

Comment form for 1st Review Phase of the Deliverable 2b) Regional and subregional assessments of biodiversity and ecosystem services for Africa, Chapter 4 ‘Direct and indirect drivers of change in the context of different perspectives on quality of life’

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Diane Douglas (DD)
German IPBES Coordination office and national scientists (IPBES)
Gianluca Ragusa (GR)
Grace Nangendo (GN)
Intergovernmental Technical Panel on Soils (ITPS)
Jean Bruno Mikissa (JBM)

Mekuria Argaw (MA)
Nakashima - ILK expert (N)
Rainer M Krug (RMK)
Susan Ringrose (SR)
Vincent-Akpu Ijeoma (VAI)
William Olupot (WO)

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
1	German IPBES Coordination office and national scientists (IPBES)	0	General			A half-to-one-page abstract/executive summary related to the background, methodology and key findings would be helpful, particularly for new readers. An abstract is already included in Chapter 6.	To be included (CLAs)
2	German IPBES Coordination office and national scientists (IPBES)	0	General			Facts and findings from natural sciences should be more coherent and stringent in the presentation than socio-economic drivers; please carefully check any "bias" in writing team.	Unclear what this comment means. References added where necessary.
3	Mekuria Argaw (MA)	0	General comment on direct and indirect drivers of biodiversity and ecosystem change			The direct drivers can be grouped in to two broad categories: Natural and Anthropogenic. The anthropogenic factors include land clearing or conversion, biomass energy or fuel wood and charcoal extraction, logging, mining, fire, war, grazing, IAS, etc... While the natural direct drivers include climate, Floods, Tsunamis, volcanos, pests and diseases. The indirect drivers can be categorized into several factors such as economic (trade policy and imbalance, unemployment, urbanization, investment, commodity market and price, International trade), social	Yes will be incorporated into the SOD (CLAs)

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						(poverty, livelihoods, conflicts, gender, education, etc...), Politica (governance, equity, resource allocation, etc...), demographic (population growth, migration, refugees, etc...), Institutional and governance (policy, law enforcement, accountability, investment, tenure, corruption, policy synergy, etc...)	
4	Jean Bruno Mikissa (JBM)	1	1	38	1425	Excellent document, well documented and the capter gave an overview or big picture on both direct and indirect drivers on biodiversity in Africa.	Yes will be incorporated into the SOD (CLAs)
5	Mekuria Argaw (MA)	3	38	3	39	The title of the chapter could be more relevant if it refers to the drivers of change to the BES than the quality of life. It can be modified to "Direct and Indirect Drivers of Change on Biodiversity and Ecosystem Services". On the conceptual framework, the direct drivers are linked to Good quality of life by dotted arrows, which means the link is important but not the focus of the assessment. The direct drivers are linked to Nature (BE) with a solid line, which means, they directly influence Nature. The direct drivers also influence Natur's benefits to people (Ecosystem Services)	In SOD, authors will create link between drivers and quality of life (CLAs)

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						through the anthropogenic direct and indirect drivers. The content in the introduction discusses about the link to the BES, not quality of life. Thus, it would be appropriate to modify the title as it directly addresses drivers of change to Nature (BE) and its benefits to people (ES). The quality of life can be treated as intrinsic in the introduction.	
6	Mekuria Argaw (MA)	3	40	3	82	It would be logical to add brief descriptions (may be definitions) of the the concepts of direct and indirect drivers in the introduction	Brief descriptions/definitions of the concept of drivers to be included in SOD. I agree with that. We should clarify the necessity of such a balanced approach. We have forgotten that the final aim of all that is, as indicated in the title, 'quality of life'.
7	German IPBES Coordination office and national scientists (IPBES)	3	44			This phrase is redudant.	We don't agree this that comment. I cannot see any redundancy in the first paragraph.
8	German IPBES Coordination office and national	3	56			This is a rather ambitious statement that Africa's biodiversity is the backbone of Africa's development: specify which kind of development?	Policy relevant

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	scientists (IPBES)					Socio-economic? Only focusing on nature capital?	
9	Rainer M Krug (RMK)	3	57	3	58	These are not the only pressures - so rather use "for examples see..."	Yes
10	Rainer M Krug (RMK)	4	87	4	87	Mention the term "tipping point" and some references. E.g. Lenton, T. M., & Williams, H. T. P. (2013). On the origin of planetary-scale tipping points. Trends in Ecology and Evolution. doi:10.1016/j.tree.2013.06.001 Scheffer, M., Carpenter, S., Foley, J. a, Folke, C., & Walker, B. (2001). Catastrophic shifts in ecosystems. Nature, 413(6856), 591–6. doi:10.1038/35098000	Threshold might be replaced with 'tipping points' to satisfy the reviewer, but I don't think that it is necessary. It also think that the current references on resilience theory are more relevant,
11	Mekuria Argaw (MA)	4	102	5	131	Climate as a major natural direct driver of change to BES is not well covered. Because of the high diversity and fragility of some ecosystems in Africa, currently climate variability is seriously affecting biodiversity in agro-ecosystems and in dry and arid regions of the continent. Climate variability has already shifted cropping belts in the continent. Many crop varieties are not anymore relevant in many agro-ecosystems and are already replaced by other new varieties due a shift in the rainfall and temperature regims. Climate change	We agree with a part of the comment, as it focuses how with missed to address agrobiodiversity in our text. Biodiversity is not only wild biodiversity.

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						also has affected aquatic ecosystems through the change in the water balance of lakes. Examples can be included from the case of Lake Chad, Lake Victoria, others.	
12	Nakashima - ILK expert (N)	4	102			<p>4.2. Direct Drivers / 4.2.1. Natural direct drivers / 4.2.1.1. Natural climate variability and weather patterns:</p> <p>- Mburu and Kaguna (Kenya) 2016: The Tharaka people have noticed that "climate change, particularly lowered rainfall levels, has led to the disappearance of some of the indigenous seed varieties and also weakening of critical ecosystems like forest watersheds. This has affected the seasonal rainfall patterns by reducing the length of the rainy periods as well as the amount of rain. Continued failure of crops is compromising the capacity for production of good seeds." (<i>Gathara Mburu and Sabella Kaguna (2016). Community dialogue on ILK relevant for food and water protection in Tharaka, Kenya. In Marie Roué, Alfred Oteng-Yeboah, Peris Kariuki and Yao Adou (eds.), Indigenous and local knowledge of biodiversity and ecosystems services in Africa:</i></p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

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						<p><i>Contributions to an IPBES regional assessment. UNESCO: Paris.)</i></p> <p>- Shemdoe (Tanzania) 2016: Farmers in Mpwapwa District (semi-arid lands) in central Tanzania "talked of the change in rainfall trends in their area and its impacts. It was reported that the change of rainfall patterns has affected the use and preference of the type of tillage practices, and as a result people prefer using shallow tillage as opposed to no-till and ridging." (<i>Riziki Silas Shemdoe (2016). Indigenous and local knowledge for biodiversity and ecosystem services in Tanzania: the case of two selected communities. In Marie Roué, Alfred Oteng-Yeboah, Peris Kariuki and Yao Adou (eds.), Indigenous and local knowledge of biodiversity and ecosystems services in Africa: Contributions to an IPBES regional assessment. UNESCO: Paris.)</i>)</p> <p>- Bollig & Schulte 1999 (Kenya and Namibia) (p509 - Namibia): "The only clear trend the Himba observed was the decrease of rains and its concomittant effects on the vegetation. This perception matches exactly the data from rainfall stations.</p>	

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						<p>During the past 20 years rainfall has decreased by about 20% from the long-term average." (p505 - Namibia): "The general idea of Himba herders was that vegetation cover changes according to the abundance of annual rains. Most informants stated that, in general, there has been less rain in recent years. They were convinced that once rains fall abundantly again, grasses also will grow." (p508 - Namibia): "The Himba saw no general direction of environmental change. They interpreted vegetation dynamics as dependant on highly stochastic rainfall events. They agreed that over recent decades there had been less rain, and that changes in vegetation could be traced to this lack of rain. (...) Pastures in general are dominated by annual grasses and herbs. These, in fact, greatly rely on varying rainfall and are not affected by grazing as long as they are not damaged profoundly during their vegetational phase. - Mouhamadou et al. 2013 (Benin) [in French]: (p5049) "Fon and Bariba sociocultural groups consider that hydric erosion is the main factor for dense forest fragmentation. Whereas</p>	

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						<p>for the Lokpa and Peulh, dense forest fragmentation is caused by soil poverty"</p> <p>- Nielsen & Reeberg 2010 (Burkina Faso): "The villagers perceive a number of negative trends to the climate to have taken place over the last 50 years (Table 1,Table 2). The rainy season is perceived to be shorter than in the 1950s and 1960s, with periods of more intensive rain often resulting in flooding, or with long breaks resulting in drought. They also perceive there to have been a larger number of 'false starts', making it very difficult to know when to sow. Temperatures during the cold as well as the hot season are said to have increased and both seasons to have become longer. The wind is perceived to have become stronger, causing more wind erosion, with the result that sand is filling up river beds and destroying crops. Degradation of the soil, the disappearance of wild fauna, plants, trees, and watering holes, and growing problems with pests are also mentioned by the villagers as consequences of the changed climate; all these aspects have made rain-fed</p>	

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						<p>agriculture difficult and livelihood diversification increasingly important."</p> <p>- Campbell 2005 (Ghana): (p12) "There was a general consensus that fewer trees meant less rain, and among those aged 40 and above a general perception existed of reduced rainfall after 1960 (males 95 per cent; and females 94 per cent). A comparison of the local opinions and the meteorological records for the area did reveal some common features: despite evidence of very high rainfall variation, the records do show a slight decline in rainfall from 1960 to 1995 (Figure 2)."</p> <p>- Solomon et al. 2007 (Ethiopia): (p486) "The major constraints of livestock production in the Borana rangelands are presented in Table 11. Pastoralists in the five peasant associations ranked recurrent drought as the primary constraint, followed by feed and water scarcity. Recurrent droughts have aggravated other problems, such as feed and water shortages, disease prevalence and consequent livestock losses, food insecurity, starvation and poverty.</p>	

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						<p>Other constraints included animal diseases, predators and communal land ownership." (p491) "Borana elders stressed the importance of episodic drought that can result in rangeland degradation and mass livestock mortality. The effect of drought is seen by the respondents in terms of livestock numbers that unexpectedly and temporarily exceed the available forage and water. Thus, during drought years pastoralists are forced to utilize the dry season grazing areas around permanent water points (deep wells). Such continuous grazing pressure and trampling invariably results in serious overgrazing and rangeland degradation."</p> <p>- Sop & Oldeland 2011 (Burkina Faso): (p6) "More than 60 per cent of the informants in all ethnic groups listed the major cause of vegetation change to be drought. The relative importance of other factors varied among ethnic groups. The Fulani believed population aging and deforestation to be secondary factors. For the Mossi, deforestation was the second leading cause. The Samo informants rated bushfires to be the</p>	

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						most important factor, after drought (40 per cent) (Figure 6)."	
13	Diane Douglas (DD)	4	103	4	126	For natural climate variability, it might be valuable to provide a brief discussion of the 11 and 22 year sunspot cycles, as well as longer solar cycles that drive 50 to 80 year cyclic variance in climate, as well as other periods (e.g., Suess cycle) . The chart you present in Figure 4.1 could be partly attributed to a Gleissburg-century cycle in solar activity. See for example: Ogurtsov et al., 2002 : http://link.springer.com/article/10.1023/A:1022411209257#page-2 and Ma 2008: https://www.researchgate.net/publication/257563298_Gleissberg_cycle_of_solar_activity_over_the_last_7000_years	We think we should not address the controversy on the origin of climate change, as intrinsically suggested by the reviewer. That would be unproductive.
14	German IPBES Coordination office and national scientists (IPBES)	4	105			"The coefficient of variance of ?monthly? rainfall is negatively correlated with ?annual? rainfall" should be rewritten.	Agreed
15	Diane Douglas (DD)	4	111	4	112	Provide a definition or description "comfortable climatic zones"	Agreed should be detailed

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16	Nakashima - ILK expert (N)	4	121	4	126	<p><i>"There has been extensive debate in the literature as to the nature of the Sahelian degradation that was observed during the 1970s to 1990s. Although this was initially attributed mostly to increasing population and poor land management, which clearly placed increased pressures on the system. There is now extensive evidence that this coincided with a dry period. More recent increases in rainfall is largely responsible for a greening of the area that has been detected from more recent satellite imagery (UNEP, 2012)."</i></p> <p>ADD ref of Sop & Oldeland 2011 (Burkina Faso): Scientific observations have been made concluding to a regreening of the Sahel region. However, the authors argue that these conclusions are obtained through large scale methods, and that a finer approach should be undertaken. They report local inhabitants' observations relative to vegetation dynamics and different species abundance. Local inhabitants observe that the majority of the species considered are in decline. They mention several factors for this decline, mainly drought. These</p>	None

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						results, at the local scale, are in contradiction with several scientific studies. The authors suggest that the results obtained must be dependant on scale of observation, and therefore that local knowledge is a useful tool to assess change at the local scale.	
17	Rainer M Krug (RMK)	5	133	5	141	Add references. See e.g. Richard Cowling's publications	Added
18	Grace Nangendo (GN)	5	133	5	155	In which ecosystems is fire fire detrimental to biodiversity survival? Also assess fire impacts to mangroves	Agreed. "Various ecosystems (line 136) should be detailed
19	Mekuria Argaw (MA)	5	133	5	155	Although the title covers all sorts of pollution, use of pesticides and herbicides are the major contributors to pollution and ecosystem degradation in Africa. Particularly, floriculture, horticulture, tannery, textile, and mining industries are causisng serious ecological degradation. The section should at least provide the list of banned chemicals those still in use in Africa. One good example mentioned is DDT. There are large amounts of stockpiles of unutilized herbicides and insecticides in many countries. Give emphasis to this	We agree that this part suffers a lack of structure, and that it is necessary to distinguish natural and anthropogenic fires Actually the title covers both natural and anthropogenic sources of pollutions. Attempts have been made to tackle both. The issue of DDT has been underlines and mention of stockpiles is included in the new version

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20	Nakashima - ILK expert (N)	5	141	5	142	<p>section about fire impact and fire management:</p> <p>ADD info and refs about indigenous fire management, contributing to shaping present ecosystems and maintaining fire dependent ecosystem dynamics.... Issue can also be addressed in section 4.2.2.2.4. "Land management practices, e.g. fire, deforestation"</p> <p>EXAMPLE:</p> <p>- Kamau & Medley 2014 (Kenya): local communities have a long use of fire for their livelihoods and to manage resources (facilitating hunting, preventing bush encroachment, enhancing pasture...). But since the colonial era, fires were considered as damaging for the environment and prohibited. The prohibition, continued by the implementation of a protected area, causes conflicts between local inhabitants who were deprived from their land and resources, and Park managers. Local inhabitants still use fire illegally, sometimes leading to accidental fires that can be detrimental to the environment. Today, studies recognize the potential benefits of using fires based on local</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

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						<p>knowledge. This study highlights the knowledge of local inhabitants of fire management, and urges the Park managers to integrate it to the management of the area, to pacify the conflict and improve the conservation of the ecosystem. (p77) "Indigenous communities in Africa also show a deep history of using fires in the dry season for many reasons, including to stimulate sprouting for game and livestock grazing, create new areas for cultivation, kill disease causing vectors such as ticks, and to keep away dangerous animals such as snakes (Butz, 2009; Eriksen, 2007; Kull & Laris, 2009; Wardell, Nelson, Rasmussen, & Mbow, 2004). Seasonal burning practices by indigenous communities can prevent damaging late season fires, increase plant biodiversity, and improve the productive capacity of tropical pastoral lands (Angassa & Oba, 2008; Butz, 2009; Sheuyange et al., 2005)."</p> <p>(p77): "Fire suppression policies resulted in the encroachment of bush over some savanna landscapes (Angassa & Oba, 2008) or were simply ignored (Kull, 2002; Kull & Laris, 2009).</p>	

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						<p>The consequences of implementing strict fire-control policies in Africa have been large-scale illegal burning (e.g., Kull, 2002) and the occasional occurrence of catastrophic fires (Cochrane, 2009; Sheuyange et al., 2005)." (p82) "All participants from both ethnic groups agreed that small, low-intensity fires reduce bush encroachment and ensure that catastrophic fires do not occur around the villages and in the protected area. They also suggested that removal of dead wood for subsistence is a sustainable activity that can reduce fires in the protected area. The majority of participants argued that the rules prohibiting firewood collection and grazing in CHNP were partly responsible for high intensity fires within the boundary." (p82): [a representative from a Maasai village]: "Our animals depend on the Chyulu Hills and we use fires to help our animals survive. If we the Maasai do not burn grass during the dry season, our animals will starve and die of thirst because we do not have rivers around to supply our animals with water. Our villages will be covered</p>	

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						<p>with bush and this will be dangerous for us because it will promote attacks by snakes and predators, including lions and hyenas. If the land is left unburnt for a long time and a fire outbreak occurs, the fire is uncontrollable due to the excess amount of bush. According to me, it will be very difficult for the Maasai to live without using fires. What we can do is prevent the fires from damaging the forest, which we need for medicine and rain making. I want to tell KWS officials that fires are beneficial to the Maasai people.”</p> <p>- Solomon et al. 2007 (Ethiopia): (p490) "Household respondents expressed their opinion that burning with a hot fire (heavy fuel load) can be a valuable tool for the control of bush encroachment, adding that in the absence of fire, the long-term trend will probably be for the woody plants to increase further in density. The Borana pastoralists used to burn grazing sites once every 3 years to control woody plants and to improve the nutritional quality and accessibility of the grasses. These benefits from burning are well known in other</p>	

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						pastoral systems of Africa (Hobbs and Spowart, 1984; Coppock and Delting, 1986)."	
21	Mekuria Argaw (MA)	6	157	6	175	The text needs to be restructured in to the typology of diseases that affect flora and fauna, aquatic ecosystems, agroecosystems, other fragile ecosystems that are susceptible to diseases. Agrobiodiversity is highly affected by diseases. Examples can be cited from different African countries. Many crops are not anymore growing in some localities because of diseases (e.g., wheat, beans, maize and others are increasingly affected by new varieties of diseases and are facing local extinctions).	We don't think that such a typology would have relevant, as diseases can transgress any biogeographical typology. However, the rest of the comment is relevant.
22	German IPBES Coordination office and national scientists (IPBES)	6	176	16	630	Description of linkage between anthropogenic drivers and biodiversity seems too mechanistic and simplistic. More examples are needed. Presently, this is partly redundant to chapter 1.	Right! However, to improve this part, it would be useful to have a copy of the current chapter 1.
23	German IPBES Coordination office and national	6	176	16	630	Discussion on anthropogenic drivers needs to be embedded into a reflection of the legitimate right of people of food, health, adequate housing as well as economic prosperity and development. The	We plenty agree with that. We should clarify the necessity of such a balanced approach. We have forgotten that the final aim of all that is, as indicated in the title, 'quality of life'.

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	scientists (IPBES)					description of anthropogenic drivers should take this into account in a balanced approach.	
24	German IPBES Coordination office and national scientists (IPBES)	6	186			This seems to be a superficial statement for Africa: cash crop, plantation, Green Revolution. Green revolution seems to have a lower impact in Africa than in Asia.	Maybe it is not true in the past, but we cannot ignore that a current trend is the extension of cash crops on lands which have been sold to agroindustry from foreign
25	German IPBES Coordination office and national scientists (IPBES)	6	187			For official documents, it has to be decided if "land grabbing" should be the guiding term. The separation in large-scale foreign vs. domestic direct investment in land would be helpful.	Policy relevant
26	William Olupot (WO)	6	191	6	192	the statement "the total area...plant abundance" would be clearer stated the other way round	Rephrased as suggested
27	William Olupot (WO)	6	193	6	194	the word "highest" may not be appropriate when comparing only two cases	We don't agree
28	German IPBES Coordination office and national scientists (IPBES)	6	198			Publication year to be completed.	Changes made as suggested

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29	Abdelfattah Badr (AB)	6	198			State the year of publication of Freitas, ????	Right. Moreover, we did not manage to find on the web any' Freitas' addressing fragmentation or habitat destruction in Africa.
30	German IPBES Coordination office and national scientists (IPBES)	6	204			Corridors seems no realistic options for Namibia as all land south of the vet fence is farm land, communal or commercial; the perspective seems biased.	Policy relevant
31	Vincent-Akpu Ijeoma (VAI)	7	208	7	208	The de Wasseige et al, in reference list is '2012' not '2013'	Will add
32	German IPBES Coordination office and national scientists (IPBES)	7	220			It is unclear if this can be proven that "near subsistence farms" still prevail for African agricultural expansion areas. There seems a tendency for higher market integration.	Policy relevant. We would add that we have to be careful with 'corridors', which also represent a very controversial issue.
33	Grace Nangendo (GN)	7	228	7	234	Industrial development is another cause of habitat loss that needs to be explored. Investors and government often consider natural lands as free land or land that will require less compensation. Please consider assessing impacts of industrialization	Right
34	Abdelfattah Badr (AB)	7	232			Give reference to the highlighted sentence	Which one?

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35	Nakashima - ILK expert (N)	7	235			<p>4.2.2. Anthropogenic drivers / 4.2.2.2. Overexploitation</p> <p>- Kamau & Medley 2014 (Kenya): (p82) "A representative from a Kamba village observed: "Chyulu is our home and we depend on the hills for our survival. We have been experiencing droughts in recent years and I think this is because the rate of tree cutting in our villages is unprecedented. Our streams have dried up because we have exposed them to the sun by cutting trees. We must start thinking about our environment because we have nowhere else to go when all the springs and trees are gone.""</p> <p>- Glover & Elsidig 2012 (Sudan): (p342) "A key informant questioned on the subject of 'accessibility to the forest reserve' explained that forest decline was often a direct consequence of over reliance on the forest as source of basic needs, over-harvesting and population pressure. Results in Table II indicate that the majority of respondents did enter the natural forests without permission from either the FNC or local leaders."</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.
36	Mekuria Argaw (MA)	8	248	8	255	The problem of overgrazing and subsequent colonization of habitats	Also in West Africa

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						by encroachers is a very common and serious problem in African dry ecosystems, especially in the eastern and southern Africa. Several examples or cases can be cited from literature. One example is here below. <i>Asheber Tegegn, Amaha Kassahun, Lisanwork Nigatu and Kidane G/meskel. 2010. Plant Species Composition, Spatial Distribution and Diversity along a Grazing Gradient from Livestock Watering Point in Allaidege Rangeland of North-Eastern Ethiopia Rangelands. Journal of the Drylands 3(2): 226-233;</i>	
37	William Olupot (WO)	8	248	8	254	overgrazing also leads to proliferation of low forage value but indigenous grasses. This needs to be mentioned	We do not understand as <i>Aristida congesta</i> is indigenous.
38	William Olupot (WO)	8	265	8	267	the sentences are not clear	Right
39	Grace Nangendo (GN)	8	273	8	279	Woodlands also offer very good wood for charcoal. In some areas they are the most exploited for fuel wood and charcoal. In some areas it is the remnant multipurpose trees that are being cleared. Consider assessing these two wood sources in the report.	Right
40	German IPBES Coordination office and	8	277			The loss of forest area in Tanzania "per day" may be more illustrative.	We do not agree. First, we do not use a 'journalistic' style. Second, a 'per day loss' does not make sense.

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	national scientists (IPBES)						
41	Vincent-Akpu Ijeoma (VAI)	8	280	8	280	The definition is for bush meat hunting while bush meat is the wildlife	Right
42	William Olupot (WO)	9	287	9	288	with regard to taste, there is a more original earlier publication by Olupot et al. 2009 describing bushmeat socioeconomics in uganda's major hunting areas	OK for adding Olupot et al (2009), but the reference Obioha et al (2013) is also right.
43	Vincent-Akpu Ijeoma (VAI)	9	301	10	340	FAO yearly publication on 'State of world fisheries and aquaculture' could be a useful reference on fisheries; DEAT 2000 not in reference list	Noted
44	Grace Nangendo (GN)	9	302	9	338	Transboundary waters pose a management challenge especially where there are no transboundary waters management agreements. Policies may vary greatly and/or enforcement of policies may be non existent in one or more of the countries making the other country's enforcement uneffective.	To include transboundary water issues
45	Gianluca Ragusa (GR)	9	305	9	305	According to The State of World Fisheries and Aquaculture 2014 (Source: FAO, 2014) availability of fish from Africa's fisheries could be increased by: (i) rebuilding overfished or depleted stocks and ensuring that	Information from FAO State of the World Fisheries to be used

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						<p>small-scale fishers receive sufficient resources; (ii) reducing post-harvest losses; and (iii) ensuring a sufficient portion of small pelagic fish is made available for human consumption. As regards (i), good management is needed to ensure recovery of overexploited and depleted stocks. Globally, good management has been estimated to be able to boost availability from marine capture fisheries by about 20 percent. Applying this percentage to Africa's fisheries, another 1.1 million tonnes of fish might become available. In this respect, governments should more carefully consider allocation of rights and ensure that the small-scale sector, both marine and freshwater, has secure access to resources. In addition in relation to point (ii), it is estimated that 25 percent of the fish caught or landed in Africa never reaches consumers' mouths. Adding in fish that loses its nutritional value, an estimated 35 percent of total landings does not benefit the consumer.</p>	
46	Gianluca Ragusa (GR)	9	308	9	308	The FAO study (Source: de Graaf, G., Garibaldi, L., 2014) has estimated that in the continent the fisheries and	Information from FAO State of the World Fisheries to be used.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>aquaculture sector employs about 12.3 million people. Half of the 12.3 million people employed in the whole fisheries sector are fishermen, 4.9 million (42.4 %) are processors and 0.9 million (7.5 %) work in fish farming. More than half of the fishermen (55 %) are employed in inland fisheries whereas the largest share of processors (42 %) works in marine artisanal fisheries followed by 30 % in inland fisheries and 28 % in industrial fisheries. Many small-scale ('artisanal') fisheries involve high food/livelihood dependency on fishing, and often represent employment of last resort particularly in weak and post conflict states. Fish exports from Africa constitute about 19 % of total agricultural volumes but notably 5 % of total value. The total annual fisheries production is estimated to be about 8 million metric tons, which represents only about 5 % of world fisheries production, and contributes at least 10 billion USD to African economies every year.</p>	
47	Grace Nangendo (GN)	9	315	9	315	Also inland fresh water bodies face the similar challenges. Consider assessing them	OK

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
48	German IPBES Coordination office and national scientists (IPBES)	10	341	ff		The chapter on Land Tenure is rather "thin" and lacks substance compared to the fact sheet parts based on biology, botany etc. Lack of socio-economic experts in the team?	Land Tenure issues to be Developed 2) TASSIN: The following reference might be useful: https://www.researchgate.net/profile/C_Lund/publication/228849154_African_Land_Tenure_Questioning_Basic_Assumptions/links/0046352b884dbd9fb4000000.pdf
49	German IPBES Coordination office and national scientists (IPBES)	10	341	ff		Some references, e.g. Otsuka, Migot-Adholla, Place, Meinzen-Dick etc. should be given.	References noted
50	Mekuria Argaw (MA)	10	341	10	346	In Africa, tenure or resource (land and forests) ownership has a very important contribution to either the conservation or degradation of ecosystems. Customary land administration is very common in many African countries. Clans, local chiefs, traditional leaders, etc.... have the de facto right to own, transfer, distribute, or sell land to community members and administer its management and use. This kinds of tenure systems might often contribute to better conservation or lead to degradation due to malfunctioning	Text to be reviewed as suggested

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						governance. On the other hand, common property resources such as grazing lands, natural forests, woodlands, important ecosystems such as wetlands are often open access resources and have no clear definition of tenure. These imanate from absence of proper policies in place or poor implementaiton in there is one in place. Such issues should be addressed explicitly in the subsection. What is presented in the text did not cover the key issues.	
51	Nakashima - ILK expert (N)	10	341			4.2.2.2.3. Tenure systems Generally, there are many examples of traditional tenure systems, existing before colonization, some of them having subsisted after, that contributed to biodiversity conservation. They are often based on the authority of customary chiefs and rely on rules regulating the access to certain areas, or restricting the exploitation of certain resources. However, several authors report that the authority of these chiefs is questioned today among younger generations, and that they have been challenged by the superimposition of rules emanating from the State.	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>FOR EXAMPLE: - Akouehou, 2004 [in French] (Benin): (p3) "In the forests, some traditional chiefs are named; it is the place where ancestors have installed the protector gods when they were choosing the ground that became the village. Thus, forests are under the authority of the traditional chief or a descendant of the first dweller of the villages. He installs rules forbidding the felling of great trees except for public uses: building a school, a clinic, a pirogue. Rural populations of the Kouffé mounts have thus an idea of the importance of the forest and elaborate their own management or protection norms, which are often not in contradiction with the ones prescribed by the law". (p6): "It must be highlighted that no villager can enter the forest in the aim to make a big hunt if they have not received before the authorization from the chief hunter of their land jurisdiction. That is why it is difficult to understand the situation of fauna scarcity without understanding the role of chief hunters. The ignorance of these associations of hunters from the</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>forest administration prevents the sustainable management of fauna resources in this protected area of central Benin."</p> <p>- Andersen et al. 2014 (Egypt and Sudan) (p37): "The nomadism practiced in the RSH [Red Sea Hills] is based on tradition and territoriality. The nomads' mobility is circumscribed by socially defined rights of access and use that are centered on home areas and extended to more distant and broadly defined areas in response to variations in vegetation and availability of water. The traditions governing rights of use are transmitted orally and by example and exercised within the circles of family, section and tribe, where vital TEK can be seen to underpin the pastoral lifestyle."</p> <p>- Dixon 2008 (Ethiopia): (p352) ""We depend on wetland cultivation for food production but in recent years there have been problems with termites, wild pests and worms. The problem is getting worse because of a lack of coordination among each other. In the past, abba laga [father/leader of the catchment] was</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>powerful in coordinating farmers but today it is powerless to take action against those who break the rules due to a misinterpretation of the new democracy, and lack of support from government. Some farmers abandon the land between plots, so the rodents and other wild animals hide there and attack the crops" (farmer at Korqa wetland, West Wellega)."</p> <p>- Elias 2015 (Burkina Faso): (p28) "Customary and formal laws, which are also gendered, structure rights to forests and trees and influence incentives and capacity to manage tree resources (Fortmann and Bruce, 1988; Meizen-Dick et al., 1997; Quisumbing et al., 2001)."</p> <p>- Hammi et al. 2010 (Morocco) - Campbell 2005 (Ghana): (p10) "This complex system [based on sacred groves] was argued by all interviewees to be more effective than official government legislation, such as those restricting bush fires (Provisional National Defence Council Law 46) and hunting-habitat destruction (Legislation Instrument 685 of 1971), which lacked respected local guardians and participation. The</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>evidence supporting this view was the greater sustainability of sacred groves, as revealed in the ecological survey results."</p> <p>- Savadogo et al. 2011 (Burkina Faso): (p1639) "The natural resource management system relies on principles, rules and customary laws. However, social mutations have currently led to the abrogation or deterioration of principles ruling their protection." (p1644) "The system of natural resource management of the sacred woods among the Mossi relies on principles, rules and customary laws (no wood cutting, no fire, no hunt, no visitation outside of the worship days). In the animist tradition, every neighborhood has access to at least one sacred wood. Persons responsible of the management are mainly customary authorities, divinities' guardians, dignitaries and other resource persons constituted by the elders. Water and forestry agents are rarely involved in the management of the sacred woods because their intervention is often perceived by inhabitants like an interference in their intimate affairs. They rather</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>intervene in the management of communautary forests that do not hold any sacred character" (p1653)</p> <p>"Traditional management of natural resources in sacred woods, based on the customary interdictions, principles and totams, protect a lot of animal and vegetal species from exploitation. Hence, these formations become shelters for biological diversity. Indeed, no one has the right to have a field, hunt, even less go cutting or gathering fire wood (Juhé-Beaulaton 2010). The one who, without authorization from the village chief (first customary authority of the village), takes any small product from a sacred forest for their every day needs, would expose all the inhabitants to evils that are supposedly generated by the ire of the spirits of the ancestors who founded the village, for example the proliferation of mosquitoes, drought, incurable illnesses..."</p>	
52	German IPBES Coordination office and national	10	342			Resources "have been" effectively owned and managed, common property systems of today do not guarantee this any more.	Right

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
	scientists (IPBES)						
53	German IPBES Coordination office and national scientists (IPBES)	10	347			Phrase is not clear in its meaning	Noted
54	Diane Douglas (DD)	10	350	10	354	In your expanded discussion, please include reference to the use of fire for development/construction -- in areas with dense forest/shrubs etc. fire is used to clear areas for road construction etc., and if not managed well can become uncontrolled wildfires. Also used for flushing out bushmeat (hunting) in some regions., for example - Mozambique, which also leads to many wildfires.	Right
55	Nakashima - ILK expert (N)	10	350			4.2.2.2. Anthropogenic drivers / 4.2.2.2.4. Land management practices e.g. fire, deforestation - Sulieman et al. 2012 (Sudan): (p237) "Regarding their opinion of changes in plant species composition in the study area, the key informants gave several reasons: vegetation clearance for agricultural expansion, charcoal and firewood production, cuttings for	Text suggested is useful for expanding this section on Land Management Practices

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>building materials, grazing and recently herbicides applications."</p> <p>- Bollig & Schulte 1999 (Kenya and Namibia): (p505): "Only a few areas were reckoned as permanently degraded. Vegetation change around settlements was seen as an inevitable consequence of livestock husbandry and an intense use of tree and bush layer for construction purposes. " (p500): "Astonishingly, few informants mentioned overgrazing as a major problem leading to desertification. In fact, most informants claimed that cattle have decreased over recent years and complained bitterly about this change."</p> <p>- Chalmers & Fabricius 2007 (South Africa) (p7): "All the experts believed that fire would have a positive effect on grazing by curtailing forest expansion, and by promoting the growth of green grass. They also believed that the absence of fire would cause forests and woodland areas to expand. All of them used fire from time to time for a variety of purposes, such as promoting livestock grazing, preventing forests from expanding, clearing land for</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>cultivation, and controlling ticks. All the experts believed fire could be useful, and that it would only be dangerous if used irresponsibly." (p10)</p> <p>"The local experts' knowledge was remarkably consistent with scientists' understanding of landscape change in forest grassland mosaic ecosystems such as the Wild Coast. They understood that fire normally originated in grasslands and affected forest margins (Scholes 1997, Trollope 1999, van Wilgen et al. 2003, van Wilgen 2005) and that frequent fires tend to suppress woody plant growth, particularly of saplings in grassland (Versfeld and van Wilgen 1986, Solbrig et al. 1992, Trollope 1999, Bond et al. 2003a, van Wilgen 2005). They also knew that frequent fires can lead to the transformation of forest and woodland to grassland (Scholes and Walker 1993, O'Connor and Bredenkamp 1997, Scholes 1997), and understood that fire removes moribund grass, leading to the renewal of grassland (Scholes and Walker 1993, van Wilgen et al. 2003, van Wilgen 2005). The experts also provided additional insights, which</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>were not found in the literature but which made much logical sense: for example, that an increase in woodland cover eventually resulted in forest interiors becoming denser than before, and that changes in cultivation practices could affect land cover."</p> <p>- Dalle et al. 2005 (Ethiopia): (p11-12)</p> <p>"Major factors for the deterioration of range condition identified by them included drought (lack or shortage of rain), woody plant encroachment and high livestock population density (Table 8b). Participants in the community meeting during the analytical workshop identified shrinkage of grazing land, as a result of land alienation to other ethnic groups and also for establishment of ranches, as the mainstem for all other degrading factors, which they described as branches of the problem tree (Figure 5). Furthermore, indiscriminate establishment of 'Ollas' (villages) against the rules and regulations of 'Dongora Seera', herding dry livestock on grazing lands for lactating livestock, corruption, and expansion of crop cultivation were mentioned as additional factors</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>contributing to rangeland degradation."</p> <p>- Mouhamadou et al. 2013 (Benin): p 5056 "Determining factors of dense forests fragmentation do not spare sacred forests. Indeed, sacred forests are examples of local traditions contributing to saving the threatened flora and fauna (Camara, 1994; Chandrashekara, Sankar, 1998; Kokou et al., 1999). Several authors suggest the need to draw lessons from these local management systems (Ostrom, 1997; Ramakrishan et al., 1998). But, currently, several elements contribute to their decline, notably demographic growth, forest clearings and vegetation fires, uncontrolled dwelling expansion, traditional religious beliefs erosion and weakness of religious chiefs' power."</p>	
56	German IPBES Coordination office and national scientists (IPBES)	10	350	ff		This part is still in a rudimentary state as stated by the author: it needs much more differentiation in order to justify the anthropogenic dimension compared to ecological processes.	
57	Mekuria Argaw (MA)	10	350	10	359	Land mismanagement or absence of proper land management practices is	Yes will be incorporated into the SOD

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						one major driver of land or soil degradation in cultivated lands in Africa. This is related to lack of resources, technology, poverty and poor governance. Smallholder farmers do not invest in land management technologies for the above or other reasons. Thus, agro-ecosystems continue to degrade and loose the important ecosystem services (provisioning, regulating, supporting, etc...). The text in the sub-section need to address these issues.	
58	Abdelfattah Badr (AB)	10	354			Expand the comment on the managed system including agriculture	Noted
59	Vincent-Akpu Ijeoma (VAI)	10	356	10	359	erosion is not cause by climate change	We do not agree with comment
60	German IPBES Coordination office and national scientists (IPBES)	11	360	ff		The whole chapter: the focus should now be on treaties and conventions with impacts.	Right
61	Mekuria Argaw (MA)	11	367	11	367	I disagree. IAS are well studied documented in Eastern Africa. What is lacking is technology and proper eradication methods. For instance, there are regional iniatives to control	Ok, We will work on it

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						and eradicate Partinium (cop weed) in agricultural lands, water hayacine (water weed) in fresh water lakes such as lake victoria and Prosopis (woodland bush or tree) in rangelands such as in Ethiopia. Despite the level of knowledge on IAS, there is no good example on successful erodication and control.	
62	Mekuria Argaw (MA)	11	396	11	405	I think these kinds of examples or at least a list of the most important IAS species (both plants and animals) affecting different ecosystes need to be assessed and presented at least in a summarized tabular form. How these IASs are affecting ecosystems and causing local extinction of indigenous species (as discussed in this paragraph on fish) in necessary to explore and present it here. Cat fish in Ethiopian fresh water lakes are replacing the indigenous Telapia and Nile pertch, which are very much adapted to breeding in turbid water. Whereas cat fish cannot breed in turbid water and sedimentation to lakes rapidly reduces its reproduction capacity, leading to a serious decline in population. Please explore such kinds of examples. Some references	We can add some examples showing that studies do exist on IAS in Africa, but I am sorry to observe that, if we refer to other continents, IAS in Africa are poorly documented.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						are added here: Interactive effects of habitat modification and species invasion on native species decline. Raphael K. Didham ¹ , Jason M. Tylianakis, Neil J. Gemmell, Tatyana A. Rand and Robert M. Ewers; TRENDS in Ecology and Evolution Vol.22 No.9.	
63	German IPBES Coordination office and national scientists (IPBES)	11	406	12	451	A stronger focus on the African situation is needed.	Ok, We will complete this example.
64	Mekuria Argaw (MA)	11	406	12	451	GHGs by themselves may not cause changes in BES. They lead to change in climate and weather regimes. Thus, the sub-section should be combined with climate. Climate is of course a result of anthropogenic activities causing GHG release. I suggest this section to be taken to the climate part.	That means that we have to separate climate in two parts, the natural part and the anthropogenic part (same comment as for fire). Need to discuss it with the CLA's. I suggest: - either, change the title from "Greenhouse gas emissions" to "Climate Change". I think it will be more related to anthropogenic drivers, - or, to discuss this point with other regional assessments and see how they threatened this point
65	Vincent-Akpu Ijeoma (VAI)	12	422	13	447	Kgope et al in reference list is 2010 not 2012; Bhardwaj 2015 is not in reference list	The right date for Kgope et al is 2010, not 2012.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
66	German IPBES Coordination office and national scientists (IPBES)	12	428	12	431	What may be the effects on biodiversity?	Some relevant information is found in pp. 2013-2016 of http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap22_FINAL.pdf 2) OKAY I will work on it
67	Rainer M Krug (RMK)	12	432	12	433	I don't think overall emissions per country make much sense here. It would be more useful to show the per capita emissions for each country as population numbers vary widely in Africa.	We do not agree. This is not something we have to address. We think that this figure is more useful when we link it with the figure 4.5. it shows that even if the African countries are the lowest GHG emitter they are those who will suffer most from the impact of climate change
68	Abdelfattah Badr (AB)	12	434			The map may be replaced by a more recent map in whci South Sudan is recognized as a state	OK
69	William Olupot (WO)	13	445	13	445	is it ecosystems or species that migrate?	We do not accept the concept of 'ecosystem migration'. Species can move, not ecosystems which are not living beings, but concepts.
70	Mekuria Argaw (MA)	13	452	14	542	Although the title covers all sorts of pollution, use of pesticides and herbicides are the major contributors to pollution and ecosystem degradation in Africa. Particularly, floriculture, horticulture, tannery, textile, and mining industries are	Perfectly right

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						causings serious ecological degradation. The section should at least provide the list of banned chemicals those still in use in Africa. One good example mentioned is DDT. There are large amounts of stockpiles of unutilized herbicides and insecticides in many countries. Give emphasis to these issues and provide a list of examples as cases from the regions to illustrate the impact.	
71	German IPBES Coordination office and national scientists (IPBES)	13	469			The respective reference needs to be added.	Nonga et al, 2011; Quin et al, 2011; Deininger & Byerlee, 2010
72	Abdelfattah Badr (AB)	14	482			complete th highlighted word	Greater elaboration on the state of affairs is given. Challenges of compliance be several nations in Africa has been highlighted and appropriate references given.
73	German IPBES Coordination office and national scientists (IPBES)	14	482			The respective reference needs to be added.	Greater elaboration on the state of affairs is given. Challenges of compliance be several nations in Africa has been highlighted and appropriate references given.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
74	German IPBES Coordination office and national scientists (IPBES)	14	496	14	498	Here is a natural driver and not an anthropogenic driver mentioned.	The respective references have been given
75	German IPBES Coordination office and national scientists (IPBES)	14	509	14	509	Language seems not adequate: "wrath".	Noted and corrected
76	William Olupot (WO)	14	512	14	512	sentence starting this line is not clear	The word 'wrath' is replaced with 'consequence'
77	Mekuria Argaw (MA)	16	557	16	630	SLM is presented as a positive driver. This is not reflected in the chapter. I think the focus of the chapter is the negative drivers. Otherwise, SLM is not by itself the only positive driver and there needs to be a separate section dealing with all the positive change drivers. I feel that this is part of a restoration assessment and should not be included in this chapter. The absence of SLM is already discussed as a negative driver in management practice section above. The following paper is a good	The sentence has been corrected to explain the causes of 'desperation'

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						reference: Achieving Zero Net Land Degradation: Challenges and opportunities. Ilan Stavi a,*, Rattan Lal; Journal of Arid Environments 112 (2015) Pp. 44-51.	
78	German IPBES Coordination office and national scientists (IPBES)	16	577			Having addressed all problematic drivers before, sustainable land management comes rather abruptly into the debate.	Mistakenly included here. We think this refers to another section.
79	German IPBES Coordination office and national scientists (IPBES)	16	577			Reference to definitions should be given.	We will include
80	Nakashima - ILK expert (N)	16	577			4.2.2.6. Sustainable land management - Moussa & Yamba 2008 (Niger): (p152-153) "Although farmers complain about the disappearing and/or rarefaction of many species, this still illustrates a good management of biodiversity, a recent phenomenon, dating back to a couple of decades, since the growing awareness of the need to conserve the tree to fight desertification. This	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						can be illustrated by the words of this farmer from Sharken Housa, according to whom a couple of decades ago, his field had no more than a dozen of trees; today there are about a hundred."	
81	Vincent-Akpu Ijeoma (VAI)	16	588	16	620	These cited references like World Bank 2012,2012; World Bank and AfDB 2015; UNCCD 2012; Chasek et al 2015 are not in reference list	We will fix
82	Grace Nangendo (GN)	16	617	16	622	The Kagera TAMP project is a good example to use here. There is abundant literature about it. For example check the "Activities", and "Information Resources" content at http://www.fao.org/in-action/kagera/home/en/	We will consider citing example given - however based on two comments above we need to be careful on how much we include.
83	Rainer M Krug (RMK)	16	623	16	624	This statement is essential! I would like to see this triage between the huge need for development, the right of the population to development, the (necessarily?) increased impact on the environment (BES) more discussed as this is the key of the further impact on the BES: can Africa's welth increase while at the same time keep it's impact on BES constant or even decrease it?	We will look to expand - possibly move to earlier in section to give more emphasis

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
84	Nakashima - ILK expert (N)	16	630			ADD ILK can be a way to counteract land degradation: - Kong et al. 2015 (South Africa): (p85) "The LEK [local ecological knowledge] of the rural livestock farmers in Mier have much potential to contribute to the monitoring of land degradation in the duneveld because their assessment of the veld condition corresponded well with the field measurements and did much better than the three vegetation metrics determined from remotely sensed data."	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.
85	German IPBES Coordination office and national scientists (IPBES)	16				The complexity of SLM cannot be squeezed into one page. One should consider just to refer to a positive driver here.	We partly agree, but cannot see how this can be simply referred to one driver, it needs more context which might, or might not be covered in other parts of the assessment.
86	Mekuria Argaw (MA)	17	631	18	663	The sub-section mixed up two different things. It tries to show the link between direct natural and anthropogenic drivers, which is even not well elaborated. The Table 4.2 is too simplistic to show the link. The explanations are not strong enough to illustrate the complex relationship. The second is the link between the	We agree to consider that Table 4.2 is rather simplistic. We will try to detail the enhancement of 'natural drivers' on 'anthropogenic drivers' in a more accurate way. But I am afraid that, as being a table, it will always remain simplistic. However, we will add comment on this table, as such comments are still lacking.\

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						indirect and direct drivers as shown in Figure 4.6. However, this should have been discussed after discussion on the Indirect drivers in sub-section 4.4. The figure should be moved to the next sub-section where it is relevant. In my view, sub-section 4.3 should not be there. It is enough if you show the link between the direct drivers and the indirect drivers. Those natural drivers and obviously aggravated by anthropogenic drivers.	
87	German IPBES Coordination office and national scientists (IPBES)	17	635			The respective reference needs to be added.	Reference to be included
88	German IPBES Coordination office and national scientists (IPBES)	17	643	18	659	The presentation seems rather simplistic.	Not sure if this relates to the sentence ending 659 or the figure starting 660. The figure tries deliberately to reduce complexity whilst highlighting the tiered levels of interactions. This entire section will be re-considered before the SAD as the need to better link direct and indirect drivers as been highlighted throughout the IPBES

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
89	Intergovernmental Technical Panel on Soils (ITPS)	17		17		Section 4.3 (Link between natural and anthropogenic drivers) should be a subsection of section 4.2 That is subsection 4.2.3.	Noted
90	German IPBES Coordination office and national scientists (IPBES)	18	650			The Machakos example is cited repeatedly although 20-years old. Contemporary case studies would be appreciated.	True, but it well illustrates the specific point. Will see if additional examples can be found.
91	William Olupot (WO)	18	650	18	651	sentence starting this line is not clear	Sentence rephrased
92	German IPBES Coordination office and national scientists (IPBES)	18	652			Not clear: Do you mean Elinor Ostrom? How is the Machakos case related to general Ostrom statements on local institutions?	Will reword
93	German IPBES Coordination office and national scientists (IPBES)	18	655			General statements without evidence are needed as they may have implications for policies.	The statement makes no sense, but what I think is meant is that general statements need referencing to be included, and this can be done.
94	German IPBES	18	662			There are some mistakes in Fig. 4.6. Please correct.	Will fix

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
	Coordination office and national scientists (IPBES)						
95	Nakashima - ILK expert (N)	18	664			<p>4.4. Indirect drivers of change (mixed categories)</p> <p>- Chalmers & Fabricius 2007 (South Africa): (p10) "Perhaps the greatest LEK contribution was their understanding of the ultimate drivers (sensu MA 2003) of land-cover change. The local experts confirmed that national policies and macroeconomic factors changed rural resource use patterns. When household incomes change due to remittances, social grants, and job creation as a result of government policies, resource use changes from forest products to store-bought materials. This causes an increase in forest cover and density as natural resource harvesting is reduced. Local experts also told us that the unavailability of child labor, because of government policies ordering compulsory school attendance for children under 15, meant that herd boys were no longer available to keep</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>livestock out of unfenced fields. The most cost-effective alternative, rather than fencing the fields, was to start cultivating smaller home gardens that could be fenced or supervised (Andrew and Fox 2004). This contributed to an increase in forest cover because abandoned fields reverted to forests. The provision of piped water to villages (Statistics SA 2001), the result of macro policy factors, further contributed to the shift toward home gardens, and local experts alluded to this too." (p11)</p> <p>"The experts told us that the process of human movement, stopping cultivation, lack of fire, and forest expansion could all be linked. Under the Betterment Programme in South Africa (Letsoalo and Rogerson 1982), people were grouped together in tribal communities that would make their governing easier. Therefore, people were forced to relocate from scattered settlements into centralized villages. This meant abandoning fields and their homesteads, which were recolonized by forests. In more recent times, people have again moved, this time to be to nearer to infrastructure</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>such as roads, clinics, telephone lines, and water pipelines. When people moved homesteads, they abandoned cultivation and their fields and homesteads reverted to forest (Andrew and Fox 2004). This also influenced fire regimes, as people frequently used fire to open up land for cultivation."</p> <p>- Savadogo et al. 2011 (Burkina Faso): (p1646) : "From the point of view of local population, the factors at the origin of the regression of sacred formations are principally the implantation of foreign religions, the uncontrolled occupation of the lands for cultivation purposes, the growing demand in natural resources (firewood, construction wood, medicinal plants...), often bringing uncontrolled extractions, grazing, modernization and urbanization, which cause the eviction of some populations who abandon many worship places."</p>	
96	German IPBES Coordination office and national	18	664	29	1059	Description of linkage between indirect drivers and biodiversity needs to refer to causal effects in more detail. Ch 4.4.6 is a positive example to serve as a model.	To be explained in SOD

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
	scientists (IPBES)						
97	Nakashima - ILK expert (N)	18	678			<p>section 4.4.1. on "policy changes": ADD lack of integration of indigenous/local modes of governance and resource use: - Baco et al. 2007 (Benin) (p209): "Beninese agriculture is heavily limited by constraints from which the most important are the absence of a clear scheme for the seed systems, the "dictatorship" of industrial crops, the abandonment and disappearance of local practices and knowledge, the inter-regional and cross-border migratory flows, the heavy market footprint in the definition of new production objectives of the producers. These changes are not without consequences for the conservation of the diversity of cultivated plants, and consequently for food security". - Glover & Elsiddig 2012 (Sudan): (p348): "Prevention of local people from entering forest reserves, although one of the purposes of formal government management, usually leads to conflicts between the local people and the forest guards and</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>officers. The uncontrolled use of the natural resources in the area has aggravated the pressures on the farm economy, directly causing shortages of fuelwood and fodder. It is also a source of decline of tree cover in the area. The present study demonstrates the need for integrated policies towards more secure land and tree tenure rights for the landless and marginal farmers so as to combat the looming crisis of forest land utilization and its consequences for agricultural and overall economic development in the study area. This policy would probably also improve farmers' standard of living and provide significant potential to promote sustainable development through conserving biodiversity and geodiversity and, at the same time, protecting the environment from further degradation. There is also a need for policy changes and effective law enforcement that facilitate sustainable use and management based on local community partnership and encouragement of communal property rights and local-level institutional regimes that ensure</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>sustainable resource management and protection of biodiversity and geodiversity across Sudan."</p> <p>- Fairhead & Leach 1994. Contested forests: modern conservation and historical land use in Guinea's Ziama reserve. <i>African affairs</i>.93(373):481-512.</p> <p>- Solomon et al. 2007 (Ethiopia): (p492) "Pastoral development programs previously attempted in semi-arid Borana were not successful, mainly for the following reasons: (1) they were founded on controlled management options and primarily based on the theories of equilibrium and the 'tragedy of the commons'; (2) they often ignored the indigenous knowledge of the pastoralists, and (3) they seldom considered the social consequences."</p>	
98	German IPBES Coordination office and national scientists (IPBES)	18				The whole chapter lacks of straight-forward argumentation, in particular when it comes to social issues.	Noted and will be dealt with in depth in SOD

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
99	Nakashima - ILK expert (N)	19	678			<p>4.4.1. Policy changes</p> <p>- Oguge 2016 (Kenya): Replacement of ILK with other governance systems is negatively impacting the landscape in Kenya. The Samburus report that "The course of landscape change is primarily due to a breakdown of the traditional governance system, since many no longer adhere to it due to a lack of good plans for the implementation of traditional laws.</p> <p>- Chibememe et al. 2014 (Zimbabwe): (p192) " According to Mataire (1998), the Eurocentric nature of the colonial system of conservation is based on sectorial policies and laws, designed in a 'command and control' approach. Mohammed-Katerere (1998) observes that these policies and laws succeeded in creating inequitable natural resource distribution and disempowerment of traditional leadership structures. These polices and laws ultimately failed to recognise local users as planners, protectors and owners of the natural resources and gave rise to unsustainable resource use patterns leading to biodiversity loss (Matowanyika 1998)."</p> <p>- Dalle et al. 2005 (Ethiopia): (p7) "</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>external interferences, originally planned and implemented to bring development and to improve the living conditions of the pastoralists, have disturbed this knowledge base, weakened its applications and, consequently, contributed to rangeland degradation (Gemede Dalle 2004). Similarly, Kamara et al. (2004) reported that national policies and development interventions in the Borana area have resulted in conflicts of authority between traditional and formal systems, contributing to rangeland degradation and low animal productivity."</p> <p>- Glover & Elsiddig 2012 (Sudan): (p347) "In this study, people's perception indicated that biodiversity (including natural forests and forest outside reserves) and geodiversity are in a state of continuous degradation and decline as a result of mismanagement and low inputs of investment in forest protection. Results suggest that the formal management based on government control of the forest reserves and prevention of local people's entry is a failure and unsustainable"</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>- Solomon et al. 2007 (Ethiopia): (p491) "Another cause of rangeland degradation is recent (e.g. cultivation) and historical land alienation. According to the respondents, land alienation began following political perturbations caused by the Anglo-Italian war (1931–1941) and subsequent ethnic conflicts, which displaced the Borana from over 60% of their traditional grazing land. A large portion of Borana rangeland was also alienated in the past for the purpose of establishing demonstration and commercial ranches, a process that is still continuing.(...) Land alienation is often done without consulting with the communities involved and the presumed advantages never materialize. Some of the elders expressed their concern that such land alienation not only reduces key grazing lands, but also fragments the rangelands and obstructs movement of pastoralists with their livestock from one grazing area to another."</p>	
100	Mekuria Argaw (MA)	19	678	19		Policy is a key indirect driver of change BES. It should be looked at scale such as International (e.g., on trade and	Noted

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						commodities), national (on land use, taxation, investment incentives, etc...) and local (e.g., shift in crops such as from subsistence to market oriented production or from consumption crops to cash crops, etc...). Such changes cause degradation of ecosystems and biodiversity. This can be supported with examples.	
101	German IPBES Coordination office and national scientists (IPBES)	19	686			The example is not easy to understand: Negative economic policies impact on biodiversity via transport corridors or dams. The expectations raised by the headline were not fulfilled adequately.	This section will be reworked
102	Rainer M Krug (RMK)	19	713	19	714	You surely men "ecosystem services" or "functioning natural ecosystem? Because an ecosystem is not necessarily natural and functioning! A degraded ecosystem is still an ecosystem.	We meant ecosystem services
103	German IPBES Coordination office and national scientists (IPBES)	20	734			More reflections on the listed principles is needed.	Will add

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
104	Mekuria Argaw (MA)	20	736	26	899	The discussion on Economic systems seems to be too broad and a bit out of context. The focus should be on trade imbalance, how that leads to resource or ecological degradation in developing countries. The general economic development discussion is not logically linked to the topic of the chapter.	Will add
105	German IPBES Coordination office and national scientists (IPBES)	20	748			Quality of Figure 4.7 is loo low.	Quality to be improved by graphic designer
106	German IPBES Coordination office and national scientists (IPBES)	21	751	ff		The whole chapter on trade and sectoral change would benefit from focusation and deletion of redundancies.	Noted and will be explained in depth in SOD
107	German IPBES Coordination office and national scientists (IPBES)	22	789			The Figure on road development does not fit well to the key messages of the chapter.	Noted

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
108	German IPBES Coordination office and national scientists (IPBES)	22	789			Fig. 4.8. The respective reference needs to be added.	Will add
109	Abdelfattah Badr (AB)	22	790			Add source and show on a map on which boudries are mapped	Will add
110	Abdelfattah Badr (AB)	23	805			Add source full information and show on a map on which boudries are mapped. The indicators of future development is not clear on the map	Source will be added
111	German IPBES Coordination office and national scientists (IPBES)	23	805			Fig. 4.9 is not clear.	The caption will be rephrased
112	German IPBES Coordination office and national scientists (IPBES)	23	807	ff		Compared to other chapter, the one on economics is long and not well unstructured. Perhaps one sub-chapter on trade issues and another on (renewable) energy would be helpful.	The text on economics will be shortened
113	Rainer M Krug (RMK)	24	830	24	833	You mention the large potential of renewable resources somewhere else in the text as a chance for Africa: but	Changes made as suggested

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						here you caution and mention Geothermal. You should say here, to keep it consistent, say something along the lines of "despite the large potential / availability / ... of RETs for large-scale grid electricity, implementatio should be done cautiously due to their negative impacts on BES (and local / small scale renewal should be the preferred option?)" Decentralised RETs?	
114	German IPBES Coordination office and national scientists (IPBES)	26	898			The Chapter 4.4.2 ECONOMY refers to large-scale electric grid and geothermal systems. Can these be specified? Compare this to 4.4.4 where "unconventional technologies in energy production" were mentioned.	To be rephrased
115	Nakashima - ILK expert (N)	26	900			4.4.3. Population growth and urbanization ADD examples, such as - Oguge 2016 (Kenya): Communities of the Samburu ethnic group reported that "Increase in population has led to higher stock numbers, increased grazing pressure and demand for water." (<i>Nicholas O. Oguge (2016). Landscape ethnoecological knowledge base and management of ecosystem services among the Samburu of</i>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<i>Northern Kenya. In Marie Roué, Alfred Oteng-Yeboah, Peris Kariuki and Yao Adou (eds.), Indigenous and local knowledge of biodiversity and ecosystems services in Africa: Contributions to an IPBES regional assessment. UNESCO: Paris.)</i>	
116	German IPBES Coordination office and national scientists (IPBES)	27	910			It is not clear what contribution of improved health care is to biodiversity protection. This seems an arbitrary example.	More relevant examples to be sourced
117	German IPBES Coordination office and national scientists (IPBES)	27	913	ff		Urbanization is tackled several times. More coherence and streamlining at which place the focus lies on urban systems.	Noted and text shall be rephrased
118	German IPBES Coordination office and national scientists (IPBES)	27	927			It seems rather simple that informal settlement growth means poverty and inequality. A crucial role have the informal sectors in job creation, growth and entrepreneurship.	Noted
119	Mekuria Argaw (MA)	28	900	28	951	The text on population is too heavy and the link with biodiversity and	Text to be reworked

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						ecosystem change is only mentioned in the last paragraph. Migration and refugees is one of the major causes of ecological degradation in Africa, at least for increased deforestation. This has to be emphasized and support it with examples.	
120	Abdelfattah Badr (AB)	28	941			Indicate source and mention the numbers of projected population density for 2050.	Source will be added
121	Mekuria Argaw (MA)	29	960	28	970	Technology plays a positive role. If the chapter considers positively contributing factors such as technology and SLM, they should be treated separately. Otherwise, they all have to be excluded and focus on the negative drivers.	Noted
122	Rainer M Krug (RMK)	29	961	29	970	This is an important question, which is discussed only very broadly and without any references. I would ask for a more detailed summary of the state of affairs as in all regards, this is the crucial question which is mentioned all over the chapter (e.g. RETs, and other technologies to enable growth while possibly reducing the impact on biodiversity and ecosystem functioning.	Primary Energy Consumption in Africa has risen from 261.7 metric tons of oil equivalent in 1998 to 435 mtoe in 2015 (Statista, 2016) showing a rise of 66% in 17 years. In South Africa, only 16.9% of the final energy consumption was renewables in 2012 (en.wikipedia.org, 2016). At COP 21 in Paris, Parties to the UNFCCC reached a historic agreement to combat climate change and to accelerate and intensify the actions

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
							<p>and investments needed for a sustainable low carbon future. Among the global strategies in reducing greenhouse gas emissions from fossil fuels is the development of alternative fuel sources. One such is use of liquid biofuels in the transport sector whose growth in production and consumption will increase due to, among other reasons, mitigation of biodiversity loss (Brenana & Owende, 2009). Production of such fuels must be both technically and economically viable. Hence, be competitive in pricing; requiring low to no additional land use; enabling air quality improvement, and; requiring minimal water use (Reviewed in Brenana & Owende, 2009). Technological application in the exploitation of microalgae could meet these conditions and therefore make a significant contribution to meeting the primary energy demand, while simultaneously providing environmental benefits (Brenan & Owende, 2009). Aside climate change, other key pressures</p>

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
							threatening biodiversity in Africa include habitat loss and wildlife crime. Space-based technologies, such as Earth Observation satellites and their geospatial data, satellite-communications and global navigation satellite systems will be among key tools in the monitoring, assessment and managing of biodiversity and ecosystems in support of sustainable environmental development (UOOSA, 2016).
123	German IPBES Coordination office and national scientists (IPBES)	29	961			The three lines on technology is not sufficient to adequately tackle this important driver.	Text on technology to be developed further
124	Mekuria Argaw (MA)	29	971	29	971	Insecurity does not reflect the content. It should be replaced with illegal trade. War is one major anthropogenic direct driver and should be treated in the earlier sections.	Noted
125	Abdelfattah Badr (AB)	29	992			Indeed is one word	Noted

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
126	Nakashima - ILK expert (N)	29	1012			<p>4.4.6. Cultural practice and spirituality - Campbell 2005 (Ghana): p 11 "Responding to a question on the most important factor for the possible decline of the sacred groves, the interviewees cited youth assertiveness, western culture, education, local urbanisation and "new" religions (Christianity and Islam) – factors which were also noted as influencing age and gender norm changes and greater individual volition. Some interviewees, mostly elders, mentioned all these factors as important."</p> <p>- Savadogo et al. 2011 (Burkina Faso): p1639 "In Burkina Faso, Mossi society has a long tradition of animist practices tending to regress with the raise of imported religions, like Islam and christianism. Vestiges of this ancestral tradition that are sacred woods, witnesses of the forest element, are more and more threatened by the high demographic density and extensive agropastoral exploitation." (p1645) "In Burkina Faso in general and among the Mossi society in particular, animism was the only religion practiced before.</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						Tradition and custom applied in many Mossi tribes and animist dignitaries were rigorously watching over the preservation of sacred woods often sheltering worshipped divinities. But nowadays, the entrance of christianism and islam caused social mutations that affected a lot of cultures, notably the Mossi's. These mutations were expressed by massives conversions into these monotheistic religions, and consequently, by the progressive abandonment of animist practices and rites. This was followed by the non-respect and rejection of many customary laws, with changes in the ways of thinking and in the behaviours. The worships are now only known and practiced by rare animist older persons."	
127	Intergovernmental Technical Panel on Soils (ITPS)	29		29		Subsection 4.4.5 (Insecurity). This title does not seem appropriate here. I would have preferred something like 'War and Conflicts'	Title to be reworded
128	Mekuria Argaw (MA)	30	1012	30	1070	Cultural practices are positive contributors and should not be considered here.	Noted

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
129	Nakashima - ILK expert (N)	30	1013			<p>section 4.4.6. on "cultural practice and spirituality":</p> <p>add refs of indigenous/local practices linked to religion/spirituality and contributing to conservation (REMARK: overlaps with chapter one)</p> <p>AND change in religion leading to changes in resource managements...</p> <p>- Baco et al. 2007 (Benin) [in French]: (p205) "On the agricultural front, Baco et al. (2004) observe that the renewed interest for monotheistic religions (christian and muslim) has prevented the celebration of animsit ceremonies like celebrations of "outing" of the new yam in northern Benin. yet, celebrations of "outing" of the new harvests constituted before communitarian practices that allowed to preserve some varieties."</p> <p>- Golden 2014 (Madagascar): (p255) "It is critical for conservation managers to understand local people's cosmology because it speaks directly to the ways in which they value the land. Local people find the land to be both productive in its utility and also a space of spiritual communion and moral structure. Without this recognition, conservation managers</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						cannot hope to engage local people in protecting forested areas when the value system incentivizing protection is highly divergent." - Virtanen 2002 (Mozambique): (p237) "In Mozambique the concept of 'cultural-historical protected zones' of the new Forest Law represents a move towards pluralist legislation, which supports the use of local customary institutions for the conservation of nature. However, if local institutions are promoted from above merely as a tool to preserve biodiversity for its own sake, separating the institutions from their socio-cultural bases, they will soon lose their legitimacy. Sacredness is a powerful means of conservation only when it is linked to a broadly respected belief system, with adequate normative controls and means for their enforcement. "	
130	Abdelfattah Badr (AB)	31	1071			leave space between Environment and governance	Noted
131	Nakashima - ILK expert (N)	IN GENERAL				DRIVERS GENERAL SUGGESTION: precise that local/indigenous peoples can give their own explanations about environmental changes, relying on	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>their own cultural and social background. Their explanations are consistent in the local worldview. They should be considered even if they do not correspond to a scientific way of thinking, because they represent valid explanations in the local worldview, and also because the understanding of these explanations can make it easier to bind conservation efforts to local interests.</p> <p>FOR EXAMPLE:</p> <p>- Bollig & Schulte 1999 (Kenya and Namibia): (p511- Kenya) "When it comes to the search for causes of environmental change, the Pokot explain degradation in terms of intrasocietal conflicts. They internalize the problem and see the fault for decreasing biomass production with themselves, although in a very different sense than environmental scientists do. Overgrazing was not stated as a major problem leading to degradation. It was the conflict between seniors and juniors in a gerontocratic system, disrespect, and antisocial behavior, that led to decline".elders explain how some changes in the environment occurred</p>	<p>likely there are other views on the matter.</p>

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>(p499 - Kenya): "The vegetation started to change in the following way: One day an old man detected that his wife had committed adultery with a much younger man. The old man said to himself that it was just the abundance of milk which made these young men commit adultery with the wives of their elders. And in the end it was the abundance of grass that caused the milk to be plenty. The young man was caught and terribly beaten. He had to give out an oxen to his seniors. However, the old man was still furious. He was angry with the juniors; he was angry with the abundance of milk; and he was angry with the plentiful grasses. So he cursed the plains and the grasses. Within one year the plains started to change into a dense bush, and after three years the bush had become almost impenetrable. Lions, hyenas, and leopards entered the bush and devoured livestock. Elephants and buffaloes came too. The grass plain vanished; all became one big dense bush."</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
132	Nakashima - ILK expert (N)	IN GENERAL				<p>DRIVERS ADD observations and explanations from local/indigenous populations as sources of assessment of environmental change drivers. FOR EXAMPLE: - Paré et al. 2010 (Burkina Faso): (p283) "Most of the respondents perceived that clearing of vegetation for cultivation of cash crops (agribusiness) was the major driver of vegetation change (Table 3). The informants mentioned that the decrease in rainfall over the last 20–30 years was one of the major abiotic constraints on vegetation growth. Another important factor mentioned was the population increase, which was primarily caused by rural immigration into the region since the 1970s." - Chalmers & Fabricius 2007 (South Africa): (p6-7) "The local experts identified six factors that affected forest size and density (Table 2). These were: 1. Increased occurrence of exotic trees and shrubs that people do not harvest, as they are seen as inferior in quality to indigenous species.</p>	Will seek guidance on integration of ILK, considering the current IPBES guide. What value is attached to the authority of one or two people as representing an entire tribe? Is it likely there are other views on the matter.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>2. Emigration by people leaving the area, and relocation of homesteads within the area itself.</p> <p>3. Reduced frequency of fire, which encourages forest expansion around the edges because saplings, especially <i>Acacia karroo</i> (known locally as Umnga), are able to take hold.</p> <p>4. Reduced reliance on building materials from natural resources because of an increase in employment and the widespread access to social grants, enabling people to purchase building materials from hardware suppliers.</p> <p>5. Less cultivation and many abandoned fields.</p> <p>6. Change in cultivation practices, from large cultivated fields to smaller home gardens"</p> <p>- Ayeni et al. 2016 (Nigeria) (p33): "The communities' local experts reported that changes in climatic condition, deforestation in the last 30 years and constructions of surface storages (reservoirs) are the major factors responsible for declining surface water in the region. There is thus, a good corroboration between the results of remotely sensed data of</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>LCC assessment and the communities' local experts' observations of land cover changes and changes in surface water resources in the region". (p41): "The local experts attributed the causes of change observed [[changes/ decrease in land cover]] to seven factors including demeaning culture in most communities; intensive farming activities and bush burning; chacoal production activities among the youths, low rainfall over the years; rapid urbanization and population increase; poor conservation of water and forest resources, and illegal logging and deforestation activities (Appendix A)."</p> <p>- Solomon et al. 2007 (Ethiopia) : (p487) "All the repondents firsly ranked recurrent and prolonged droughts as the main contributing factor. Increased livestock populations and the use of grazing land for cultivation were ranked second and third, respectively. The ban on the use of fire and development of water ponds were named as the fourth and fifth attributes, respectively." (p489) "Movement of livestock is an important management</p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<p>strategy for drought survival in African pastoral systems (Solomon, 2000). In drought situations, the pastoralists become more mobile, and often move outside the core of their territory. Such mobility minimizes livestock pressure on natural resources as it tends to distribute the animals over a wide area, thereby reducing the concentration of animals in one particular area. It also enables the exploitation of heterogeneous environments in space and time. The respondents, however, expressed concern that the option of herd movement has diminished considerably over time. Many ascribed this to interventions through development of water ponds, human population growth, expansion of crop agriculture and bush encroachment."</p> <p>- Roue et al. 2016 (Africa): Papers from Kenya, Tanzania, Cameroon and Madagascar provide detailed information from Indigenous communities assessing environmental change drivers. (<i>Marie Roué, Alfred Oteng-Yeboah, Peris Kariuki and Yao Adou (eds.), Indigenous and local</i></p>	

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
						<i>knowledge of biodiversity and ecosystems services in Africa: Contributions to an IPBES regional assessment. UNESCO: Paris)</i>	
133	Susan Ringrose (SR)		133		140	Indicate what % of continents mainland is burned annually and the locations of most extensive burning NB biomass burning for agriculture can lead to excessive CO formation - see MOPITT mapping	
134	Susan Ringrose (SR)		201		205	This needs references (maybe Ringrose et al., 1997, Ferguson and Hanks, 2010)	Will add
135	Susan Ringrose (SR)		342		349	This is/was counteracted by CBNRM measures which are of relevance here	
136	Susan Ringrose (SR)		357			Need an expanded definition of arid areas to include semi-arid areas which are more populated and therefore prone to human induced environmental impacts	
137	Susan Ringrose (SR)		378			Further elucidation of the Maroyi (2012) example would be useful	Will add
138	German IPBES Coordination office and national scientists (IPBES)		380			The type and origin of invasive species in South Africa should be specified for the 10 000 000 ha.	Agree.

Comment #	Reviewer Name	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment	How to Address
139	Susan Ringrose (SR)		396			Explain that this is an example of AIS Impacts	Comment not clear
140	Susan Ringrose (SR)		412			Earlier in this chapter it was explained (rightly) that El Nino/La Nina events were part of the natural variability of the climatic system NOT related to climate change as such	Need to discuss it with the CLA's. I suggest: - either, change the title from "Greenhouse gas emissions" to "Climate Change". I think it will be more related to anthropogenic drivers, - or, to discuss this point with other regionals assessments and see how they threatred this point
141	Susan Ringrose (SR)		412			Earlier in this chapter it was explained (rightly) that El Nino/La Nina events were part of the natural variability of the climatic system NOT related to climate change as such	Right. It will be clearer if we do not process a mixture between 'natural climate' and 'anthropogenic climate'.
142	Susan Ringrose (SR)		415		417	Avoid irrational comments - multi-global efforts are underway with many countries participating - kindly give examples of IPCC work in Africa (from numerous web references)	http://ipcc-wg2.gov/AR5/images/uploads/WGII/AR5-Chap22_FINAL.pdf
143	Susan Ringrose (SR)		415		417	Avoid irrational comments - multi-global efforts are underway with many countries participating - kindly give examples of IPCC work in Africa (from numerous web references)	Noted.
144	Susan Ringrose (SR)		419			Give examples of these 'wanton harvests'	OK
145	Susan Ringrose (SR)		419			Give examples of these 'wanton harvests'	OK, We will work on it

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146	Susan Ringrose (SR)		439			Either provide narrative for Figure 4.5 or remove it.	Figure caption to be provided
147	Susan Ringrose (SR)		444		451	This 'explanation' needs examples to underscore its credibility - kindly provide these	
148	Susan Ringrose (SR)		465		466	Indicate where major areas of intensive farming activity occur (a map would be useful) so as to provide concrete examples as to where pesticide/herbicide use might be a problem. Are these mainly local famers or land grab farmers??	
149	Susan Ringrose (SR)		472		474	Where, exactly?	
150	Susan Ringrose (SR)		476		482	Is DDT (and other banned substances) still in use? In which countries?	The Non Target species example of Maasai Mara has been provided
151	Susan Ringrose (SR)		483		485	Greater explanation of irrigation induced salinisation required	More elaboration on salinization in Africa has been provided. An example is also provided.
152	Susan Ringrose (SR)		486		498	Biotechnology, mining and volcanic eruptions all important but treatment here much too scanty. References and examples needed and a fuller explanation of the issues	More on volcanic eruptions in the succeeding paragraphs.
153	Susan Ringrose (SR)		498			Do gorillas have a unique response to volcanic activity? Give references and explain what this might be??	More details added and the special characteristic of the highly endangered gorilla is provided. The relevant references have been cited

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154	Susan Ringrose (SR)		508		511	Need to be more explicit wrt dead seas around the coasts of Africa - mostly in upwelling zone of west Africa - explain and give references	Additional text "Emergence of dead zones, sequel of nutrient fed into the sea from agricultural catchment and rise in dissolved carbon has been on the rise worldwide (Diaz and Rosenberg, 2008; Lavelle et al, 2005) and the African seas will not be exceptions especially in areas draining regions with escalated intensive agricultural practices. This is worsened by the well-known natural coastal upwelling associated with western boundary of landmasses which are productive but unfortunately suffer for severe hypoxia (<0.5 ml O2/liter), a condition already affecting eastern Pacific Ocean, south Atlantic west of Africa, and Bay of Bengal (Diaz and Rosenberg, 2008). So far, the total export of nutrients (nitrogen and phosphorous) by the African rivers increased by 10 to 80% (Yasin et al, 2010) and rivers draining ivory Coast's mainland are already oversaturated with CO2 (Kone et al, 2009)." With the relevant references are added.

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155	Susan Ringrose (SR)		511			In which lakes are pesticides 'capable of altering endocrines'? References and location(s) needed	This is possible in all lakes but examples of lakes where this has been observed are given
156	Susan Ringrose (SR)		528			Which water bodies do you mean and how widespread is this phenomenon? How many people are/were affected?	Information on natural distasters and statistics provided
157	Susan Ringrose (SR)		538			A number of lakes are naturally stratified in terms of temperature/salinity. Explain differences between natural and human-induced stratification and how the latter in particular might adversely affect species distributions.	To be explained in SOD
158	Susan Ringrose (SR)		546		548	Indicate specific negative affects (on ecosystems) of gases indicated here NB CO2 from volcanoes can kill animals..	To be indicated in SOD
159	Susan Ringrose (SR)		548		556	Indicate how motor vehicle pollution in urban areas has adversely affected ecosystems (give examples)	To be indicated in SOD
160	Susan Ringrose (SR)		570		571	These are natural occurances which are inherently part of the environment	Detailed explanation of the sources of NOx and SOx are given. Appropriate citations are made of the studies that characterized the different source and effects of the toxic gases.
161	Susan Ringrose (SR)		571		572	The Sahara (infact its southern border - the Sahel) is not currently expanding - see earlier part of this chapter - it responds to natural climatic cycles	Encroachment of the desert may not be happening but land degradation (precursor of desertification) from different

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							activities including irrigation related salinization are happening and may need to be highlighted. Expansion of sahara has been replaced with 'land degradation'
162	Susan Ringrose (SR)		575		576	This kind of blanket statement is inherently untrue	The statement has been replaced.
163	Susan Ringrose (SR)		630			A number of rotational practises are currently in vogue across the continent (e.g. MCGranahan and Kirkman, 2013)	Thanks will look at the references and see if they can be included.
164	Susan Ringrose (SR)		635			Need to be specific as regarding definitions of range degradation and desertification - check for e.g. Sefe et al., 1996 and later Botswana papers	We deliberately do not use the term desertification here. It might be appropriate to define degradation for use in the assessment (as it has been defined in the LDA assessment), but this should be in an introductory section and not here.
165	Susan Ringrose (SR)		635			Need to be specific as regarding definitions of range degradation and desertification - check for e.g. Sefe et al., 1996 and later Botswana papers	Noted.
166	Susan Ringrose (SR)		649			Where is this positive impact of policy wrt poverty amelioration and population growth?	Will relook at this section to give greater clarity
167	Susan Ringrose (SR)		651			What is Machakos an example of? (indicate its location and a reference would be useful)	Will add, however as an assessment the text needs to be kept short and focussed.

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168	Susan Ringrose (SR)		656			Take it as read that short term survival will always win over conservation and sustainability - people will strive to stay alive using whatever means possible.	Will need to strengthen and reference
169	Susan Ringrose (SR)		659			Give examples	Will add
170	Susan Ringrose (SR)		673		677	Where is current economic growth severely impacting ecosystems? All such generalisations need qualification.	To be explained in SOD
171	Susan Ringrose (SR)		708		712	Need references/examples as to where these extinctions are taking place and which species are being adversely affected	Insert in 708: This is because biodiversity conservation is mainly implemented through management of protected areas policy (Iritie, 2015). Such a system has evolved from the "fortress" approach that was centralized to "community-based conservation" initiated in the late 80s and widely adopted in the 90s (Iritie, 2015). This paradigm shift in conservation is based on participation of local people and other stakeholders in a co-management approach. However, where there are conflicting legislations, governance dilemma have occurred leading to deforestation and unsustainable harvest of ecosystem goods, e.g. in

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							the Mount Marsabit National Park in Kenya (Roba et al., 2004; Robinson, 2013). This policy approach has been severely criticized due to low added value for local communities, short-term vision, integrated projects of conservation and development (IPCDs) that worsen conservation problems because they generate new inhabitants and therefore population pressure and over-exploitation of resources, persistence of competition problems between hunting and agriculture, ambiguous effects on incentives for conservation, etc. (Reviewed in Iritie, 2015).
172	Susan Ringrose (SR)		708		712	Need references/examples as to where these extinctions are taking place and which species are being adversely affected	Will add
173	Susan Ringrose (SR)		710			An example could be the KAZA project (see web) in southern Africa where five countries are striving to resolve corridor/population growth/movement and infrastructure problems	INSERT AFTER 710 A good example is the 520 000 km ² Kavango Zambezi (KAZA) Transfrontier Conservation Area (TFCA) in the Okavango and Zambezi river basins at the convergence of Angola, Botswana, Namibia, Zambia and Zimbabwe borders. KAZA TFCA

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							provides safe corridors for wildlife movement between its 36 national parks, game reserves, community conservancies and game management areas.
174	Susan Ringrose (SR)		710			An example could be the KAZA project (see web) in southern Africa where five countries are striving to resolve corridor/population growth/movement and infrastructure problems	Example of KAZA will be added
175	Susan Ringrose (SR)		725		729	Kindly note that a number of countries ratify treaties and draw up action plans with no guarantee of their being implemented. Implementation in many cases is the stumbling block.	Thank you. The comment is well-noted
176	Susan Ringrose (SR)		741		746	Please quantify how much trade Africa engages in worldwide and with whom? What are the trends? See IMF report by Allard et al	To be explained in SOD
177	Susan Ringrose (SR)		747			Fig 4.7 Where is the African trade??	
178	Susan Ringrose (SR)		751		755	These statistics need a reference	Will add
179	Susan Ringrose (SR)		771			This refers mainly to the BRIC countries many of which are now failing - there is only one BRIC country in Africa	Noted

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180	Susan Ringrose (SR)		790			Expand on your assumption that the areas with the highest road density have the greatest ecosystem impacts?	Will expand
181	Susan Ringrose (SR)		813		825	Provide tangible data in all African regions to show where this is happening and how detrimental the effects are throughout the region	Will provide
182	Susan Ringrose (SR)		864			Use biomass maps on web to show distribution - indicate country borders.	Will add a map on biomass
183	Susan Ringrose (SR)		903			Indicate where this is occurring - Nigeria? South Africa?	Countries with the highest population growth rate in sub Saharan Africa include Zimbabwe (4.36%), South Sudan (4.12%), Malawi (3.3%), Niger (3.28%), Burundi (3.28%) and Uganda (3.24%) (Worldatlas, 2016)
184	Susan Ringrose (SR)		903			Indicate where this is occurring - Nigeria? South Africa?	Noted
185	Susan Ringrose (SR)		941			Fig 4.13 Indicate in narrative where there appears to be conflicts wrt ecosystems service provision and population density	Caption to be further developed
186	Susan Ringrose (SR)		983		1008	References to specific cases needed	Will add
187	Susan Ringrose (SR)		985			What are 'illegal laws'	Will be explained in SOD
188	Susan Ringrose (SR)		1055		1061	Show exactly how the benefits of biodiversity protection might accrue to the rural and urban poor in Africa	Will add the requested information in SOD

