overgrazing, deforestation and poor irrigation. [Nagla Hamadain, Sudan]	Noted.
25514	42	45	42	48	It would be useful to know where. For long-distant livestock marketing chains originating in pastoral systems, limited access can spring from bureaucratic or political factors, while the opportunity for urban wage-labour is less attractive and less-relevant. Relieving constraints to market access in such systems is unlikely to increase wage-labour migration. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, text revised accordingly.
10182	42	46	42	47	Check the refs [Lizzie Mujuru, Zimbabwe]	Accepted, done.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5508	42	44	43	6	Decentralization of management of the use of natural resources cannot be a universal means of preventing the degradation of rangelands in drylands use. The effect of this measure apparently depends on the specific conditions, the context of its application. One of the negative examples of decentralization of governance are the reforms in Mongolia that began in the late 1980s during the country's transition from a centralized socialist economy to a free market (Potkanski, 1993; Mearns, 1996; Mearns and Dulamdary, 2000). The primary factor that determine the depth and scale of changes in grazing ecosystems was the disbanding of existing pastoral cooperatives, and the privatization of the majority of state herds. This led to a whole cascade of consequences that followed each other, which had and continues to exert a strong influence on the condition of rangelands and the effectiveness of the future use of the pastoral commons in general. After the abolition of livestock cooperatives herders began to make their own decisions on all aspects of livestock – from grazing to the sale of finished products. In a short time, the number of livestock-breeding household sharply increased. And immediately herders had to face the problem of selling finished products. The existing opportunities were not calculated for a significant increase in livestock production. Moreover, under new conditions, many functions of the state began to act inefficiently or ceased to be carried out. Under these conditions, individual herders began migrate as close as possible to cities and large settlements, where they can quickly realize their products. As a result, a large number of livestock households are concentrated in areas around large settlements in confined areas, pasture overgrazing and even partial irretrievable destruction occur. At the same time privatization did not affect the pasture watering infrastructure, which was created in the years preceding the restructuring and represented mainly by an extensive network of water pits and wells. Most of them were abandoned and gradually are destroying. Compared to the late 1980s, by 2000 the number of operating water supply facilities had decreased by 40%. As a result, more than 10 million hectares of remote pastures could not be used in the warm season. The consequence of such a development was an increase in the burden on available pastures, their overgrazing and degradation. References Mearns, R. (1996). "Community, collective action and common grazing: The case of post-socialist Mongolia." The Journal of Development Studies 32(3): 297-339. Potkanski, T. (1993). "Decollectivisation of the Mongolian pastoral economy (1991-92): some	Rejected. The situation you describe is not an example of decentralized management by communities, but an outcome of individual deciisions of herders without regulating role of communities, so without some form of decentralized management. The papers you indicate also mention the difficulties for collective action. So we do not see a contradition with these sources, and what we have written.
24352	42	15	47	42	This section should also discuss the role that integrated land use planning can play in combatting desertification and achieving land degradation neutrality (Orr et al 2017, Cowie et al 2018) and the LDN response hierarchy (avoid > reduce > reverse) should be mentioned. In the LDN framework, the section on integrated land use planning starts on page 75. The response heirarchy section starts on page 61 and Figure 7. (Orr et al 2017 https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf; Cowie et al 2018 https://doi.org/10.1016/j.envsci.2017.10.011) [Barron Joseph Orr, Germany]	Noted. The detailed discussion of LDN is given in Chapter 4, so here we do not repeat these aspects to avoid duplication.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
21342	42	15	47	43	In terms of (possible) policy repsonse, there is quite a bit developed in: Quillérou, E., Stringer, L.C., Øystese, S., Thomas, R.J., Bailly, D., Favretto, N., Stewart, N. (2015) Chapter 6 - Enabling action: Conditions for success. Stewart, N. (ed) In: ELD Initiative (2015). The value of land: Prosperous lands and positive rewards through sustainable land management, pp. 104-131. Available from www.eld-initiative.org [Emmanuelle Quillerou, France]	Noted. The examples given are mostly specific business models or spcific government policy tools. We recognize that there are big number of such policy tools, covering all of them will be beyond the scope of this chapter. We will keep this paper in mind, though.
5458	42	1			with 1% reduction in rainfall associated with 0.45% increase in urbanisation. Very crude information. Factors for increase in urbanization are many. How could only this be considetred as an important factor? Environemental degardation is perhaps the most influential in this regard. [Daniel Danano Dale, Italy]	Noted. The paper we cited does not claim that rainfall is the only driver, it considers and controls for various other factors. In our writing we also had clearly stated that and written that it is only one of many factors.
9094	42	8		45	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Accepted.
19468	42	22			for example,analysis of statistics and satellite images indicate the fact that more than 90% of dust storms in Iran arise from its neighbor countries, Iraq, Syria, Jordan, Kuwait, Saudi Arabia and Afghanistan which is due to socio-economic developments. [Azadeh Khaman, Iran]	Noted. What we wrote is consistent with this idea that there are issues that individual households or even individual countries cannot fully control by themselves. Regarding the figure of 90%, we need the source of this figure in order to consider for including in the Chapter text.
19238	42	30			same as page 35, figure 3.9. Because the source of organic carbon as wastes is more mportant in the cities (dense settlements) than in croplands or rangelands in dry areas, fluxes of organic matter wastes towards villages and croplands could be emphisized to improve SOC storage. This can be done only with a big chage of policy and possibility of trade between municipalities as waste collectors (or privite providers such as hotels, supermarkets etc...), compost or biomethane units and farmers for which the use of SOM as mulch, fertilizer, higher water retention properties could be generalized. [Pascal Podwojewski, France]	Rejected, no scientific evidence/publications provided to support the changes suggeste
26542	43	7	43	42	while not peer-reviewed, the synthesis and three thematic papers at http://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/empowerment-of-dryland-women.html may be useful (declaration, I am a co-author) [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Relevant text included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26544	43	43	44	8	Reference could be made here to Morton, J. (2017). Climate change and African agriculture: unlocking the potential of research and advisory services. In Nunan F. (ed.) Making Climate Compatible Development Happen (pp. 109-135). Routledge. Findings included general resource constraints of rural advisory services, disconnects between advisory policy and climate policy, the importance of adviiory services adopting commodity/value chain approaches and remaining open to engagement in input supply, new opportunities presented by ICTs, and the importance of mutual learning between multiple stakeholders. A less polished and longer (but more accessible) version is at http://gala.gre.ac.uk/14374/1/14374_Morton_Climate%2C_agriculture_and_knowledge_in_Africa_%28pub_PDF%29_2014.pdf [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, included.
976	43	43	44	8	Maybe the universities and research institutes (i.e. scientists) play a key role in knowledge divulgation. What is the role of a scientist in this process? [Jose Luis Vicente Vicente, Germany]	Noted. Chapter covers extensively the role of science and research, and of dissemination of research findings for addressing desertification-climate change interactions.
2954	43	19		21	as science-society collaboration is not taken into account, there is onyl one solution: More Research and collection! But what is also needed is finding a way to tackle gaps and uncertainties and act! There is progress in understanding and organizing science-society interaction/interface. Susstainability science and transdiscillinary approaches provide theories and practices on how to proceed under risk and uncertainty ...on how to identify solutions, create innovation, implement options and formulate policies... [Cordula Ott, Switzerland]	Noted. Relevant text included.
2952	43				not addressed is societal collaboration to increase understanding and normative decision-making... a bit mechanistic: especially actors' agency and t is missing [Cordula Ott, Switzerland]	Accepted. Relevant text included.
17238	44	6	44	8	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Accepted, references included.
14422	44	7	44	7	Add "youth" besides gender [Rattan Lal, United States of America]	Rejected. No scientific evidence/publications provided to support changes suggested by reviewer.
978	44	9	44	21	I miss a comment about the situation of some small farmers in Eastern Africa, where some rich people from Asia have come to the countries and bought the most fertile lands at a very low prices in order to implant monocrops. I think this is such an importatn threat to ladn tenure security. [Jose Luis Vicente Vicente, Germany]	Accepted, included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26546	44	17	44	20	This understates the long-established consensus on this point, backed up by a considerable literature, e.g. Lane and Moorehead "New Directions in rangeland and resource tenure and policy" in Scoones (ed) New Directions in Pastoral Development inAfrica, IT Publications 1995 and Behnke, R. (1994). Natural resource management in pastoral Africa. Development Policy Review, 12(1), 5-28. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, we included more evidence and emphasized on this point.
25516	44	20	44	21	This gives the impression that needs for research exist only for individual tenure systems. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, text revised, included communal land tenure and cooperatuve land tenure.
25108	44	30	44	30	From first page of the draft till now (page 44) most examples are from Africa and Asia. We know that desertification is a major issue in those two continent but regional equity has not been considered in the report. [Sayed Masoud Mostafavi Darani, Iran]	Accepted, we have enlarged the coverage of other regions. We need to keep in mind that this may be a natural and expected outcome since a far predominant share of drylands are located in these two continents. See figure 3.2.
10418	44	48	44	48	"Decreasing power and role of traditional community institutions resulted in lower success rates of community-based programs for rangeland management in Dirre, Ethiopia (Abdu and Robinson, 1 2017)." I do not know about any shift in policy that may lead to deceasing power and role of traditional community institutions in Etrhiopia. This statement needs to include why this so [Zitouni Ould-Dada, Italy]	Accepted, the reason for this is included: top down management by Government which marginalizes community institutions.
9098	44		72		check twice all refernce, and use one format. Do not use co-authrors use names of all authrors, thanks [Amanullah Amanullah, Pakistan]	Accepted.
5460	44	21			redistribution reforms. very controversial strategy. It may even lead to more fragmenetaion in land use and worsen desertification [Daniel Danano Dale, Italy]	Accepted, text revised.
5462	44	48			Decreasing power and role of traditional community institutions resulted in lower success rates of community-based programs for rangeland management in Dirre, Ethiopia (Abdu and Robinson, 1 2017). I do not know about any shift in policy that may lead to decreasing power and role of traditional community institutions in Etrhiopia. This statement needs to include why this so [Daniel Danano Dale, Italy]	Accepted, text revised.
24186	45	7	45	7	this portion is very well written but I would add that one of the major issues in desertification research is that major research university may not look to desert research in general as a cuttiong edge science, additionaly funding for desert research even in major economies is slim, let alone existing in some cases. The study of planetary desert as dune on Titan and Mars has actually largely contributed to bring desert science back to academia e.g. Sharma et al., 2018 [Heggy Essam, United States of America]	Accepted.
17240	45	21	45	21	Why research is needed only for mitigation? Please, clarify [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Research is needed not only on mitigation but also adaptation. Text corrected accordingly.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10884	45	35	45	35	This is a very old reference and it does not seem to justify the point being made here. If these issues are still true, a more current literature is preferred. [Debra Roberts, South Africa]	Accepted. Done. More recent reference added.
10886	45	47	45	47	First usage of the acronym, please define. [Debra Roberts, South Africa]	Accepted.
19724	45	48	45	48	At national level, countries develop NAPs; however, due to…… [Sabit Erşahin, Turkey]	Accepted.
24354	45	7	46	7	Other emerging policy issues that would require further research (UNCCD, 2015. Outcomes and policy-oriented recommendations from the UNCCD 3rd Scientific Conference. https://www.unccd.int/sites/default/files/sessions/documents/ICCD_COP12_CST_2/cst2eng.pdf) - Cross-boundary impact of land degradation and climate change on the drylands' land users: In the context of globalized markets,the flow-on effects that land degradation and climate change on drylands have in other climatic and ecological systems through migration, markets, insecurity and conflict need to be explored scientifically - Land speculation: Increased speculation on land and large-scale land acquisitions are likely to have huge social consequences from the international to the local level, altering both access to and the use of natural resources - Land transformation and land degradation: the loss of ecosystem services that were provided by natural ecosystems prior to their transformation can bring about a degradation of agricultural systems, which could affect human well-being at medium to long timescales. The dependence of production landscapes on services provided by natural ecosystems needs to be further studied, to inform land-use planning and the balancing of intensification and extensification in land use; - New trends in land-use change: Relatively recent trends towards major extractive land-use changes (such as mining) and landscape alterations for irrigated agriculture may lead to irreversible changes of landscape and land productivity, affecting future livelihoods - Income diversification and land-based adaptation to climate change: Studies are needed on the ramifications of income diversification (and the barriers to it) in rural drylands in the face of climate change and land degradation; - Resilience-conferring actions: While research has been conducted into the rehabilitation or restoration of already-degraded land and mitigating land degradation under degrading use, less is known about resilience-conferring actions that can prevent or mitigate the degradation of land under non-degrading use, particularly also in the light of climate change [Barron Joseph Orr, Germany]	Accepted and incorporated
10902	45	18	47	8	2004 is a long time ago. You might want to consider a more recent source to also capture what has published since then, [Debra Roberts, South Africa]	Noted. More recent references reviewed, old reference removed
11444	45	7			Please give attention to paragraphing. This example of a full-page paragraph is extreme. Each paragraph should contain one main message with a few supporting arguments. [Debra Roberts, South Africa]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19240	45	20			Unless waterharvesting from surface water, the use of fossil water table for crop irrigation even for smallholders is not sustainable in drylands especially in areas where water is needed as drinking water. The better use of rainfed agriculture even in areas <200 mm rainfall is possible with selected crops, appropriate crop rotation, and wise organic matter management. [Pascal Podwojewski, France]	Accepted, a sentence added to capture the suggested idea. However, the original statement only calls for more research on the impact of current agricultural development trends on the drylands i.e. in terms of exacerbating or otherwise the effect of climate change and desertification
2314	45	40			Delete "a" before "means" [María Almagro Bonmatí, Spain]	Accepted. Done. More recent reference added.
11446	45	42			An aside comment: in developing countries local farmers often lack the knowledge, capacity or finances to make adjustments in their practices. What is the situation in developed countries where the farmers do not lack either knowledge or capacity – do they make the necessary adjustments? [Debra Roberts, South Africa]	Accepted. Comment well taken. Lack of implementation capacity is an issue everywhere but more apparent in the developing world for obvious reasons. Statement modified accordingly
10888	46	6	46	7	This sounds somewhat prescriptive. [Debra Roberts, South Africa]	Accepted. Prescriptive sounding text removed.
10894	46	11	46	11	Consider replacing 'industry sector' with 'non-agricultural industries' since there are agro-allied industries. [Debra Roberts, South Africa]	Accepted, revised.
17242	46	12	46	13	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Accepted, references added.
10890	46	13	46	14	The sentence ' Moreover, usually women and girls spend considerable amounts of time collecting fuelwood.' seem out of place here. [Debra Roberts, South Africa]	Accepted. Removed.
25110	46	19	46	19	When we say "many countries" is not suitable and scientific to insist on the name of 2 countries!...in the latter sentence an Iranian paper was referenced but it is not logical to include Iran because in some cases renewable energy is being used in rural communities. .....https://www.sciencedirect.com/science/article/pii/S2214317316300762 https://www.researchgate.net/.../305537328_Renewable_energy_development_in_rural_... [Sayed Masoud Mostafavi Darani, Iran]	Accepted, text revised to include more examples. We studied the first paper you suggested, could not access the second.
19618	46	19	46	20	The word "Iran" is suggested to be deleted; because social and political issues are not barriers to expending energy renewable in Iran, rather it can be argued that illegal sanction by the USA has adversely effected Iran's development in expanding renewable energy production. [sadegh ziayan, Iran]	Noted. The text was revised following other comments.
19610	46	19	46	22	Unfortunately, the average energy consumption in oil and gas producing countries of Persian Gulf and Africa is far higher than the average global consumption. It is imperative that the oil and gas exporting countries devote part of their financial means to the production of renewable energy with the scientific support of international organizations. It should be noted that most oil and gas exporting countries have high potential for solar energy production. [sadegh ziayan, Iran]	Rejected. Policy-prescriptive.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19620	46	21	46	21	Add to the beginning of the line 21: "Iran intends to acquire technologies pertaining the production of renewable energy resources in order to align itself with sustainable development objectives." But "sanctions by the UN and by the US have affected international trade and financial transactions with Iran, which has made technology transfer and financing renewable energy projects more difficult and expensive. The sanctions have also limited foreign investment in different sectors, including renewable energy". Source: Moshiri, Saeid, Lechtenböhmer, Stefan, 2015, "Sustainable Energy Strategy for Iran", Wuppertal Institute for Climate, Environment and Energy, Berlin. [sadegh ziayan, Iran]	Rejected. Policy-prescriptive.
17244	46	27	46	33	unclear what is meant by away of agricultures. No single reference in this para [Jose Manuel Moreno Rodriguez, Spain]	Accepted, clarified, references included.
19048	46	29	46	30	It is necessary to improve the qualification level of local population. As mentionned above , the the autochthonous have to leave the agricultural sector (especially pastoralism) and converting to industry or services, as these dry areas are not intended to be agricultural areas [Azziz Hirche, Algeria]	Noted, we included text on education for economic diversification. We dont share your pessimism about agricultural potential of drylands.
10892	46	39	46	40	This sounds somewhat prescriptive. [Debra Roberts, South Africa]	Accepted, deleted.
5034	46	39	46	40	Does this sentence refer to fossil fuel prices or the prices of commodity crops (and if so which crops)? [Eamon Haughey, Ireland]	Noted. This sentence was deleted further to other comments.
17246	46	39	46	40	Policy prescriptive. Please, rephase [Jose Manuel Moreno Rodriguez, Spain]	Accepted, deleted.
3376	46	40	46	40	Desertification is considered the most serious environmental problem facing Sudan, Which lies within the zone where the risks of desertification are high. The area that is threatened by desertification hazard lies between latitudes 18 degrr N extending across the country from east to west covering a total area of 65 million ha . According to Kassas (1991) the vegetation belt in Sudan has moved South wards by 150 Km in 20 years (1970-1990). Most of the rain – fed cropping land between 15 degree and 17 degree N was lost due to movement of the sand from the Libyan desert .According to Sudan National Council for Research m the area classified as a semi – desert region (100 – 300 mm in the country between 14 N and 16 N and occupying 350.000 Km Squares has now become a desert (Lewis 1975) [Nagla Hamadain, Sudan]	Noted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3378	46	40	46	40	In Sudan about 5 time 10 five squares kmsquers are directly affected by desertification. More than half of population of Sudan lives in the area. The recent increase of population has led to the impoverishment of the natural resources of the semi – arid zone of the Sudan the high variability of rainfall , which is a norm or the typical arid zone indices high vulnerability of the ecological systems rendering it more prone to desertification of the land , is irrationally used by man. The desert through desertification is not a desert encroachment from the north to the south , but the expulsion of man destructive activities northwards into the arid fringes of the Sahara . Desertification is a process of the destruction of the ecological potential of land use through incompatible utilization in the desert marginal zone which ultimately leads to desert extension through man himself. [Nagla Hamadain, Sudan]	Noted.
10896	46	44	46	45	This is a dated reference and might not be pertinent to the present reality. [Debra Roberts, South Africa]	Accepted, recent references added.
980	46	27	47	42	Part of the drylands and high risky areas are placed in the Mediterranean basin, and most Mediterranean areas are placed within the European Union, I miss an analysis about the influence of the Common Agricultural Policy on desertification. [Jose Luis Vicente Vicente, Germany]	Accepted, we enlarged our discussion of desertificartion in EU. Your indicated that CAP is a driver of desertification, so such discussion fits better to our drivers section, rather than here on responses. We mentioned on the role of agricultural support programs that can driver desertification and referred to a paper. However, we cannot study the implications of each specific regional, national policy on desertification due to scope limitations.
5464	46	8			traditional biomass for the majority of their energy sources. What purpose does the word tradition serve here? What does it specify? Is there calssification for biomass like traditional/ modern or scientific? [Daniel Danano Dale, Italy]	Noted. Traditional biomass is a term including fuelwood and agricultural residues. Elaborated accordingly in the text.
11448	46	8			It is inconceivable why developing countries, and women / girls burning wood, are the focus in this section. Line 19 should read “many countries (e.g. USA...) face important social and political barriers….” Please see http://www.globalissues.org/article/231/climate-justice-and-equity The IPCC should not be propagating the biases and injustices of the past. In fact, this entire section 3.7.3 is focussed on developing countries. It is inconceivable why developed countries with high emissions and at risk of desertification are completely excluded from the debate. [Debra Roberts, South Africa]	Accepted, we included relevant text on developed countries. The focus on developing countries is related to dominance of biomass in energy consumption and related impacts of deforestation and fuelwood collection on desertificaton. This aspect is not a major source of desertification in developed countries. Transition to renewables, however, in developed countries would contribute to climate change mitigation. We touched this aspect now to some extent.
1748	46	12			The sentence 'Use of biomass for energy, mostly fuelwood, crop straws and livestock manure, often leads to deforestation and desertification in drylands.' needs some references to support it. This is certainly conventional wisdom, but this is not a clear-cut issue by any means. Remember the so-called 'fuelwood crisis' in the Sahel of the 1970s and 1980s which never came to pass! [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, text revised.
15746	46	24			Improving the social awareness about the benefits of transitioning to NUCLEAR ENERGY AND renewable energy resources, such as hydro-energy, solar and wind energy contributes to their improved adoption (Aliyu et al., 2017). [Ameneh Khalilzadeh, Iran]	Rejected. Here we are discussin about renewable energy, so nuclear is not the focus of discussion here.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19242	46	25			The developement of solar pumps has a catastrophic effect on the water table in Tunisian oasis : artesian wells disappear, the 3 stages of vegetation disappear for date palm monoculture, the fossil watertable decrease dramatically, and soil salinisation is generalized in irrigated plots [Pascal Podwojewski, France]	Rejected. Solar water pumps do not cause these, they are just technologies replacing more expensive diesel pumps. What causes these land degradation issues is improper irrigation and drainage, growing human needs and resulting agricultural expansions, unsustainable land management.
10898	47	3	47	8	This is a dated reference and might not be pertinent to the present reality. [Debra Roberts, South Africa]	Accepted, recent references added.
17248	47	8	47	11	Policy prescriptive. Please, rephase [Jose Manuel Moreno Rodriguez, Spain]	Accepted, text revised.
17250	47	15	47	17	unclear what is meant by being obliged [Jose Manuel Moreno Rodriguez, Spain]	Accepted, text revised.
10900	47	18	47	18	This is a dated reference and might not be pertinent to the present reality. [Debra Roberts, South Africa]	Accepted. Old reference dropped.
10904	47	24	47	30	These are dated reference and might not be pertinent to the present reality. [Debra Roberts, South Africa]	Accepted, recent references added.
10906	47	31	47	42	You might want to also consider the negative implications of rapid urbanisation in many African countries. Although it seems to be solving one problem, there are other emerging challenges including the rapid increase in urban sprawl (and its attendant challenges), pressure on infrastructure, massive unemployed due to limited employment opportunities, etc. All these have implications for the adaptive capacities of people migrating into cities. [Debra Roberts, South Africa]	Accepted, text included.
1688	47	31	47	42	While this theory about the benefits of urbanization is interesting it seems to neglect the negative impacts of urbanization and rural depopulation, including the loss of traditional knowledge and customary sustainable use practices that are valuable for adaptation, and the loss of public services like schools and transport services on the countryside. [Simone Lovera-Bilderbeek, Paraguay]	Accepted, we considered this suggestion, and included text on this topic. The evidence on the losses is mixed.
26406	47	40	47	41	these units are not very common, please could you be more specific about their meaning? [Hans Poertner and WGII TSU, Germany]	Noted. There is no any units in the lines and page referred to, but we will keep this comment in mind throughout the text.
26412	47	26	50	18	title of section 3.8.1 does not correspond with content of subsections - there is not one single case study but several examples. Please rephrase [Hans Poertner and WGII TSU, Germany]	Rejected. The case study was revised since FOD. We think the title matches the contents accurately.
26414	47	25	63	36	The wide variety of interesting and important case studies and the coverage of diverse, globally balanced set of case studies is to be commended. Well done. [Hans Poertner and WGII TSU, Germany]	Noted, thank you.
19244	47	24		42	same as number 5 and 10 : trades of organic wastes from cities to countryside [Pascal Podwojewski, France]	Noted. We think that trade of organic waste from cities to rural areas does not fit the content of these lines. But we will keep this in mind in other relevant sections.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10908	48	8	48	11	These references are almost 20/more than years. What has happened since then? [Debra Roberts, South Africa]	Accepted, Updated figures according to new literature have been added
26408	48	11	48	12	How can the erosion decrease but its intensity increase? This process is a bit unclear. Please rephrase. [Hans Poertner and WGII TSU, Germany]	Accepted,Thank you corrected
10912	48	21	48	45	There is no reference to Africa in this sub-section. You might want to consider including an example. [Debra Roberts, South Africa]	Accepted,References and figurs added
19726	48	26	48	26	……according to FAO (2015), rates……. [Sabit Erşahin, Turkey]	Accepted, Corrected
2318	48	26	48	27	I am not sure about the fact that soil erosion rates have been substantially reduced. Please add a comment here to clarify the such statement. The reference by FAO 2015 is missing in the reference list, so I could not check whether such statement is correct or not. [María Almagro Bonmatí, Spain]	Accepted, Conflicting sentence was deleted as it referred to the magnitude of erosion in temperate rangelands
10910	48	31	48	31	Dated reference [Debra Roberts, South Africa]	Noted, Reference is Ketrtis, 2003
5036	48	32	48	33	Not clear what the meaning of '29.2 x 106 ha' represents here. [Eamon Haughey, Ireland]	Accepted, Corrected
19728	48	41	48	41	……..Pakistan to be 6341 tkm-2yr-1 and that……. [Sabit Erşahin, Turkey]	Accepted, Corrected
6906	48	1	62	20	Will the case studies better presented in form of tables? [Wilfran Moufouma Okia, France]	Noted. We have decided to maintain the current format as the studies only highlight some key aspects
1574	48		62		These case studies need to focus/incorporate more on social-economic responses and impacts with some numbers or figures. This information will help to explain how desertification would directly affect the people lives [Rajesh Chintala, United States of America]	Accepted, Case studies have been improved, although we cannot deliver what the reviewer is suggesting at this moment
18866	48	1	64	40	what relationship for this section and other sections in this chapter, the introduction should be given for the relationship for this section and other sections. [Jianguo Wu, China]	Noted. Thank you. Short introduction and objectives of the subsection has been included
18868	48	1	64	40	From Figure 3.10 to Figure 3.18, the figures are not clear and essentials, the figures can be removed if no essentials. [Jianguo Wu, China]	Accepted. Some figures were eliminated
19246	48	4		13	Montgomery, D. R. (2007). Soil erosion and agricultural sustainability. Proceedings of the National Academy of Sciences, 104(33), 13268-13272. [Pascal Podwojewski, France]	Noted. Relevant literature added
19248	48	4		13	the two preceeding references are much more uptodate to describe soil erosion status in the world [Pascal Podwojewski, France]	Accepted, added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19392	48	4		13	Deininger, K., & Byerlee, D. (2011). Rising global interest in farmland: can it yield sustainable and equitable benefits?. World Bank Publications. [Pascal Podwojewski, France]	Noted
2316	48	13			The following reference should be included to reinforce the statement: Boix-Fayos, C., Martínez-Mena, M., Arnau-Rosalén, E., Calvo-Cases, A., Castillo, V., & Albaladejo, J. (2006). Measuring soil erosion by field plots: understanding the sources of variation. Earth-Science Reviews, 78 (3-4), 267-285. [María Almagro Bonmatí, Spain]	Accepted
1750	48	21			The authors might perhaps note in this section several papers that look at trends in dust storms (indicating trends in wind erosion). For example: Kim J., (2008). Transport routes and source regions of Asian dust observed in Korea during the past 40 years (1965–2004). Atmos. Environ. 42(19), 4778-4789.Kang, L., Huang, J., Chen, S., & Wang, X. (2016). Long-term trends of dust events over Tibetan Plateau during 1961–2010. Atmospheric Environment, 125, 188-198. Ridley, D. A., Heald, C. L., & Prospero, J. M. (2014). What controls the recent changes in African mineral dust aerosol across the Atlantic?. Klingmüller, K., Pozzer, A., Metzger, S., Stenchikov, G.L. and Lelieveld, J., 2016. Aerosol optical depth trend over the Middle East. Atmospheric Chemistry and Physics, 16(8), pp.5063-5073. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Some suggested references were included to improve the section
19394	48	26		29	appropriate reference to add: Montgomery, 2007 same as line 14; but also Den Biggelaar, C., Lal, R., Eswaran, H., Breneman, V.E. & Reich, P.F. 2003. Crop losses to soil erosion at regional and global scales: evidence from plot-level and GIS data. In K. Wiebe, ed. Land Quality, Agricultural Productivity, and Food Security. pp. 262-279. UK, Cheltenham, Edward Elgar. [Pascal Podwojewski, France]	Accepted,
19396	48	29		32	Add this reference Wiebe, K. D. (2003). Linking land quality, agricultural productivity, and food security. U.S. Department of Agriculture. Agricultural Economic Report No. 823 [Pascal Podwojewski, France]	Noted
26410	48	29			“worst” is judgmental - please rephrase, e.g., “most notable” or similar [Hans Poertner and WGII TSU, Germany]	Accepted, Corrected
17252	49	1	49	1	I found this section extremely weak. In general, the links between climate change and erosion in arid lads are poorly developed it at all [Jose Manuel Moreno Rodriguez, Spain]	Rejected. In fact, we emphasized the links between soil erosion and climate change in the case study. However, following this comment we further strengthened the narrative linking climate change and soil erosion in our case study.
17254	49	2	49	2	"Future climate change". But whcih climate change. Specffy what scenario and time framework and provide a reference [Jose Manuel Moreno Rodriguez, Spain]	Noted, The satetment is general as it tries to introduce the paragraphs related to affected mechanisms}

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25590	49	3	49	3	The impact of glacier on soil erosion is not clear. This is a topic of intense research which aspects are controversial. Actual knowledge tends to show that glacial erosion depends on several factors such as the lithology, the geomorphology of the basal landscapes, its rehology, the speed and nature of ice (cold glacier stabilize the substratum vs warm based glaciers that increases erosion). It implies that glacial retreat does not necessarely induce an increase of soil erosion. Line 3 could thus be rewritten with caution : "glacier retreat could increase soil erosion in certain regions and reduce the production of fine sediments in others (REF)". [Pierre-Henri Blard, France]	Accepted, Clarification has been made
3380	49	10	49	10	The consequences of desertification depend on the following four functions that vary by region country and year : [Nagla Hamadain, Sudan]	Noted, Comments seems to be incomplete
17256	49	12	49	12	"predicted climate change". No probability is associated to future climate change. Therefore, the word "prediction" must not be used. Instead, projected, is recommended [Jose Manuel Moreno Rodriguez, Spain]	Accepted
17258	49	16	49	16	This examples does not align with the heading. There is no succesfful restoriation or rehabilitation here but just a description of the problem [Jose Manuel Moreno Rodriguez, Spain]	Accepted Section has been modified,
19730	49	16	49	16	3.8.1.4.1 Soil Erosion and…….. [Sabit Erşahin, Turkey]	Noted, Section has been modified, when possible unceratainty language has been added. However these case studies are intended to illustrate strategies to address desertification
19052	49	16	49	35	3.8.1.4. 1 is it in adequacy with 3.8.1.4.Successful Restoration and Rehabilitation Examples ??? The reforstation and agro-pastoral plantations led by DGF (Forest adminstration) and HCDS (agro-pastoral adminstration) are more relevant in this paragraph [Azziz Hirche, Algeria]	Accepted Section has been modified,
1592	49	16	49	35	section 3.8.1.4 doesn't have information about any successful rehabilitation learning points. It just stated the problem and not talked about any rehabilitation efforts (please add if any have) [Rajesh Chintala, United States of America]	Accepted Section has been modified,
7542	49	19	49	19	Almost, the same constations was mentioned by Elouissi et al. (2017) in Macta watershed (Northwestern Algeria). • Elouissi A, Habi M., Benaricha B. & Boualem S. A. (2017).Climate change impact on rainfall spatiotemporal variability (Macta watershed case, Algeria). Arabian Journal of Geosciences, ISSN 1866-7511. Volume 10, Number 22. Arab J Geosci (2017) 10:1-14. DOI 10.1007/s12517-017-3264-x [Abdelkader Elouissi, Algeria]	Noted
19050	49	20	49	21	See : Salamani M., Kadi Hanifi H., Hirche A, Nedjraoui D., 2013. Évaluation de la sensibilité à la désertification en Algérie. Revue d'écologie; 68 (1) 71 - 84. [Azziz Hirche, Algeria]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5038	49	23	49	24	For further context it would be useful to know what the current population density is and/or what the numeric change in population has been since independence. [Eamon Haughey, Ireland]	Accepted. Population data has been added
17260	49	23	49	24	Growth rate is unclear [Jose Manuel Moreno Rodriguez, Spain]	Accepted. The growth rate was clarified
17262	49	27	49	35	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Additional reference has been added
19556	49	15	51	9	It will be necessary to appreciate the possibility of adding the Zaï experience to Burkina Faso [Ibouraïma Yabi, Benin]	Rejected. Case studies are presented here only to illustrate few successful stories/hot spots, not to produce a comprehensive report or erosion and control
21340	49	15	64	40	Solutions to tackle specific forms of land degradation could be added more systematically. For instance see for salt-induced degradation: Qadir, M., Quillérou, E., Nangia, V., Murtaza, G., Singh, M., Thomas, R.J., Drechsel, P., Noble, A.D. (2014) Economics of Salt-induced Land Degradation and Restoration. Natural Resources Forum, A United Nations Sustainable Development Journal, 38(4): 282–295. for land rehabilitation after mining: McNeill, T, Quillérou, E (2016) Making money after mining: farming on rehabilitated open cast mines can lead to increased revenues – but it needs to be maintained. The Solutions Journal, Special issue on "Sustainable Land Solutions", September-October, 74-79. For examples of integrative solutions: Quillérou, E., Thomas, R.J., Guchgeldiyev, O., Ettling, S., Etter, H., & Stewart, N. (2016). Economics of Land Degradation (ELD) Initiative: Broadening options for improved economic sustainability in Central Asia. Synthesis report. Report for the ELD Initiative from the Dryland Systems Program of CGIAR c/o ICARDA, Amman, Jordan. Available from www.eld-initiative.org For an example of benefits to agriculture and reduced dam maintenance costs brought by soil and water conservation structures: Quillérou, E. (2016) Economic valuation of infrastructure for land and water management: case study in apricot-olive farms in the governorate of Kairouan, Tunisia [in French]. Consultancy report for GIZ Tunisia in relationship with the project for Promotion of Sustainable Agriculture and Rural Development in Tunisia (PAD) and the Economics of Land Degradation (ELD) Initiative. Informed by contributions from the PAD project team and local stakeholders. For an example of benefits to agriculture of reintegating more legumes in cropped areas: Quillérou, E. (2015) Legumes in North-West Tunisia: benefits for soils but what economic benefits? Assessing the economic viability of expanding legume production in North-West Tunisia [in French]. Consultancy report for GIZ Tunisia in relationship with the project for Promotion of Sustainable Agriculture and Rural Development in Tunisia (PAD) and the Economics of Land Degradation (ELD) Initiative. Informed by contributions from the PAD project team and local stakeholders.	Rejected. Case studies are presented here only to illustrate few successful stories/hot spots, not to produce a comprehensive report or erosion and control
19250	49	3		4	Generally regressive erosion depends on the base level. If sea level rises, the regressive erosion should decrease (only coastal erosion increases) [Pascal Podwojewski, France]	Accepted. Specification has been made

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11450	49	3			Please explain the connection between glacier retreat and soil erosion? It seems to be very important, being mentioned first? [Debra Roberts, South Africa]	Accepted, Explanation provided
25770	50	1	50	9	Figure not needed, concentrate on figures that are policy relevant or provide conceptual or mechnistc understanding [Hans Poertner and WGII TSU, Germany]	Accepted. Figure deleted
7574	50	3	50	3	There should have a reference (a source) for the Figure 3.10 [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. Figure deleted
7576	50	4	50	9	If this text is a note, it should be indicated [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. Figure deleted
19732	50	4	50	9	Indent both sides [Sabit Erşahin, Turkey]	Accepted. Figure deleted
17264	50	10	50	10	This seems a good example, but the way it was explained does poor justice to its value. This section would benefit afrom rewriting, making it more declarative and providing measures of the lessons learned of the case. [Jose Manuel Moreno Rodriguez, Spain]	Rejected. We value the positve feedback provided by the reviewer but the structure has not been changed. Lessons learnt form all case studies were added
16032	50	10	50	10	What stands for no-till? It should be defined or it should be substituted with no-tillage that is of easier comprehension [Tiziana Susca, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. A short defeinition is provided
2514	50	19	50	20	It is not clear to what the seven and fifteen years refer. Please clarify. [William Lahoz, Norway]	Accepted. Clarification has been provided
17266	50	23	50	23	Mediterranean climate… of Chile [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Clarification has been made
17268	50	25	50	25	This example needs to be supported by literature. The outcomes of the success story of this case are poorly explained, and no data were provided. [Jose Manuel Moreno Rodriguez, Spain]	Rejected. Lessons learnt form all case studies were added
19252	50	3		3	The picture 3.10 (2) with caracks is very often used abusively and out of context. Surface soil crusts with cracks are NOT related to any climate change, drought or any big erosion featture. Its a natural process which occurs after runoff as semidentary crusts (Valentin C, Bresson LM. 1992. Morphology, genesis and classification of soil crusts in loamy and sandy soils. Geoderma 55: 225–245.) This crust has its proper struture. The composition is generally richer in clays - and especially expansive clays that are more likely to occur with contrasted climate and lowlands. AFter drying the clays are shrinking (Braudeau, E., J.P. Frangi, and R.H. Mohtar. 2004. Characterizing nonrigid aggregated soil-water medium using its shrinkage curve. Soil Sci. Soc. Am. J. 68:359–370. or Peng X and Horn, R. 2015, Identifying Six Types of Soil Shrinkage Curves from a Large Set of Experimental Data Soil Sci. Soc. Am. J. 77:372–381). This occurs in low depressions filled seasonly with sediments in low depressions. If there are salts, the shrinkage can be bigger but the dispersion after a small rain is much bigger and the structure becomes coarser. [Pascal Podwojewski, France]	Accepted. Figure deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19254	50	21		23	Tillage or- No tillage deserves much more specification than just affirmation. According the fact that no till has been developed in industrial soybeans fields of south Brazil and north argentina with the systematic use of glyphosate to provide a mulch with weeds, this easy process cannot be applied in sandy soils (Arenosols) of drylands. Because frequent tillage not only limit the weed competition for water, but it IS THE ONLY WAY to brake the soil capillary rise through micropores that need to be brocken, if not the soil surface is crusting and crops are dying (case of olive orchards below 200mm rainfall). Its a dilemma: frequent Tillage reduces the inputs of organic matter, compacted the soil and bare soil is prone to aeolian erosion BUT without tillage, soil evaporation is too fast (capillary rise) and trees are getting weak and die. [Pascal Podwojewski, France]	Rejected. The case study does not look for setteling the dabate around No Tillage. We only want to highlight its use to congrol erosion
19734	51	6	51	6	...harvesting for fuel. [Sabit Erşahin, Turkey]	Noted, I rearranged those sentences as a whole related with the sentence commented by the Reviewer and added “very likely”
21274	51	9	51	9	Maybe modern irrigation is employed but in expense of depletion of ground water use [Erhan Akca, Turkey]	Accepted, Comment well taken and addressed.
21276	51	9	51	9	Akça, E., Takashi, K., & Sato, T. (2015). Development and Success, For Whom and Where: The Central Anatolian Case. In Land Restoration (pp. 533-541). [Erhan Akca, Turkey]	Accepted, Comment well taken and a new sentence added at the end of that para considering Akça et al. (2016).
17272	51	12	51	13	This sentnece needs to be clarified. What environmental change has caused sea level rise? Please, be specific and support this, at a minimum with previous IPCC reports. Why sea level rise is highest in tropical and subtropical regions needs to be supported.I believe this does not concur with previous IPCC assessments. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. The sentence changed to 'Current environmental changes including climate change, glacier and polar ice melt, floods, river flows',
17270	51	12	51	23	This introductory paragraph needs much rework. It is misleading in some statements, if not simpy wrong. Text need to be supported by the relevant literature. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Text revised. This cross-chapter case study was moved now to Chapter 4.
17274	51	16	51	18	Unclear sentence. "-- or some form of protected land" is misleading, since the previous lands are not protected. Please,clarify. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. The word 'other' deleted in the text. This cross-chapter case study was moved now to Chapter 4.
17276	51	19	51	20	"i) increased tidal activity…chaning climate…" This sentence is unclear. What has caused climate change until now? Please clarify and provide references. [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Text revised. This cross-chapter case study was moved now to Chapter 4.
10914	51	23	51	24	The texts in Figure 3.11 are quite blurry [Debra Roberts, South Africa]	Noted. The Fig 3.11 was taken from the referred paper. Copying from the original paper will make the text more clear. This cross-chapter case study was moved now to Chapter 4.
19736	51	25	51	25	…….tributaries (Kalhoro et al., 2017) [Sabit Erşahin, Turkey]	Accepted. The reference corrected. This cross-chapter case study was moved now to Chapter 4.
17278	51	26	51	26	The case study of the Indus delt has no connecteion to desertificacion and climate change [Jose Manuel Moreno Rodriguez, Spain]	Rejected. The connection to climate change is given (Rasul et al.,2012). Another reference added (Abbas et al., 2017), and desertification is land degradation in arid, semiarid and dry subhumid areas. This cross-chapter case study was moved now to Chapter 4.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7578	51	26	51	29	This text should be placed from the line 24 to 27 before the Figure 3.11 [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted. The text in line 27-29 on page 3.51 placed before Figure 3.11. This cross-chapter case study was moved now to Chapter 4.
25518	51	27	51	29	The point made here could be made at greater length - that salination and water logging in Sindh is also caused by over-irrigation upstream. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Added to the text 'The salinization and water logging in the upcountry areas including Sindh and Punjab provinces is caused by seepage from the irigation network and over-irrigation'. This cross-chapter case study was moved now to Chapter 4.
19910	51	36	51	36	Net ecosystem productivity (NEP) in South……. [Sabit Erşahin, Turkey]	Rejected. There no such phrase in page an dline number given by the Reviewer. We also checked the rest of the text, no such phrase. This cross-chapter case study was moved now to Chapter 4.
3894	51		52		Nicely written however description about Fig. 3.11 is not clear. I would suggest to make it more more precise. [Pushp Raj Tiwari, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. The caption of Fig 3.11 changed to 'Sea water intrusion in the Indus delta through its major creeks and tributaries'. This cross-chapter case study was moved now to Chapter 4.
19054	51	12	54	6	Same question : 3.8.2 is it in adequacy with 3.8.1.4.??? [Azziz Hirche, Algeria]	Taken into account. The section 3.8.2 is not the same as section 3.8.1.4. The latter deals with erosion whereas 3.8.2 is about inland intrusion of sea water. This cross-chapter case study was moved now to Chapter 4.
19738	52	2	52	2	….barrage (about 200 km upstream of the Indus delta)…. [Sabit Erşahin, Turkey]	Accepted. The text changed; '200km' changed to '200 km'. This cross-chapter case study was moved now to Chapter 4.
25772	52	4	52	7	Figure not needed, concentrate on figures that are policy relevant or provide conceptual or mechnistc understanding [Hans Poertner and WGII TSU, Germany]	Accepted. Figure 3.12 deleted. This cross-chapter case study was moved now to Chapter 4.
19740	52	7	52	7	(Kalhoro et al., 2017) [Sabit Erşahin, Turkey]	Taken into account. As Fig 3.12 has been deleted, the comment is no more valid. This cross-chapter case study was moved now to Chapter 4.
19742	52	15	52	15	……..reached 84 km……. [Sabit Erşahin, Turkey]	Accepted. This cross-chapter case study was moved now to Chapter 4.
10916	52	18	52	18	This is a dated reference and might not be pertinent to the present reality. [Debra Roberts, South Africa]	Noted. The present circumstances have not changed much. The text amended bu changing 'is causing' to 'causes'. This cross-chapter case study was moved now to Chapter 4.
17632	52	18	52	19	he lake Umia is an interesting case, but the connection to desertification and climate change is wanting [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Text added in the end of paragraph. This cross-chapter case study was moved now to Chapter 4.
17280	52	20	52	20	Change ingresion by intrusion [Jose Manuel Moreno Rodriguez, Spain]	Accepted. "ingression' changed to 'intrusion'. This cross-chapter case study was moved now to Chapter 4.
17284	52	21	52	23	Unclear sentece. How was water atracted? [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Text improved; 'attracted' changed to 'affected'. This cross-chapter case study was moved now to Chapter 4.
5040	52	22	52	22	The term fresh water may be more generally understood than sweet water (if the intended meaning is the same) [Eamon Haughey, Ireland]	Accepted. Text revised; 'sweet water' changed to 'fresh water'. This cross-chapter case study was moved now to Chapter 4.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17282	52	22	52	22	Change sweet water to fresh water [Jose Manuel Moreno Rodriguez, Spain]	Accepted. 'sweet water' changed to 'fresh water'. This cross-chapter case study was moved now to Chapter 4.
19256	52	6			Same as line 20. The picture 3.12 (2) with the cracks is not appropriate, and generates a false idea of degrdation or desertification. I can show pictures with similarvsoil surface features in very productive jessours (small very productive terreces used for centuries for waterharvesting in Northern Africa). [Pascal Podwojewski, France]	Accepted. Figure 3.12 deleted. This cross-chapter case study was moved now to Chapter 4.
19258	52	10			I don't understand erosion rate expressed as km year. It could be expressed as a surface affected by erosion or a volume (or as a weight) per hectare. [Pascal Podwojewski, France]	Rejected. The unit km/yr is correct; it is the length of seawater intrusion landward when images of different years were compared. This was ascertained from the senior author through email contact. The word 'erosion' in line 10 has een changed to 'intrusion'. This cross-chapter case study was moved now to Chapter 4.
19260	52	14			A "high" salinity of 0.18 mg /L is absolutely not saline at all, its very soft water. [Pascal Podwojewski, France]	Accepted. The word 'high' has been deleted. This cross-chapter case study was moved now to Chapter 4.
1752	52	19			Is Lake Urmia really affected by sea water ingression as suggested? It is a long way from the sea. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Text revised; 'sea water' changed to 'salty water'. This cross-chapter case study was moved now to Chapter 4.
10918	53	1	53	1	What do the colours in Figure 3.13 mean? [Debra Roberts, South Africa]	Accepted. Caption added: 'The dark blue colour shows the water area of the lake and light blue clolour shows the dried up parts. This cross-chapter case study was moved now to Chapter 4.
25774	53	1	53	2	this needs some explanation in caption, what does the colour change signify in the lake? could these pictures be supplemented with a panel with a graphic on lake condition or similar? [Hans Poertner and WGII TSU, Germany]	Accepted. Caption added: 'The dark blue colour shows the water area of the lake and light blue clolour shows the dried up parts. This cross-chapter case study was moved now to Chapter 4.
17286	53	7	53	7	This is a good case study but of intrusion related to wate abstactrion due to human activities, not in relation to climate change [Jose Manuel Moreno Rodriguez, Spain]	Accepted. Text added. This cross-chapter case study was moved now to Chapter 4.
10920	53	12	53	13	It might be helpful to also provide information on what has happened since 2003. [Debra Roberts, South Africa]	Accepted. Text added: 'whereas in 2009, around 40,000 ha was abandoned (Romo-Leon et al., 2014). This cross-chapter case study was moved now to Chapter 4.
10340	53	14	53	30	The first half of this paragraph is relevant, as it relates to sea water intrusion in semi arid mangroves regions. The second half of the paragraph however is more general, and I think there is too much overlap with sections on mangroves in other chapters [John Devaney, Ireland]	Accepted. The second half (line 25 to 30) deleted. This cross-chapter case study was moved now to Chapter 4.
10338	53	17	53	17	I think a reference should be supplied for the carbon storage in mangrove ecosystems [John Devaney, Ireland]	Accepted. Reference provided. This cross-chapter case study was moved now to Chapter 4.
7580	53	22	53	24	In the sentence " Based on remotely sensed data, a sharp decline in the mangrove area was found in the arid coastal region of Hormozgan province in southern Iran during 1972, 1987 and 1987 (Etemadi et al., 2016)." , " 1987" has been mentionned twice, [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Taken into account. The year is 1887. This cross-chapter case study was moved now to Chapter 4.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2516	53	24	53	24	What is time-period for the ca. 1% mangrove degradation rate for Myanmar? Per year? [William Lahoz, Norway]	Taken into account. The rate is per year. This cross-chapter case study was moved now to Chapter 4.
19744	53	27	53	28	Indonesia (3,410 Ggt CO2 yr-1), Malaysia (1,288 Ggt CO2 yr-1), US (206 Ggt CO2 yr-1) and Brazil (186 Ggt CO2 yr-1). [Sabit Erşahin, Turkey]	Noted. The lines 25 to 30 deleted. This cross-chapter case study was moved now to Chapter 4.
25112	54	10	54	10	There are successful examples of Green Belt usage for combatting desertification in central Iran. The project was started near 50 years ago in Isfahan province. The related information can be presented if it is needed, [Sayed Masoud Mostafavi Darani, Iran]	Noted. We have already a case study from that region, i.e. Turkey. Need to keep regional balance in the coverage. We will keep this in mind though, it would have been really helpful if you referred us to some specific publications on this.
7582	54	18	54	18	The sentence "…. the Chinese government recognised that desertification and dust storms jeopardised livelihoods…." should be "…. the Chinese government recognized that desertification and dust storms jeopardized livelihoods…." [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted:We have revised the sentence.
19056	54	26	54	28	Please quote the references [Azziz Hirche, Algeria]	Accepted:We have added the references as follows:State Forestry Administration of China. 2015. A bulletin of desertification and sandification state of China. Available from:http://hmhfz.forestry. gov.cn/uploadfile/main/2015-12/file/2015-12-29-3264a2babd924d22995 dd5ed3602bccb.pdf . Wang T. 2014.Aeolian desertification and its control in Northern China. International Soil and Water Conservation Research, 2(4),34-41 Wang F, Pan X, Wang D, Shen C, Lu Q. 2013.Combating desertification in China: Past, present and future. Land Use Policy 31,311– 313.
5042	54	30	54	32	Meaning of "… the 'double reduction' since the reduction occurred in 2004" not clear [Eamon Haughey, Ireland]	Accepted:We have revised the sentence.
11452	54	8			This section reads a bit like a brochure or progress report. Do list all the activities in these examples, include any actual numbers that can shed more light on these project, mention for each whether the trees planted are indigenous (which has enormous implications in terms of biodiversity), in other words, some more scientific attention would improve this section. [Debra Roberts, South Africa]	Accepted:We have added new content for the Scientific and technological supports for combat desertification,emphesising on protecting local vegetation in desertification-prone lands and planting suitable indigenous tree or shrub or grass species according to local conditions in decertified lands or natural restoration of vegetation and conservation biodiversity
1754	54	12			The authors rightly state in this section that many desertification control projects in China have been established with one of the aims being to mitigate dust storms. However, evidence for the success of such schemes in this respect is mixed, at best. For a critical review, see Middleton, N., 2016. Rangeland management and climate hazards in drylands: Dust storms, desertification and the overgrazing debate. Natural Hazards, pp.1-14. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Partially accepted. Thank you for your comment and suggestion. Your comment has stimulated a lot of discussions and debates among the authors, but by the time of submitting the SOD, we have not yet reached an agreement on how to comprehensively address this comment. For this reason, we will allocate special time during the next Lead Author Meeting to discuss and finalize the response to your comment
19746	55	20	55	20	As a means to combat desertification, the government invested…….. [Sabit Erşahin, Turkey]	Noted, text revised.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10922	56	1	56	1	What do the colours in Figure 3.14 mean? [Debra Roberts, South Africa]	Acccepted: The green colored band represents the location of the green dam
25776	57	4	57	7	Figure not needed, concentrate on figures that are policy relevant or provide conceptual or mechnistc understanding [Hans Poertner and WGII TSU, Germany]	Rejected: I do not agree with the reviewer. Because these photos indicate us the examples of the best practice application in Turkey on the issue, and they are not policy relevant.
25778	58	1	58	3	Figure not needed, concentrate on figures that are policy relevant or provide conceptual or mechnistc understanding [Hans Poertner and WGII TSU, Germany]	Rejected: I do not agree with the reviewer. Because these photos indicate us the examples of the best practice application in Turkey on the issue, and they are not policy relevant.
1756	58	14			The authors should add Senegal and Djibouti to the list of cooperating planting countries to make the list complete. [Nicholas Middleton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, we have added the two countries
10924	59	3	59	14	Already, there are ongoing implementation in some of the partner countries and these should be reflected in this report. [Debra Roberts, South Africa]	Accepted, relevant information added.
17290	59	18	59	18	Please, reconcile the role of climate change on invasions with previious IPCC asesstment. [Jose Manuel Moreno Rodriguez, Spain]	Accepted: We add the following sentence supported by R5: In general, it is expected that the distribution of invasive plant species with high tolerance to drought or high temperature increased under Climate Change scenarios (medium to high confidence; Settele et al., 2014).
14424	59	18	59	24	It would be important to show other examples (e.g. less dry regions but with same problems). Suggests to add following: On the other hand, decreasing human population as common trend in developing and post-conflict countries such as Bosnia and Herzegovina, is also suitable for invasive species and weed expansion especially on abandoned land (Kapović Solomun, 2018). Reference: Kapović Solomun, M. 2018. Final report on Land Degradation Neutrality Target Setting Program in the Republic of Srpska, Banja Luka, Republic of Srpska, Bosnia and Herzegovina. [Rattan Lal, United States of America]	Rejected. Thank you for your suggestion. We need to focus on drylands because of differentiation with Chapter 4. Moreover, the idea that there is a trend of decreasing population in developing and post-conflict countries is not universally true. Thirdly, many post-socialist countries experienced such invasive species encroachment e.g. Russia, the reason being not population decrease, but lack of economic profitability of agriculture in some areas leading to abandonment of farming there. Still, we thought that this idea is important to explore and transferred the suggested sentence to Chapter 4 for consideration to be included there.
17292	59	20	59	24	Please, provide references [Jose Manuel Moreno Rodriguez, Spain]	Accepted: We added new references: Compared to more mesic regions, the number of species that succeed in invading drylands is low (Bradley et al 2012). Yet, drylands can be heavily impacted by invasive species in terms of their effect on biodiversity as well as the socio-economic wellbeing of resident communities (Lemaître et al 2011, 2015, Newton et al. 2011). Moreover, increasing human populations in dryland areas are responsible for creating new invasion opportunities as 38% of human population are supported by drylands (Safriel & Adeel 2005).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25520	59	16	62	20	While not peer-reviewed https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1196&context=envs_facpub is useful on prosopis and its livelihod impacts in Kenya. There is also plentiful literature on encroachment of Acacia drepanalobium (which is indigenous so not technically invasive) on rangelands in Southern Ethiopia. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	The reference on Prosopis and its livelihood impacts in Kenya would not be relevant here as the case study is only on three countries - Mexico, USA and Ethiopia. On the second point, as indicated in the introduction of the text on case studies on invasive plant species, it has clearly been indicated that there are many alien invasive plants even more important than A. drepanalobium but because of space limitation I have decided to restrict the narration to the two most important ones P. juliflora and P. hystrephorus
17294	60	6	60	8	The refeerence provided does not support the sentence [Jose Manuel Moreno Rodriguez, Spain]	Accepted: now added additional references (Rouget et al 2015). Due to the time lag between the first release of invasive species and their impacts, the consequences of invasions are not immediately detected and may only be noticed centuries after introduction (Rouget et al. 2015). Climate change and invaders such as exotic grasses may act in concert (Bellard et al., 2013, Hellmann et al. 2008, Seebens et al., 2015).
17296	60	8	60	12	These text needs to be supported by references [Jose Manuel Moreno Rodriguez, Spain]	Accepted: For example, the invasion of dryland ecosystems often changes fuel loads, which can lead to an increase in the frequency and intensity of fire (Evans et al. 2015). I have now rephrased the second sentence: We can expect that in areas where the climate is becoming warmer, an increase in the probability of suitable weather conditions for fire may in turn promote invasive species that are particularly prone to disturbed habitats, which in turn may lead to further desertification.
10926	60	13	60	18	Is there an explanation for the expected decrease by 2050? Is the projected decrease consistent across all RCP scenarios? Also, what accounts for the regional differences? [Debra Roberts, South Africa]	Answer: This projection represents an ensemble model of different statistical algorithms and 3 General Climate Models, which allowed us to include regional differences in climate projections (see Bellard et al., 2013 Global change biology for further details). The slight decrease is indeed consistent across the two emission scenarios. In fact, the species are more likely to shift their suitable conditions at higher latitudes so by keeping the same delimitations of dryland areas it can hide the fact that species are shifting and not completely disappearing. Moreover, temperature will become very high (with no analog situation on earth) so the model does not predict suitable values in this area. Finally, this subset of species is not a representative sample of IAS worldwide, just a subset of well-known invaders (IUCN list of the 100, Lowe et al., 2000) so the decrease predicted should be considered with cautious and not generalized to biological invasions within dryland regions.
17298	60	16	60	16	Using predicted is not appropriate since scenarios are not probabilisity representations of the future [Jose Manuel Moreno Rodriguez, Spain]	Accepted: Replace predicted by estimated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10928	60	22	60	22	The colour codes in Figure 3.18 is quite faint and will hardly be visible to those with colour blindness. It is also quite difficult to make out the outline of the map. Perhaps, consider wrapping the maps with boundaries and use colours that are more visible and with greater contrasts. [Debra Roberts, South Africa]	Accepted: now added an outline of the landmasses, which help to distinguish the colour on the figure. Unfortunately, there is no colour blindness option in the argument of the package.
5044	60	23	60	24	Clarity of the figure 3.18 could be improved by adding an outline of the landmasses /seas [Eamon Haughey, Ireland]	Accepted: We have now added an outline of the landmasses on the Figure.
10420	60	31	60	31	A large number of invasive plant species occur in the country. However, the two that inflict the heaviest damage are Parthenium hysterophorus and Prosopis juliflora. The invasion of fertile lands by Prosopis juliflora is obiviously an environemental risk, (as seen in Ethiopia). How about the opportunity that it may present for vegetating /restoring marginal lands where other species when planted couldn't easily survive the harsh conditions (soil nutrient and moisture deficit, heat etc). This also applies for condidtions in other countries where aridity and land degradation are expanding. There is an ongoing debate among professionals in the natural resources sector in Ethiopia on the advantages and disdavantages of Prosospis in Ethiopia.It possess the quality of greening a vast area of degarded land in short time (nitrogen fixing, soil carbon seqestration, biomass), which help in mitigating land degaradtion and climate change (marginal and degraded lands) [Zitouni Ould-Dada, Italy]	Rejected: It is similar that the previous comment (1508)
10930	60	1	61	40	It might be helpful to add a sentence or two about how the alien invasives were introduced (e.g. is it because climate change that made the system conducive for habitation?). Furthermore, you might want to consider adding some bits of information on the socio-economic (if any) on the human system. [Debra Roberts, South Africa]	Accepted: We have now added before L26 P59 ("Climate change is expected to further affect …"): Current drivers of species introductions are due to human introductions intentional or not (e.g., human population growth, expanding trade network and travel links worldwide) (Richardson et al. 2011, Seebens et al. 2018). Moreover, land uses and habitat degradation are one of the primary cause of the introduction and spread of alien species (Chytry et al. 2012).
5046	60	30	62	20	Suggest that the layout of this section put the description of the problem, the consequences and interventions, together under each country heading (as this would make each case easier to follow for the reader). [Eamon Haughey, Ireland]	Rejected. We have intentionally kept this structure for comparing country experiences in each aspect.
11454	60	4			Whether alien species increase N and C is entirely species and location dependent, but it does not therefore imply a positive ecological impact. [Debra Roberts, South Africa]	Accepted: agree, this sentence illustrates the previous statement that "the effect of invasive plant species on ecosystem functioning and land degradation is not fully understood", and not that it implies a positive ecological impact.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5466	60	31			A large number of invasive plant species occur in the country. However, the two that inflict the heaviest damage are Parthenium hysterophorus and Prosopis juliflora. The invasion of fertile lands by Prosopis juliflora is obiviously an environemental risk, (as seen in Ethiopia). How about the opportunity that it may present for vegetating /restoring marginal lands where other species when planted couldn't easily survive the harsh conditions (soil nutrient and moisture deficit, heat etc). This also applies for condidtions in other countries where aridity and land degradation are expanding. There is an ongoing debate among professionals in the natural resources sector in Ethiopia on the advantages and disdavantages of Prosospis in Ethiopia.It posses the quality of greening a vast area of degarded land in short time (nitrogen fixing, soil carbon seqestration, biomass), which help in mitigating land degaradtion and climate change (marginal and degraded lands). From the point of view of mitigation of GHG emissions from agricucllture and forestry prosopis would be an option in degarded landscapes. However, this is not to overloook its unsuitability for fodder and timber but it has other environemental advanatages mentioned. it is a good source of wood fuel for energy at home [Daniel Danano Dale, Italy]	Rejected: In Ethiopia this controversy about the possible advantages of P. juliflora in arid environments has been raging on for quite some time among the scientific community but after many years of debate the consensus is shifting towards the need for arresting the buildup and spread of the invasive plant as the negative consequences outweigh by huge margin the benefits including the impact on biodiversity in rangelands. P. juliflora is eliminative native species and the dense thickets it produces hampers access to grazing lands and water sources; and the thorny leaves hurt animals and reduce the quality of leather.
11456	61	33	61	40	This example has been mentioned before in the report. With so many alternative examples to choose from, is it necessary to repeat something? [Debra Roberts, South Africa]	Acccepted. We moved the earlier figure depicting this example here, instead of having the same example in two places.
17300	61	39	61	40	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Noted, this sentence dropped during revision.
25522	61	47	61	48	Apparently also for dune stabilisation, especially along roads, but I don't have a reference for this. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Rejected: See answer to 23798 comment
19748	62	9	62	9	.....(less than 200 mm yr-1)..... [Sabit Erşahin, Turkey]	Noted. For clarity, we changed this as "less than 200 mm per year "
7584	62	16	62	17	There is something rong in this sentence : "Projections of increasing temperature and (Abatzoglou and Kolden, 2011), and observed reductions in and earlier melting of snowpack ...." [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Noted. Corrected.
19750	62	16	62	17	Projections of increasing temperature (Abatzoglou and Kolden, 2011), and observed reductions..... [Sabit Erşahin, Turkey]	Noted. Corrected.
10932	62	17	62	17	Delete 'and' before '(Abatzoglou and Kolden, 2011)' [Debra Roberts, South Africa]	Accepted
17302	62	23	62	23	This is an interesting paragraph on drogh, but we have been reading about drought long ago. A definition and clarification of drought should be much earlier one [Jose Manuel Moreno Rodriguez, Spain]	Accepted. We have now provided the definition of the drought right in the beginning of the chapter tp faciliate reading. We also note the definition of drought is also available in the Glossary.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17304	62	42	62	44	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Noted. This text was dropped during SOD preparation.
10506	62	30			for planning drought responses there is a need for information - therefore information systems need to be strengthened [Zitouni Ould-Dada, Italy]	Agreed and accepted. We in fact discuss about this later in this case study (see FOD version of Chapter 3, page 63, line 47 to page 64 line 11)
17288	63	14	53	14	This case study has no connection to water intrusion at all [Jose Manuel Moreno Rodriguez, Spain]	Rejected. The comment does not correspond to line no. This cross-chapter case study was moved now to Chapter 4.
19752	63	9	63	9	……the value of 19 million USD (World Bank, 2006). [Sabit Erşahin, Turkey]	Noted. Corrected.
19668	63	12	63	13	Koen Verbis, Abou Amani, Anil Mishra and Blanca Jiménez Cisneros, 2016: Strengthening drought risk management and policy: UNESCO International Hydrological Programme's case studies from Africa and Latin America and the Caribbean, Water Policy, online 26 October 2016, wp2016223; DOI: 10.2166/wp.2016.223 [Abou Amani, France]	Noted. We could not find link to drought impacts on water quality changes - which was the topic of the line this comment refers to, but we think the paper provides some useful examples on the role of early warning and drought monitoring
2518	63	21	63	21	Perhaps authors could mention the potential of citizen science to reduce these gaps in quantification/assessment of drought costs. [William Lahoz, Norway]	Accepted, included.
25524	63	27	63	46	In practice there is a lot of fuzziness and overlap between the three categories. One example is planning of labour-intensive public works that also contribute to drought resilience, as with the Ethiopian Productive Safety net There are a number of interventions, also confusingly referred to as "drought mitigation" that are responsive to drought or early drought onset, but deal with livelihood impacts rather than with direct food needs: marketing interventions/"destocking", emergency livestock vaccination, negotiation of exceptional access for grazing to protected areas or commercial ranches. For market interventions: i) Morton, J., & Barton, D. (2002). Destocking as a drought–mitigation strategy: clarifying rationales and answering critiques. Disasters, 26(3), 213-228. ii) Morton, J. (2006). 13: Pastoralist Coping Strategies and Emergency Livestock Market Intervention John Morton. In Pastoral Livestock Marketing in Eastern Africa: Research and Policy Challenges (pp. 266-74). Practical Action Publishing. iii) Abebe, D., Cullis, A., Catley, A., Aklilu, Y., Mekonnen, G., & Ghebrechirstos, Y. (2008). Impact of a commercial destocking relief intervention in Moyale district, southern Ethiopia. Disasters, 32(2), 167-189. For emergency vaccination Catley, A., Abebe, D., Admassu, B., Bekele, G., Abera, B., Eshete, G., ... & Haile, T. (2009). Impact of drought-related vaccination on livestock mortality in pastoralist areas of Ethiopia. Disasters, 33(4), 665-685. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted and revised.
19754	63	28	63	28	….when it occurs……. [Sabit Erşahin, Turkey]	Accepted and revised.
10934	63	37	63	37	Replace 'that' with 'than' [Debra Roberts, South Africa]	Accepted. Done.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17306	63	40	63	46	References are needed [Jose Manuel Moreno Rodriguez, Spain]	Accepted and revised.
26416	63	38	64	17	This is a very important section; highlighting literature/knowledge gaps is key to a) understanding this chapter and b) future research on key issues. Well done. You might wish to consider mentioning whether there are any specific time periods for which data could be analysed retrospectively if there are literature gaps, but raw data is available. [Hans Poertner and WGII TSU, Germany]	Taken into account. Importance of information dealt with later in section.
19644	64	1	64	6	In addition to FEWSNET early warning system in Eatern and SADC regions, it is important to mention similar early warning system by CILSS/AGRHYMET for West Africa (http://agrhymet.cilss.int/index.php/2018/07/25/bulletin-de-suivi-de-la-campagne-agropastorale-en-afrique-de-louest-juin-2018/) [Abou Amani, France]	Accepted and incorporated.
19646	64	8	64	9	Justin Sheffield; Eric Wood; Nathaniel Chaney; Kaiyu Guan; Sara Sadri; Xing Yuan; Luke Olang; Abou Amani; Abdou Ali; Siegfried Demuth; Laban Ogallo, 2013: A Drought Monitoring and Forecasting System for Sub-Sahara African Water Resources and Food Security, BAMS-D-12-00124 [Abou Amani, France]	Accepted and taken into account
7586	64	9	64	10	It should have a "," at the end of the sentence: These indicators have been successfully linked with social media (Tang, Zhang, Xu, and Vo, 2015) [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted and period added.
19756	64	10	64	10	(Tang, Zhang, Xu, and Vo, 2015)?? [Sabit Erşahin, Turkey]	Noted. Corrected as (Tang et al., 2015).
19758	64	10	64	10	…….(Tang, Zhang, Xu, and Vo, 2015). There must be care…… [Sabit Erşahin, Turkey]	Noted. Corrected.
7588	64	20	64	20	There is something rong in this sentence : ".a diversity of water property instruments and instruments allowing water transfer." [Boyossoro Hélène Kouadio, Cote d'Ivoire]	Accepted and revised
26516	64	4			please check your use of IPCC calibrated language vs. unintended confusion with similar-sounding language, e.g. "high uncertainty" [Hans Poertner and WGII TSU, Germany]	Noted. We understand the reviewer meant page 64, line 43, we have made the needed changes there. Page 64, line 4 does not contain uncertainty language
19058	65	1	65	4	The drylands will necessarily increase because, in our opinion the main driver of degradation is the man and not the climate as it is suggested in this report [Azziz Hirche, Algeria]	Rejected. We understand the reviewer concerns, and we have carefully assessed the drivers of desertification according the published literature. We note substantial regional differences in desertification processes, drivers and impacts, both in the short and long terms. The attribution of desertification is complex problem and cannot be reduced to single factors. We dont share the reviewer's opinion which conflates drylands and desertification. Drylands are globally vital ecosystems providing livelihoods to billions of people. We cannot agree that being a dryland equals being degraded.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2520	65	7	65	7	The authors could include information on the use of Earth Observation (remote, in situ), reanalyses, and ESA CCI datasets to monitor desertification, and study the interaction between desertification and the climate system. [William Lahoz, Norway]	Accepted: We will add related information
11462	65	9	65	10	Re climate change and biodiversity: There was a technical report on this in 2002, and the subject comes up often, but never in-depth. This is a huge and complex topic that has not received sufficient attention. [Debra Roberts, South Africa]	Accepted. We emphasized on this point further.
19060	65	12	65	13	The drylands will necessarily increase as the main factor of degradation is the man and not the climate, although the report explains that two existing scientific currents concerning this issue. [Azziz Hirche, Algeria]	Rejected. We understand the reviewer concerns, and we have carefully assessed the drivers of desertification according the published literature. We note substantial regional differences in desertification processes, drivers and impacts, both in the short and long terms. The attribution of desertification is complex problem and cannot be reduced to single factors. We dont share the reviewer's opinion which conflates drylands and desertification. Drylands are globally vital ecosystems providing livelihoods to billions of people. We cannot agree that being a dryland equals being degraded.
19062	65	12	65	13	The table showing "Processes and Drivers of Land Degradation , including Desertification" shows that the main factors of degradation are the cultivation and overgrazing which come back almost everywhere even if other factors of course exist . [Azziz Hirche, Algeria]	Rejected. We dont agree with this generalization that cultivation and overgrazing are most important causes of desertification everywhere. This is not in line with available scientific literature. The literature shows that drivers of desertification are numerous, and context-dependent. Many studies debunk the idea of overgrazing as the single most important cause the desertification in dryland rangelands.
19064	65	12	65	13	However, worldwide, the population is growing faster than the livestock, while the rains are less frequent or stagnant .. If they also increase, this increase is low and can not satisfy the population or the livestock nedds. the GAP can only increase and the pressure on the land will go up. Contrary to the suggestion of line 13 and 14 of page 65, the evolution of anthropogenic drivers is clear. The population is worldwide growing and if drylands countries do not benefit from a change in economical model , desertification will persist, unless there is an extraordinary improvement in current climatic conditions, which is rather unlikely. It is very unfortunate that there was no prioritization of the drivers and one of my regrets about this chapter is to have put on the same level the role of the man and that of the climate. [Azziz Hirche, Algeria]	Rejected. Our understanding of anthopogenic drivers is much more complex than suggested here. Anthropogenic drivers include numerous hard-to-predict factors such as access to markets, availability and knowledge of SLM measures, governement policies enabling or hindering SLM adoptions, etc, etc. Population growth is only one factor.
10184	65	24	119	45	Revise the ref list to include all references in the text. Ensure that the use of a, b, c etc. is appropriately applied. Remove repeated references and add the missing references. Be consistent throughout the reference section, [Lizzie Mujuru, Zimbabwe]	Accepted.
26670	67	15			Separate initials CW to read C.W. [Abiud Kaswamila, United Republic of Tanzania]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11460	67	45			Residential water consumption is not usually the greatest user in the sector, and reducing wasteful water consumption by industry and agriculture could have greater impact. [Debra Roberts, South Africa]	Noted. We have emphasized on agriculture and industry.
26672	68	23			replace coauthors with names [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26674	68	30			consistence in writing reference [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26676	68	41			consistence in writing reference [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26678	68	53			replace coauthors with names [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26680	69	4			consistence in writing reference [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26682	69	18			where you have 2008b there should be 2008a which isnt there [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26684	69	51			consistence in writing reference [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
26686	70	3			Opt to use symbol or words i.e and and &, both have been used [Abiud Kaswamila, United Republic of Tanzania]	Accepted.
17308	71	40	71	40	This reference is duplicated [Jose Manuel Moreno Rodriguez, Spain]	Accepted.
17310	99	22	99	22	I could not find this paper, nor even in the Researchgate page of the main author. There, he lists a conference paper with fewer authors that was published as a DVD. The author team must revisit this reference and decide whether conference proceeding without being peer reviewer can be included, following the IPCC guidelines. [Jose Manuel Moreno Rodriguez, Spain]	Accepted.
17312	101	50	101	50	This citation is incorrect. The name Payne does not appear anywhere in the text as author. Please, cite as appropriate. [Jose Manuel Moreno Rodriguez, Spain]	Accepted, corrected.
16062	134	44	135	28	There is a need to involving divers studies where are several results of research on impacts, adaptation and local solutions in the west africa area [Youssouph Sane, Senegal]	Accepted. We increased our coverage of West Africa in this Chapter.
16064	154	25	154	38	IPCC could increase its efforts to studie the vulnerability of coastal zone of west africa especially the erosion on the level of the Senegalese coast. It will be necessary to lay the foundations for an integrated coastal zone management plan to effectively combat coastal erosion, in combination with concrete measures to protect the coastline. It would also be interesting to study the pollution of dust storms in West Africa to better understand its impact on health. [Youssouph Sane, Senegal]	Accepted, Coverage on this expanded, we admit that this is an ongoing process. Any reomendatios of papers will be appreciated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1512		15		16	I would correct the IPBES claims. Land degradation comes from increasing demands on land-base resources which emanate from increasing consumption per capita and population growth. [Billie Turner II, United States of America]	Noted. Our reading of IPBES does not contradict your insight. Our text also reflects income and populaton growth as important drivers of land degradation.
1514					I am surprised throughout the persistent reference to Geist and Lambin as opposed, for example, to Teynolds in Science. [Billie Turner II, United States of America]	Rejected. Both of these papers are seminal papers in the field. We calculated that we mentioned Geist and Lambin (2004) four times, and Reynolds et al. (2007) six times. These numbers do not corroborate your impression.
1518					Section 3.5.1.1 Missing is the PNAS special feature on drought in SW USA; See Woodhouse et al 2010l [Billie Turner II, United States of America]	Accepted, relevant discussion incorporated into section 3.5.1.
1520					Throughout there is minimal mention to aridfication in the developed world and sustainability of arid lands there. Surely some consideration of important decisions relative to agriculture vs urban needs in developed world is required. [Billie Turner II, United States of America]	Accepted, we enlarged the coverage of developed countries. We note that both in terms of area and population affected developing countries make up the absolute majority of drylands, so to some extent this larger focus on developing countries is warranted. But your point is well taken, we enlarged the discussion of North America, Europe and Australia throughout the text. This is an ongoing process, we will continue working on covering more of issues specifically pertinent to all concerned regions.
1522					Section 3.7.1.2. Fire management involves more than the land user. In West Africa this management has been affected by World Bank dictates to loaner countries. See Kull and Laris [Billie Turner II, United States of America]	Noted.
1524					3.7.1.3. Minimal is the discussion about the spread of shrubs across arid lands. Missing is reference on this by Anadon et al. 2014. PNAS. [Billie Turner II, United States of America]	Rejected, 3.7.1.3 focusses on bush encroachment. Bush encroachment is discussed in 3.8.3.
5432					what is needed is for local populations to adapt to this variable environment which they cannot control. How to adapt is the key issue here that needs to be elaborated. Is it intended here to say that local land users need to adapt new technologis to fit to their circumstances or they continue on their own way of doing (managing the land) [Daniel Danano Dale, Italy]	Accepted. We indeed discuss on the reponses (how to adapt) extensively in the section 3.7.1, related socio-economic responses in 3.7.2 and policies in 3.7.3
27544					The structure of the chapter is adequate, the contents are precise, some images must be with greater resolution, it is necessary to homologate the references, no progress of the countries in the subject is appreciated, there are mixed processes; bio-geo-chemicals that affect ecosystems, no maps are included to apreciate risk areas [José Antonio Benjamín Ordóñez Díaz, Mexico]	Acepted. Thank you for positive feedback. We corrected the references, included a map on attribution showing different processes affecting desertification.
24634					The are differencials in figures 3.3.2 [Lizzy Igbine, Nigeria]	Rejected. No such figure in the chapter, the comment is not clear.
24636					Noting the differentials in figures 3.2.1, 3.3.2, 3.6.1 [Lizzy Igbine, Nigeria]	Rejected. No such figures in the chapter, the comment is not clear.
24638					Interacting with climate change are expantion of crop lands, poverty and migration 3.3.2.1(medium evidence, medium agreement) [Lizzy Igbine, Nigeria]	Noted. The reviewer did not give any comment.
24650					Recent 45.4 due to difference in expansion of dry lands towards northern altitude [Lizzy Igbine, Nigeria]	Noted. The reviewer did not give any comment.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24654					Robost evidence high agreement 3.7.1, 3.7.2 [Lizzy Igbine, Nigeria]	Noted. The reviewer did not give any comment.
24678					3.7.2, 3.7.3 varying figures of slm [Lizzy Igbine, Nigeria]	Rejected. There are no figures for SLM in those sections.
15924					This work is really and my comments, for the larger part, is about complementing the use of scientific literature on the use of Earth observation (EO) for desertification assessment, which in a few instances could include more relevant/updated references to the rich scientific literature on this subject. Of course some of the suggested additional references relates to work where I myself has been involved; this is not to promote my own research, but merely to complement the EO literature already included in the chapter. [Rasmus Fensholt, Denmark]	Noted. Thank you.
15954					A comment to my previous comments I can see that it's not possible to attach literature as i have indicated above - I will be happy to send by email the book chapters referred to in my previous comments if IPCC authors do not have access to the literature. [Rasmus Fensholt, Denmark]	Accepted. Reference added with text "Huber et al. (2011) explored the relationship between SST anomalies and satellite observed Sahel vegetation dynamics finding similar relationships but with substantial west-east variations in both the significant SST regions and the vegetation response. "