

IPCC SRCCL Final Government Draft Review Comments - Summary for Policymakers

Comment No	From Page	From Line	To Page	To Line	Comment
1120	0	0	0	0	Overall, the SPM is text heavy, technical and difficult to read. As the target audience for the SPM is policy makers, having the SPM use more plain language, especially in the key messages (headline statements) would improve readability and with help the uptake of the document. [Canada]
1696	0	0	0	0	General observation: Lack of East-Central European authors in the report. [Hungary]
1702	0	0	0	0	SPM seems too long, certain parts are too general. [Hungary]
568	0	0	0	0	GENERAL COMMENTS: Many paras contain generic statements. SPM repeats information from previous IPCC, IPBES, GEO, UNCCD reports. Most paras in SPM read like general statements, well known to policy makers. New findings may be highlighted and given more weightage in the report. [India]
156	0	0	0	0	The length of the report vastly exceeds the proposed length mentioned in the outline of the SRCCL as annexed to the Decision IPCC/XLV-7 and Corrigendum (4.IV.2017), in which the total number of pages is stipulated as up to 275. Although the number of pages for the Summary for Policymakers (SPM) is a reviewable volume (31 pages in the current Final Draft for Government Review), the current volume of the Final Draft of the entire report (1,376 pages) tends to place a heavy burden on the policy makers, in the endeavor to fully understand the SPM and submit the best quality of government review comment within the allocated review period. Thus, we would appreciate further consideration regarding the length of the special reports in the AR7. [Japan]
8010	0	0	0	0	We are generally concerned about the unbalanced statements and graphical presentation in Fig. SPM # of the risks related to bio-energy and BECCS in the SPM; It may contribute to a sense of inconsistency between IPCC reports, with the SR1,5 report indicating its necessity to meet 1,5 degrees and the SRCCL indicating its infeasibility without posing risks to food security and biodiversity. At the same time, the report is understating the trade-off between space for bio-energy crops and forests on the one hand and meat-intensive and wast-full consumption on the other hand, while the illustrative scenarios make this case very clearly. The use of uncommon and unclear terms as low resource intensive consumption add to this lack of clarity. [Netherlands]
7922	0	0	0	0	A general comment is that the regional differences could be emphasized better throughout the SPM. [Norway]
7924	0	0	0	0	A general comment is that the arctic is not mentioned in the SPM, even though the arctic is changing faster than any region. Several other vulnerable regions are mentioned throughout the SPM. Please consider to also include the Arctic region where it is suitable. [Norway]
4866	0	0	0	0	Could omit the full names of the cross-chapter boxes in the listing of references in conjunction with relevant parts of the text. [Sweden]
4868	0	0	0	0	Should avoid, unless there is a very good reason, "low confidence"-level findings and suchlike in the SPM. [Sweden]
4870	0	0	0	0	Overall, the SPM highlights that "All assessed pathways that limit warming to 1.5oC require extensive land-based mitigation, with most including reforestation/afforestation, large-scale bioenergy, and in the majority of cases bioenergy with carbon capture and storage (BECCS)" (cf. B7.1). In line with this, it would be meaningful if the SPM much more clearly addressed how to get there without harming other ecosystem services and biodiversity, i.e. the solutions side. As it is now, the SPM focuses much on all the problems one might run into while addressing the 1.5 degree target. The SPM should have a more solutions/good examples approaches (while of course not excluding information about pitfalls along the road). [Sweden]
4872	0	0	0	0	Please consider including a list of key concepts (such as "land degradation neutrality", with brief explanations. [Sweden]

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6976	0	0	0	0	OVERARCHING COMMENT ON SPM Thanks to the authors for their hard work in addressing comments on the SOD of the SPM. We note that the SPM is still well over its page limit of 10 pages and also note the concise and focused nature of section D. It might be helpful for authors or Sections A-C to use D as a model for the next round of drafting, both in terms of brevity and in terms of identifying key policy-relevant messages that would make the report of most use to policymakers. [United Kingdom (of Great Britain and Northern Ireland)]
6978	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - at times, the SPM reads like somewhat like an undergraduate textbook, rather than a distillation of key policy-relevant messages from the underlying report. This in turn contributes to its excessive length. For example, section A5 is contains a large amount of basic science facts (e.g. A5.4) and much of section C is simply a list of broad statements about society. The SPM could be reduced in length and made more policy relevant by focusing on the fundamental messages that policy makers need to know and material will inform and enlighten them. [United Kingdom (of Great Britain and Northern Ireland)]
6980	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - while we appreciate the challenges in integrating a number of different disciplines, it often feels like climate change is something of an afterthought in this SPM. Ultimately, however, this is an IPCC report and should therefore have climate as a central theme. For example, much of B2 and B3 is a discussion about land issues that occasionally (or not at all) mentions climate change. Please consider how the SPM can be written in such a way as it has a strong narrative theme around climate change running throughout, while of course touching on the other relevant (within scope) issues surrounding land. [United Kingdom (of Great Britain and Northern Ireland)]
6982	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - there is a lack of clear narrative theme running throughout the SPM and generally an absence of clear "take-home" messages that are likely to resonate with policymakers. This is not helped by the fact that in a number of places seemingly contradictory statements are being made. Specific examples are provided below, but in particular can be found in discussions regarding greening and CO2 fertilisation. [United Kingdom (of Great Britain and Northern Ireland)]
6984	0	0	0	0	A key narrative that emerges from the report is one of risks from land-based mitigation options. However, this narrative has the potential to be somewhat misleading without seeing the wider context. There is a large body of evidence that suggests that a portfolio of land-based mitigation options could play an important role in addressing climate change and helping to meet the goals of the Paris Agreement. And yet reading the report, we primarily get the message of risks and severe consequences from these actions, and some of the messages are a little too simplistic. It is of course vitally important that such risks are discussed and conveyed, but equally it is important to stress more clearly that land based mitigation is needed because of the severity of the climate challenges. And then supplement this with more information about how we can implement land-based response options in a way that minimises their potential harms. This is covered a little (B6) but in a somewhat superficial way. For example, rather than just say that BECCS is bad, a more substantive message would be BECCS deployed at a particular scale could have harmful impacts, but deployed at a more appropriate level could be beneficial and this is how such an appropriate level could be incentivised, managed and governed. This is the sort of information that policy-makers really value. [United Kingdom (of Great Britain and Northern Ireland)]

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6986	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - the language of the report reflects the fact that it has been written by authors from different backgrounds and to satisfy different audiences but it often means that it's not understandable to all. For example, "land degradation neutrality" will be immediately familiar to those who are aware of the UNCCD, but will not be obvious to those who are coming to the report from a climate/IPCC background. The same may apply to the frequently used "sustainable land management" (the definition of which is not always particularly clear). It is important to ensure that the language used throughout will be comprehensible to all the audiences who will read it. Therefore please consider how you can work to find a common language throughout. Alternatively, a box on key concepts might be helpful. [United Kingdom (of Great Britain and Northern Ireland)]
6988	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - Throughout this report, the term 'Sustainable land management' is used frequently; however, it is unclear exactly what is meant by this term, and it should be clarified in some manner. For example, it could be interpreted as meaning response options listed under 'land management' for any of the five land challenges excluding value chain management and risk management, or response options aimed at land degradation, or a subset of other response options. Similarly, land degradation is not clearly defined (a suggestion of how to do so is provided in a subsequent comment for A2.2). These are terms that many readers will not be familiar with, so it is essential to be as clear as possible. [United Kingdom (of Great Britain and Northern Ireland)]
6990	0	0	0	0	OVERARCHING COMMENT ON THE SPM - a key issue for policymakers to understand is the role of land based mitigation options and their respective strengths and weaknesses. At the moment, we feel that there is undue weight and attention paid to some of these options at the expense of others. In particular, there is a considerable focus on the weaknesses of BECCS and bioenergy, but much less of a critique of alternative options and this therefore feels unbalanced. This is not to say that the challenges of bioenergy/BECCS should not be highlighted (they absolutely should - this is very important! - and the SPM generally does a good job in this regard). Rather that full context should be provided by discussing the strengths and weaknesses of the full range of land response options. [United Kingdom (of Great Britain and Northern Ireland)]
6992	0	0	0	0	OVERARCHING COMMENT ON SPM - reflecting the point made about ensuring messages on land response options are better balanced in terms of costs and benefits, we would like to stress the importance of ensuring that the reader isn't left with the wrong impression that land response measures to meet the Paris Agreement will inevitably lead to problems for food production and people's livelihoods. There may be risks here but it depends on how they are implemented, and there are also opportunities presented by land to help us meet Paris goals. It is important that this nuanced message is clearly stressed with clearer messages on how to deliver this to minimise risks. [United Kingdom (of Great Britain and Northern Ireland)]

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6994	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - there is a frequent problem in the SPM (multiple examples are provided in our comments below) whereby lists of policies or response options are provided, without any actual information regarding these policies or options. It is not especially informative to the reader to know that such policies exist, without being provided with details about the, (e.g. their strengths and weaknesses, priorities etc). The SPM is already too long - if lengthy text without little purpose is included, this just exacerbates the problem of length. There are two possible solutions to this issue 1) remove such lists or 2) if it is necessary to mention particular policies or measures, select specific examples of these and then discuss in more detail (this should avoid increasing the length of the SPM) [United Kingdom (of Great Britain and Northern Ireland)]
6996	0	0	0	0	OVERARCHING COMMENT ON WHOLE SPM - we feel that the structure of the chapeaus and underlying bullet point could be somewhat improved. Our favoured approach is that the chapeau ought to be the absolute key headline message/summary for that particular section. It is then elaborated upon in the subsequent bullets below. At the moment, however, the chapeau is often a specific point in itself (not a summary) and seems to have much the same weighting as its bullets below. This then makes it more challenging to identify what exactly the main messages are. It is likely to be the case that the chapeaus will be the focus for many readers, so our suggestion is to have them as summaries of the fundamental messages of the SPM, rather than as individual points themselves. [United Kingdom (of Great Britain and Northern Ireland)]
6998	0	0	0	0	OVERARCHING COMMENT ON THE SPM - in the adopted scope of the report, attribution appears three times (e.g. chapt 5 - "Attribution: distinguishing between climatic- and human-induced changes") and yet it does not appear at all in the SPM. This is a crucial issue and very relevant to policymakers. We would like to query why it has not appeared in the SPM. [United Kingdom (of Great Britain and Northern Ireland)]
7000	0	0	0	0	OVERARCHING COMMENT ON SPM - we have made comments that there are clear messages in the underlying report about the benefits of a reduced meat diet for GHG emissions. However, there is also the potential to add nuance in this area and improve the usefulness of the information for policymakers. For example, are all forms of meat production equivalent? It may be that grass based beef and sheep farms will have a smaller carbon footprint (per calorie produced). How would this compare to the equivalent land turned over for crop production requiring fertiliser use and crop treatments as well as large machinery use? Elsewhere potentially misleading statements are made about meat impacts. For example, FigSPM1 meat calories are singled but other rising calorie consumption trends exist – i.e. for refined sugar, which has close links to rising levels of obesity, or processed foods or food additives. Ultimately, this is a complex area that is likely to receive much scrutiny when the report is released, so it is important that it is treated carefully and clear, nuanced messages (e.g. need to eat less meat, but not all meat equal) are presented. [United Kingdom (of Great Britain and Northern Ireland)]
8774	0	1	31	5	General Comment: the concept of "nature-based solutions" is not used in this report. [Chile]

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8022	0	0			<p>Overarching SPM comments:</p> <p>Overall, a well-presented and structured SPM. General comments for how it could be improved include the following:</p> <ul style="list-style-type: none"> * Sections A1 & A2 are really of tangential relevance for an IPCC report. Even the introductory parts should be focused on climate change. Instead of having a general introduction about land, better to highlight some of the most important, high confidence findings from the report itself. * Where statements on similar issues occur throughout the SPM, it is better to group them together - especially if they are somewhat contradictory. We have attempted to identify specific instances in our comments (for example those entitled 'consolidate messages'). * The Figures and choice of SSP framing are very well-designed and useful devices on the whole. However, greater consideration needs to be paid to ensure they are clear (both visually and terms of messages) and balanced. * In Section B, the SPM would be much clearer if it began with the integrated part (B7) before the issue-specific sections. In the current draft it is the opposite (issue-by-issue, brought together only at the end). * Sections C & D in particular would benefit from checking for duplicated messages, and either eliminating the duplication or trying to make the most general statements more specific. Where a statement is very general: the chances of a very similar message existing elsewhere in SPM are greater. [European Union (EU)]
8024	0	2			<p>Consolidate messages: irrigation</p> <p>Consider inserting a statement on irrigation at some point in the SPM (for example in section A6). The current draft has mixed messages scattered across the SPM. It would be good to give a consolidated, balanced view drawing on the whole report, and suggesting how its water use can be minimised, and benefits maximised, in the context of increasing water scarcity. At the moment, the SPM points out that irrigation accounts for 70% of freshwater use (A2.1) and can result in local degradation and salination (B5.3), but it also says that it contributes to greening (A3.3), dampens extreme warm events (A5.3) and has increased cereal yields (SPM.1 text) [European Union (EU)]</p>
8026	0	2			<p>Consolidate messages: nitrogen</p> <p>Similar to above comment on irrigation. The SPM mentions negative consequences of fertiliser additions in several places. It would be helpful to have a single paragraph consolidating these messages and stating how more sustainable fertiliser application (or alternatives) can be achieved. [European Union (EU)]</p>
8028	0	2			<p>Consolidate messages: greening & CO2 fertilisation. The SPM contains mixed messages on the issue of the terrestrial sink expanding due to environmental change, and CO2 fertilisation in particular. Better to place the messages on this topic together to provide a balanced overview. E.g. the message about the CO2 removal and productivity from CO2 fertilisation (A3.3, A4.1) needs to be balanced by the fact that future changes in the opposite direction are expected to outweigh this (A4.5) [European Union (EU)]</p>
8030	0	2			<p>General comment: References to rates of warming should be more consistent. The difference between "globally averaged land surface temperature" and GMST are highlighted in A3.1, but not consistently followed elsewhere. E.g., Figure SPM.2 uses the acronym in the text, but "global mean temperature" in the top heading, whilst other parts of the text refer to "global warming" throughout. It can be assumed that the latter also means GMST, but it is not clearly stated. [European Union (EU)]</p>

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1082	0				General comment: The authors have made a good synthesis of a wide range of very diverse literature. This is an important piece on a difficult subject. It provides a global overview of the interplay between the different factors and stressors. The figures have been significantly improved compared to the previous version, providing a better readability and understandability. [France]
1084	0				General comment on section D: This entire section has undergone major changes compared to the previous version, leading to much more attenuated messages about the importance of immediate action, the cost of inaction and the fact that "enough is known to take action now" (first message from section D in the Second Order Draft). We see this version as weaker than the previous version. We suggest to take up the Second Oder Draft plan for section D (the main message to be conveyed is that we know enough to take action, so we don't want the message to begin with research and knowledge gap), and keep in mind the spirit and key messages for immediate climate action. [France]
1086	0				General comment: There is a lack of strong messages, with key figures, that could be useful for communication, for media. For example on deforestation, on agroecology, nature-based solutions, on impacts of CC on forests and on agriculture, on the types of agriculture and forest management that are more resilient, on land degradation, on food security, links between climate chocks and conflicts, on economic losses, cost of inaction or delayed action... [France]
1088	0				General comment: In some places the SPM resembles more as a guide of good practices than as an assessment of the scientific literature, particularly in sections C and D. This is due in particular to the fact that most of the statement are generic and at global level, and do not reflect well all the regional/local diversity. We suggest to revise the sentences currently too lowly informative in order to provide more detailed, concrete and practical findings. [France]
1090	0				General comment: There is only very little information on hydrology and water rressources, which are key factors over land. Most statements concern temperature and GHG, but precipitation, water bodies, runoff etc... are also key drivers for agriculture, water resources, and interact with the energy and carbon cycles both at global and regional/local scales. [France]
1092	0				General comment: There is also little information on seasonality. Seasonality is potentially important when looking at land use that can have opposite effects depending on season, or only exacerbate one season etc. Processes are also different for atmosphere/land coupling between summer and winter or between the dry and wet seasons in lots of places. [France]
1094	0				General comment: The SPM seriously lacks strong messages with quantified elements, particularly in sections A and B. The global effect is thus that it is difficult to capture the important messages and that the statements are too general to be prominent and informative. We suggest to draw better inspiration from the SPM of the SR1.5 by highlighting major quantitative facts on the impacts of climate change (how many lives directly threatened by 2020, 2050...?), on the degradation of natural ecosystems (which surfaces are highly degraded and which surfaces will be so by 2020, 2050, ?), forests (consolidated figures on deforestation and forest fires) and food security (how many millions of people are currently suffering from hunger due to climate change and land degradation, how many by 2020, by 2050,...). We suggest some places where such quantitative findings would be very welcome and easily doable [France]

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1096	0				<p>General comment: Reference to the glossary: the words defined in the glossary could be marked in the SPM with a * after them, so the glossary would be more useful. For example “ecosystem services*”. Or hyperlinks could direct to the glossary. It is important that the specific vocabulary is well understood, in particular the terms “desertification” and “land degradation” are not obvious even for land surface specialists, and confusion between these two terms can lead to misunderstanding for example on the impact of deforestation. A very rapid definition should be included in the SPM the first time they are used, and a link to the glossary could be introduced. Even if the glossary is not under review, because we suggest to refer to it, we have several comments and proposal around it. Indeed it is an important piece for the SPM to be really understandable.</p> <p>-biogeochemical : includes CO2 but not CH4 and N2O, which is strange, O3 is also included, which fluxes are smaller. The list is maybe not exhaustive, but is quite detailed, so we propose to explicitly add CH4 and N2O.</p> <p>-Please add a definition of “water uses”, expliciting if in this it encompasses the water taken from rivers or groundwater, or if it is water actually evapo-transpirated (never given back to a river or groundwater).</p> <p>-The difference between the mitigation measures and mitigation practices is not clear, could a policy or taxation measure be a mitigation measure? We propose to add policy measures and taxation measures to the definition.</p> <p>-Pastures : please explicit if irrigated pastures are included of the definition of pastures in this report [France]</p>
1098	0				<p>General comment on Agroforestry : The 2019 Refinement of 2006 IPCC Guidelines for National GHG inventory adopted in May 2019 in Japan now includes new classification and coefficients for agroforestry systems, based on the following publication: Cardinael, R., Umulisa, V., Toudert, A., Olivier, A., Bockel, L., & Bernoux, M. 2018. Revisiting IPCC Tier 1 coefficients for soil organic and biomass carbon storage in agroforestry systems. Environmental Research Letters 13 (124020), 1–20. https://iopscience.iop.org/article/10.1088/1748-9326/aab5f/meta</p> <p>In the Chapter 5 on Food Security on SRCCL, cited several times in the SPM, an old classification and non updated coefficients are still used for agroforestry systems (section 5.5.1.3 and Table 5.6). In order to have consistency between the 2019 Refinement of 2006 IPCC Guidelines for National GHG inventory and the SRCCL, we propose to update the SRCCL (chap 5), even if the current review is only on the SPM. [France]</p>

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1100	0				<p>General comment on Revegetation: In the SR 1.5, the carbon dioxide removals (CDR) are mentioned a lot, and the land related CDR proposed are afforestation and reforestation, not revegetation. The explicit mention of revegetation in the CDR definition would allow agriculture to be also part of the solution, also, keeping in mind that it can relate to above-ground biomass, for example with agroforestry, and also to other compartments like below-ground biomass and soil carbon. That's why we propose to define revegetation in the glossary, to add revegetation as an example in the definition of CDR in the glossary, and to mention revegetation in the SPM.</p> <p>The definition of revegetation in the glossary could be: "direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation." (from FCCC/CP/2001/13/Add.1, p.58 https://unfccc.int/resource/docs/cop7/13a01.pdf and http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp4/Chp4_1_to_24.pdf). [note: Encompasses revegetation of agricultural land, including through agroforestry. Can relate to above-ground biomass, for example with agroforestry, and also to other compartments like below-ground biomass and soil carbon. Increasing biological sinks of CO2 and being a human deliberate activity, revegetation is part of the negative emissions, anthropogenic removals, CDR and mitigation options.] [France]</p>

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1102	0				<p>General comment on Agroecology: we welcome the presence of a definition of agroecology in the glossary. We would propose to use the one from FAO instead of the one from IPBES.</p> <p>Crop diversification, agroforestry, ecosystem based adaptation and others are quite often mentioned in the SPM, but agroecology only once and in a narrow context, so we propose to add it several times in the SPM.</p> <p>In C4.4 we propose to rephrase the second and third sentences as following: "Agroecology*, with innovative combinations of indigenous and local knowledge and modern agronomic practices, by relying on biochemical cycles and by a sustainable use of biodiversity, can contribute to overcoming combined challenges of climate change and desertification. Local practices such as water, soil, and fertility management, local seed use, improved grazing, and ecological restoration are often based on locally appropriate, non-quantifiable, indigenous knowledge."</p> <p>The main drivers of agroecology are:</p> <ul style="list-style-type: none"> ▪ Engaging in holistic and systematic consideration of each holding, with a view to finding the right solutions to be developed in each context. Leads to redesigned, sustainable agroecosystems ; ▪ Making use of positive biological interactions in farming systems: preservation of factors conducive to biodiversity (e.g. hedges, grass strips), natural regulatory mechanisms between populations and pests, a search for the right crops and rotations, reinforcement of the effects of previous crop choices, and so on ; ▪ Supporting the autonomy and resilience of farms by promoting the integrity of bio-geochemical cycles (water, nitrogen, etc.): working on crop rotation and cover between crops, reducing dependence on inputs, improving soil fertility, developing livestock/crop synergies, management of organic effluents, and much else. <p>All agricultural systems can be converted to agroecology, even already intensively managed, north and south system, including but not limited to family farming.</p> <p>Agroecology encompasses among others diversification, agroforestry, ecosystem based adaptation, and thus leads to improved food productivity (ref 6.3.1.14), and also inclusion of legumes in the rotation, soil organic matter, recycling of organic matter like compost, sludge, slurry.. Organic agriculture is an example of agroecology. [France]</p>

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1104	0				<p>General comment on the Consistency with IPBES/SPM adopted in may 2019 :</p> <p>Several topics are covered by the SRCCL and IPBES SPM, and consistency in the messages would be valuable.</p> <ul style="list-style-type: none"> • Global Biodiversity Loss and Land Use Change <ul style="list-style-type: none"> ◦ SRCCL: Global terrestrial biodiversity loss based on species richness has been estimated to be around 8-14% due to past land-use change (medium confidence). ◦ IPBES: Doesn't frame their findings in the same way, instead divides the numbers regionally - so this could sound like a new finding on global terrestrial species loss or at least could be difficult to prove that both are consistent. • Bioenergy impacts <ul style="list-style-type: none"> ◦ SRCCL: Pathways that include large increases in area for bioenergy crops may result in increased competition for land and can have adverse side-effects for water scarcity, biodiversity, land degradation, desertification, and food insecurity. ◦ IPBES: Phrases the impacts of large-scale bioenergy on biodiversity as "significant" and seem to have higher confidence statements regarding these impacts. • Food Production <ul style="list-style-type: none"> ◦ IPBES: Globally, local varieties and breeds of domesticated plants and animals are disappearing. This loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change. ◦ SRCCL: Despite having an entire chapter on food security, the SPM doesn't list biodiversity loss (even due to climate change) as one of the food security issues - unless you count "extreme events disrupting food chains" as part of that. This seems quite problematic in terms of consistency and could be used to prevent further synergies and coordinated action on both fronts. • Adaptation and Mitigation Responses <ul style="list-style-type: none"> ◦ SRCCL: Measures that sequester soil carbon also contribute to climate change mitigation and biodiversity conservation (high confidence). ◦ SRCCL: Policies promoting sustainable land management provide significant co-benefits for food and livelihood security, conserve biodiversity and ecosystem services, contribute to addressing desertification, land degradation, mitigation and adaptation (medium confidence). ◦ IPBES: No references to soil carbon's role in biodiversity conservation in the SPM (it is listed in a table at the end). [France]
1106	0				<p>General comment on Economic costs in the SPM. On several occasions, and in particular in Figure 3 on pages 21-22, the SPM presents cost values. We suggest ensuring that these costs are presented consistently throughout the SPM (including in terms of typology), and that the main assumptions associated with these costs are presented in the introduction to the SPM, in particular by recalling that they are current costs, by giving indicative values for inflation and discounting with which these costs should be considered and by specifying the degree to which social costs are taken into account in these values. [France]</p>

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1108	0				General comment on Shortening of supply chains and circular economy. The SPM does not contain any mention of the shortening of supply chains, neither local food consumption, neither circular economy. We suggest to better reflect the findings from section 5.5.2.6 about the shortening of supply chains, section 1.4.3 and cross-chapter box 4 for local food consumption, and sections 5.5.1.4 and 5.7.5.2 about circular economy. We believe sections B and D of the SPM could be the good places to insert such considerations. [France]
1110	0				General comment: Incremental vs transformational adaptation and mitigation: The notions of incremental versus transformational adaptation and mitigation processes could be brought up in the SPM, maybe in D2.3, and explained (also in the glossary for mitigation), as these notions can lead to global strategies around transformational changes. For example irrigation in agriculture, often seen as an example of adaptation to climate change (ex in A5.3), can have side effects on the resource, and is a good example of incremental adaptation measure, whereas transformational adaptation with a shift to other crops and/other agricultural systems like agroecology with agroforestry may lead to a lower need of irrigation. [France]
1112	0				General comment on nature-based solutions: nature-based solutions, or natural climate solutions, are currently attracting increasing interest from scientists (for example, Griscom et al. 2017's review) and decision-makers (as highlighted in UNEP's gap report, on the agenda of the next UN Climate Summit). Nature-based solutions are inspired and supported by nature. They are an efficient and cost-effective way of providing environmental, social and economic benefits and building resilience. Unlike SR 1.5, which has included nature-based solutions in its assessment, we consider their treatment in the SRCCL is insufficient. We propose to add a dedicated paragraph to nature-based solutions, on the potential, feasibility and sustainability of nature-based solutions, particularly with regard to co-benefits for other sustainable development goals, but also potential side effects. We propose to explicit also the need to preserve ecosystems for nature-based solutions to be used, and to clearly distinguish the negative emissions based on technologies from those based on nature. [France]
1114	0				General comment on supply chain sustainability management The SPM currently deals with supply chain only from a food security perspective (in section B4). We suggest these elements be complemented by additional considerations on the other stakes of supply chain sustainability management, including on the specific issues of combating imported deforestation, and other similar concept with regard to soil degradation. We believe that both section B and D could be good places to insert such considerations. In the report, see sections 7.5.6.3 [France]
1116	0				General comment on sustainable forest management We suggest that the SPM should give more importance to sustainable forest management (SFM), as well as Improved Forest Management (IFM), as response options for both mitigation, adaptation and prevention of land degradation, while generating significant synergies in terms of biodiversity and food security. Some key findings should also be highlighted about SFM and negative emissions. See sections 4.2.5, 4.9.5 and 6.4.1.1.2. [France]

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1118	0				<p>General comment: We do not understand the reason why some important messages from the previous version are missing, and the following paragraphs should be reintroduced in section B :</p> <p>B1.4. Land has an essential role to play in mitigating climate change and adapting to it, but improved land management is not sufficient by itself. Without rapid reductions in anthropogenic GHG emissions across all sectors, even the better management practices in cropland, pastures and forests are insufficient to achieve the long-term temperature goal in the Paris Agreement (high confidence). {1.2.2, 1.3, 2.7.3; 7.3} {SR1.5}</p> <p>B3.2. The net carbon effects of different response options over time depends on where land changes occur and on prior land use. In land that has a high carbon stock (such as forest, grassland / savannah, and peatlands), the carbon benefits of land protection are greater in the short-term than converting land to bioenergy crops, which can take several harvest cycles to “pay-back” the carbon lost (medium evidence)</p> <p>The following sentence should be turned into a headline message for B1 section of the SPM "Without rapid reductions in anthropogenic GHG emissions across all sectors, even the better management practices in cropland, pastures and managed forests are insufficient to achieve the long-term temperature goal in the Paris Agreement" [France]</p>
2878	0				<p>We would like to thank the authors for their work in preparing the Final Government Draft of this Special Report, Climate Change and Land. We appreciate the work the authors have done to improve the accuracy and readability of the report. However, it remains much longer than the agreed length. The IPCC Plenary asked for a 10 page Summary for Policy Makers, beyond this length it is no longer a summary and this draft presents us with 31 pages. We suggest authors review the document to reduce its length to the essential, key findings. [Australia]</p>
2880	0				<p>Suggest the SPM includes a section summarising what is different in this special report from the relevant chapters in the IPCC AR5, or state that it is drawing upon AR5. [Australia]</p>
2882	0				<p>Suggest rephrasing assertions of anything that *WILL* happen. Suggest amending to say "is/are likely to" or "is/are projected to". In this way, you are reflecting the probabilistic nature of multimodel climate projections and communicating transparently that there are uncertainties. Example below (p. 6, line 33-35): [Australia]</p>
2886	0				<p>Suggest including a glossary - particularly useful for terms such as 'co-benefit', 'peatlands', 'agriculture', 'greening/browning', 'bookkeeping models', and many more. [Australia]</p>
1464	0				<p>Traceability of information is not clear. References to underlying report are very long and some have very weak link. Please indicate the "key reference(s)" in bold for each sentence or paragraph. [Belgium]</p>
1466	0				<p>The SPM is far too long and difficult to understand by policymakers without an additional 'translation' in an accessible language. Also the high level messages are not clear. The SPM should be reduced to 10 pages maximum and focus on the headmessages, the more because there is a TR. [Belgium]</p>
1468	0				<p>The SPM has been completely rewritten and is now much better. It is structured in a better way. We are grateful that most of our comments were taken into account. The Figures are very different but more relevant. [Belgium]</p>
1470	0				<p>We suggest to include a box defining key concepts, such as in SR15. In particular, some terms defined in the SR15 would also be very relevant here, for example carbon dioxide removal. [Belgium]</p>
1488	0				<p>Terminology: as for the 1,5°C SR, a box with key concepts and definitions seems useful. [Belgium]</p>

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8738	0				General Comment: the concept of "nature-based solutions" is not used in this report. [Chile]
1626	0				<p>The Chinese government thanks the Bureau members of Working Groups (WGs) I, II and III of the Intergovernmental Panel on Climate Change (IPCC), the lead authors of the Special Report on Climate Change and Land and the Technical Support Unit (TSU) of WG III for their efforts in preparing this report. In order to enhance the science, integrity and balance of an IPCC output, Chinese government has made the following comments on the Summary for Policymakers (SPM) of the present report in the hope that they will be adopted in its revision process.</p> <ol style="list-style-type: none"> 1. Consistency between the SPM conclusions and the underlying report. Being a widely cited document for global policymakers, the SPM is particularly important to review the key elements of the underlying report scientifically, accurately and rigorously. However, there are still statements, data and figures in the present SPM that are inconsistent with the underlying report or fail to accurately express the conclusions of the relevant elements therein. It is suggested, therefore, that the SPM be revised as a whole to ensure its consistency with the underlying report. 2. Integrity and comprehensiveness. The important message that the SPM of this report should convey to policy makers is how to ensure food security through land use management, value chain management and risk management while achieving the global SDGs. It should provide policy makers with feasible adaptation and mitigation measures by assessing the challenges, opportunities and risks to be faced with. The present SPM gives a relatively weak assessment of the adaptation to climate change as evidenced by an uncomprehensive and unspecific discussion of meeting the challenges in the five fields including climate change adaptation, mitigation, desertification, land degradation and food security at the three levels of land use management, value chain management and risk management. It is suggested that relevant elements be supplemented and strengthened. 3. Length and space. The present SPM, which consists of 31 pages, is far beyond the number of 10 pages determined by the panel session, with the elements and spaces of various parts extremely unbalanced. For example, Part A, B, C and D are 12, 8, 7 and 3 pages long respectively. It is suggested to shorten and readjust the length of each part of the SPM. 4. Expression of confidence and uncertainty. There are such problems found in the report as the absence of confidence description of key conclusions, irregular use of confidence level or inconsistency between the confidence of conclusions and the underlying report, which need to be further checked. 5. Readability or friendliness. There are editorial errors, repeated or contradictory representations, inconsistencies between data in the figures and those in their notes, lack of a time frame or given conditions for conclusions, and no numbering for panels in a figure. It is suggested that the report be revised as a whole to increase its readability. [China]

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2368	0				<p>We wish to express our deepest gratitude to the authors and all other experts involved in the writing of this draft. We are extremely grateful for the tremendous efforts that have been made to provide this comprehensive scientific assessment of climate change and land that is policy relevant without being policy prescriptive. We highly appreciate the updates in the final government draft and thank the team for taking most of our comments into account.</p> <p>To make the report even more useful for policy makers we provide both detailed comments on individual statements and suggestions for the structure of the SPM. We hope that these are useful to the authors' final revision to the SPM and look forward to the approval session. Please be assured of our full support. [Germany]</p>
2370	0				<p>The SPM provides a very anthropocentric framing of land, starting with the first headline statement A1. Please avoid this narrow framing which focuses on the benefits land can provide for humans but does not value land for its own sake. The framing should please be expanded since it is not appropriate for the IPCC to limit itself to only one perspective. [Germany]</p>
2372	0				<p>For the sake of common understanding of the concepts central to this report which is relevant for different scientific communities and political fields, please include a box on "core concepts central to this special report" at the end of the SPM, as in the SR1.5. This will also enhance the understanding of actionable response options emerging from this special report. Please include the following concepts and definitions in this box:</p> <ul style="list-style-type: none"> - Land (glossary, P32): The specific inclusive understanding of "land" applied in this report should be clarified. - Land degradation neutrality (glossary, P33): LDN is shown to be substantial for addressing desertification and land degradation and also food security: - Sustainable land management (glossary, P52): SLM is contained in the title of the SRCCL and is an overarching concept which is addressed in all chapters. Please explain also the relation to other concepts of sustainable integrated agricultural practices (see also our related comment on the general report). - Desertification (please harmonize glossary, P16 and CH3 P7L3-14, FAQ1.3): the relation of desertification to land degradation should be clarified as well as the causes of desertification (solely human or not). - Ecosystem services (glossary, P19) a concept central to this report. - Practices and concepts related to forests (e.g. afforestation, reforestation, deforestation, forest restoration, sustainable forest management) and the relation between these <p>If the suggestion to include a box does not find your agreement, we request adding footnotes when the specific expressions are used for the first time in the text. [Germany]</p>
2374	0				<p>The SDGs need please to be more visible across the SPM to reflect the assessment in the underlying report. In the current version SDGs are only indicated by terms sprinkled such as: "sustainable development", "life on land", "land degradation neutrality",..... Relevant information has been extensively assessed in CH6. We strongly suggest to modify the headline statement A1: Collectively, land ecosystem services, and the biodiversity upon which they depend, support human subsistence and well-being across a range of SDGs (high confidence). {1.2, 2.2, 2.4, 5.1, 5.4, 6.4, 6.5, 7.4}" [Germany]</p>

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2376	0				<p>While we highly appreciate the provision of headline statements as these are very useful for outreach purposes (e.g., we translate them for our press conference upon approval of a report), the headlines of the current draft lack some important messages from the report. In addition to the suggestions for the headlines of the individual sections we think the following messages are particularly important and partly missing in the current headline statements:</p> <ul style="list-style-type: none"> - Important role of preserving high carbon ecosystems - Important role demand-side measures in the food sector (change of dietary pattern, plant-based diets including co-benefits, avoid food loss and waste and reduce overconsumption) - Need for deep transformation across all sectors - Further warming might transform the land sink into a source (irreversible tipping point and positive feedback) - Delay of ambition mitigation leads to very high risks for land / food and lost opportunities <p>In addition, there may be some terms introduced in these statements that are less familiar to readers depending on which community they are from (e.g. UNFCCC, CBD, UNCCD). To facilitate the understanding of the underlying concepts of terms introduced in the headline statements, which might not be obvious for non-experts, please add a footnote that either points to the suggested box on "core concepts central to this special report" (preferred option) or at least explain each specific expression in a separate footnote. [Germany]</p>
2378	0				<p>Overconsumption of food is just mentioned in the caption of SPM.1 Panel B as one cause of agricultural area increase. However, overconsumption is globally significant as it was "found to waste 9-10% of food brought" (Ch. 1 p. 33 II.31-32) and hence, relevant to policymakers. To clarify the extent of overconsumption and its development of the last decades, we suggest to include Figure TS.10f of the Technical Summary in combination with relating parameters for the different food categories such as agricultural land required, energy required, water required, GHG emissions, etc. It would be also interesting to provide the information on a healthy food mix. Therewith, the reader would understand how changes of the food supply to the required cal/cap/day might translate into e.g. changes of GHG emissions and water use, the freeing of land or how does overconsumption relates to the increase in overweight and obesity or other health issues. How could the reduction of overconsumption support food security and in particular reduce undernourishment of essential nutrition? [Germany]</p>
2380	0				<p>We encourage the author team to also provide gender-specific information as appropriate. [Germany]</p>

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2382	0				<p>The definitions of hazard, risk and impacts are not used consistently within this report. In many instances the authors seem to have applied the old definition of impacts (effect or consequence of climate change) that is different from new definition ("realized risk", hence referring to observations and not suitable for future projections) consistent with the definition of risk resulting from the interaction of "hazard", "vulnerability" and "exposure". We suggest to thoroughly editing the whole report in order to ensure that these terms are consistently and correctly applied in line with the definition in the glossary.</p> <p>In addition, according to the new definition, "impacts" can be both adverse and beneficial. The fact that "impacts" are linked to "risks" and hence to "hazard" would however exclude any benefice. Therefore we would request a reconsideration of the new and more coherent definition.</p> <p>Furthermore, it would be helpful, if you could explain how the definition of "impacts "as "realized risk" relates to future projections implying that "impact models" should be renamed "risk models". [Germany]</p>
2384	0				<p>The treatment of biochar is not consistent throughout the SPM (cf. B3.2, B5.1, Figure SPM.3). Statement B3.2 seems very confident given the diversity of biochar-technologies and the divergent literature on the subject. Please check and revise language throughout the SPM to make sure that statements on biochar are consistent, balanced and reflect the latest scientific findings, including the recently adopted update to the IPCC guidelines on GHG inventories subchapter on biochar.</p> <p>The assessment of biochar is also not entirely consistent across chapters in the underlying report (esp. CHs 2, 4, 5, 6). There are contrasting statements about the stability of biochar. Governance requirements to manage climate, health and contamination risks that are a precondition of biochar benefits are omitted in chapters 2, 5, and 6 and in the SPM. Generally it seems from the underlying report (esp. CHs 2, 4, 5, 6) that where biochar is implemented under appropriate governance structures it brings benefits, but it requires biomass from somewhere. If biomass residues are relocated from other uses, or additional forest and cropland are required this can result in conflicts. The report also seems to emphasise that the larger the scale, the greater such conflicts and therefore the greater the risk to e.g. food security.</p> <p>It would be helpful to make it clear throughout the report and the SPM, that while biochar has multiple benefits and a mitigation potential it also has limitations (availability of biomass and potential risks to food security in particular when upscaled; limited knowledge about its long-term stability; governance requirements for proper production and application and to avoid negative side effects). More explicit differentiation would help policy makers understand that it is not good or bad, but it depends. Currently positive and negative aspects are fragmented throughout the SPM and can cause some misunderstanding. (In Figure SPM.3 it is exactly this differentiation in scale that needs to be further clarified, cf. our comments on Fig. SPM.3.) [Germany]</p>
2386	0				<p>The Technical Summary, p. 16 ll. 7-11 clearly states: " The largest potential for reducing AFOLU emissions are through reduced deforestation and forest degradation (0.4–5.8 GtCO₂-eq yr⁻¹) (high confidence), [...]". We miss a similarly clear statement on the importance of halting deforestation and restoring forests in the SPM, which is surprising since deforestation is also one of the main drivers of land degradation. Please include the quote above or similar wording in the SPM. [Germany]</p>

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2388	0				The temperature levels chosen in the SPM should be consistent, in line with SR1.5 and informative for the long-term goals set by the Paris Agreement. It is unclear why, in Figure SPM.4, the temperature level of 2.5-3°C is shown in addition to the 1.5°C case. Why is there a range (assuming the 1.5°C line represents a median?), and what is the rationale for including this range? Is this representative of RCP4.5? And why is RCP2.6, representative of "well below 2°C", not included? Also, we miss reference to overshoot and non-overshoot pathways (as in SPM SR1.5) and the LED-P1-pathway, given it features very different characteristics for land, see e.g. chapter 2 Figure 2.27. Please revisit the selection of T-levels and the T-relevant information presented, e.g., in sections A7, B7, Figure SPM.2 and SPM.4. [Germany]
2390	0				CH3 Section 3.8 provides very useful insight into desertification case studies, thereby also informing about the resource implications for reversing desertification. "The challenges of desertification and climate change in dryland areas across the world often have very location-specific characteristics. {33.8}" Adding this statement and the reference to the SPM would indicate the availability of these case studies to the reader. [Germany]
2392	0				Mitigation options associated with changes in food consumption patterns are described with the term "dietary changes" or referred to as shifts to "nutritionally balanced diets" (B1.3), "healthy and sustainable diets" (B4.2, C2, C2.5), or "less resource intensive diets" (B7.4). We strongly request the authors to consistently use one term throughout the SPM that considers the importance of reducing the animal-content, including meat, dairy and egg, in diets (suggestions 'plant-based diets', 'less animal-intensive diets'), which is found to be the key aspect of dietary choices as a response option in the underlying chapters: (1) "the environmental impacts of the animal-rich western diets are being examined critically in the scientific literature" (1.4.3.2); (2) shift from animal-based diets "towards plant-based diets" as well as "dietary shifts away from emission-intensive livestock products" (TS.2); (3) "[...] high protein diets, which are associated with increased greenhouse gas emission" (Cross-Chapter Box 4); (4) "Shifting to diets that are lower in emissions-intensive foods like beef delivers a mitigation potential of 0.7-8 GtCO ₂ with the most of the higher end estimates based (...) on veganism, vegetarianism or very low ruminant meat consumption." (2.7.1.7); (5) "[...] to include the overconsumption of unhealthy mass-produced food [...]" (5.1.4.3); (6) "Reduction in the demand for animal-based food products and increasing proportions of plant-based foods in diets, particularly pulses and nuts; [...] are demand-side adaptation measures. [...] Similar suggestions are made for adopting the benefits of moving to plant-based protein, such as beans (5.3.4 p. 55 ll. 35-41) (7) "Assessment of individual foods [...] showed that meat - especially ruminant meat (beef and lamb) - was consistently identified as the single food with the greatest impact on environment, on a global basis, most often in terms of GHG emissions and/or land use." (Ch. 5.5.2.1 p. 76 ll. 39-41) (8) "A dietary change away from meat can reduce GHG emissions, reduce cropland and pasture requirements, enhance biodiversity protection and reduce mitigation costs." (Ch. 6 p.40 Table 6.10) [Germany]

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2394	0				<p>The importance, potential, synergies and relatively low barriers for implementation of demand-side options related to the food system are stated throughout the report and the SPM. Dietary change towards plant-based choices, reduced post-harvest losses and reduced food waste...</p> <p>(1) have "large mitigation potential without adverse side-effects for other challenges" (TS P34 L35-38)</p> <p>(2) do not need the installation of infrastructure (c.f. discussion in chapter 6)</p> <p>(3) have synergies with poverty, hunger and health and other sustainable development goals (CH 5.4.6 P66 L6-9)</p> <p>(4) exhibit necessary improvements for resilience against climate change (Ch. 5 p. 55 ll. 12-14)</p> <p>(5) could free more than 30 million km² land (Ch. 6 p. 91 ll. 19-22) and bringing this in context with finite nature of Earth's land area and the need to use land resources sustainably for human well-being (TS p.5 ll.7-9) and would significantly reduce the pressure of land degradation and desertification (Ch. 6 Table 6.34 and Table 6.42)</p> <p>(6) serve as an ideal early action, that is not costly and "simultaneously ease economic burdens of ill health caused by malnutrition in all its forms." (SPM p. 30 ll. 17-21)</p> <p>(7) feature the potential for demand-side adaptation "to contribute to reduction in food demand, land sparing, and thus need for adaptation." (5.3.4 p. 56 ll. 8-10)</p> <p>(8) have significant potential to reduce health-care costs: The adoption of healthier diets with less meat consumption in the US alone could reduce the "health care cost by USD 77-93 billion per year" (Ch. 5.6.3 p. 88 ll. 34-43).</p> <p>As reported in 5.6.3.1, dietary change and waste reduction "are necessary for achievement of a sustainable food system and "only by adopting a 'flexitarian diet' as a global average, would climate change be limited to under two degrees." (Ch. 5 p. 89 ll. 25-31). This is supported by more recent evidence in FAO projections showing that "rebalancing diets is key to increasing the overall sustainability of food and agricultural systems world-wide." (Ch. 5.4 p. 66 ll. 10-14). In addition, we would like to recall a SPM statement from the special report on 1.5°C global warming about demand-side measures in particular emphasizing the potential of low GHG-intensive food with respect to ambitious climate change mitigation and sustainable development: "1.5°C pathways that include low energy demand, low material consumption, and low GHG-intensive food consumption have the most pronounced synergies and the lowest number of trade-offs with respect to sustainable development and the SDGs (high confidence)" (SR1.5 SPM D4.2).</p> <p>Taking all these results and statements into account, we strongly encourage the authors to emphasize the potential of demand-side measures related to the food system for climate change mitigation and clarify the evident win-win situation to address many challenges at once and being a non-costly no-regret option. We suggest to emphasize these information on the potential, various aspects, co-benefits and implementation of demand-side measures in the headline statement B4. See also our more specific comments to B4. [Germany]</p>

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2396	0				<p>Aspects of dietary changes can be found all over the SPM, making it difficult for the reader to see the whole picture. Also, some of the statements are not consistent within the SPM and compared to the discussion in the most relevant underlying chapters (Ch. 1, 2, 5 and 6). This is in particular important, since the definitions found in the glossary on diet, dietary patterns and dietary transition do not address the various aspects of dietary change discussed in SPM and report.</p> <p>We therefore request the authors to add a statement to be included in the subparagraph B4 that will answer the following question: What are the key aspects regarding the mitigation potential of future dietary changes (e.g. less meat, less dairy, less egg, less sugar, less fats, reducing overconsumption...) in the context of</p> <p>(1) improving health: "significant benefits in terms of reductions in relative risk of key diseases: type 2 diabetes, cancer, coronary mortality and all causes of mortality (c.f. 5.6.3; 5.7.1.3)</p> <p>(2) improving food security (c.f. chapter 6.4.5)</p> <p>(3) region-specific nature of dietary changes (discussion on "western diet" in Ch. 1.4.3.2 or other regional specific dietary choices in Ch. 5.3.4) [Germany]</p>
2398	0				<p>We feel that the importance of building up resilience and capacity instead of narrow adaptation options should be more emphasised throughout the SPM (e.g. see Tables 6.5 and 6.54-6.61 in chapter 6). [Germany]</p>
2400	0				<p>Within the entire SPM it is not mentioned that "increasing nitrogen fertiliser efficiency" as part of improved cropland management (Table 6.4 Ch. 6 p. 24) result in synergies with other environmental aims (e.g. air and water pollution, biodiversity, health). We kindly request the authors to revise and include this highly-policy-relevant information accordingly. [Germany]</p>
2402	0				<p>We strongly support references to land degradation neutrality (LDN) (e.g. in B1.3, B 1.4). [Germany]</p>
2404	0				<p>Clarity is needed about the different concepts and practices related to sustainable integrated agricultural practices and Sustainable Land Management (SLM) practices. A number of the sustainable integrated agricultural practices are mentioned in the SPM, e.g. agroecology, conservation agriculture, and sustainable intensification, but it remains unclear how these relate to each other and to SLM. CH5, Section 5.6.4 provides useful information in this regard stating "that many of these systems are complementary in some of their practices, although they tend to be based on different narratives". SLM is a broader concept that "has functions beyond the production of food, such as delivery of water, protection against disease [...], the delivery of energy, fibre and building materials." (CH5, P44 L11-13). We suggest clarifying these concepts in the suggested box on concepts central to this report, please see our related comment. [Germany]</p>

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2406	0				<p>We miss a more prominent and consistent appraisal of the important role of preserving natural high carbon ecosystems, in particular forests, grasslands and peatlands, and the potential of forest restoration and re-naturalisation/natural vegetation restoration in ecosystems for mitigation, biodiversity, reversal of land degradation and services such as water retention. We would strongly suggest to develop a clear headline statement in this respect, and revise language throughout the SPM to emphasize the high benefit of these response options for multiple SDGs. In the same light, we strongly suggest a clear differentiation between afforestation and reforestation (e.g. A4.1, A5.6, B1.1, B1.4, B5.4), and between reforestation/forest regrowth based on locally adapted tree varieties and monoculture plantations throughout the SPM. Carbon sequestration, biodiversity and resilience are higher in the former than the latter, while some fast-growing tree species such as eucalyptus can lead to land degradation (cf. Cross-Chapter Box 2: "Potential adverse side-effects of forest area expansion depend largely on the state of the land it displaces as well as tree species selections."; CH4 P5 L24: "In areas where afforestation and reforestation occur on previously degraded lands, opportunities exist to restore and rehabilitate lands with potentially significant co-benefits (high confidence) that depend on whether restoration involves natural or plantation forests."). While this notion is partly considered in B2.3 and B5.4, it is completely absent from both figure SPM.3 and SPM.4, with figure SPM.4 referring to all "forested" land alike, and reforestation/afforestation as equivalent processes. At the same time, figure SPM.3 does differentiate between "afforestation" and "reforestation and forest restoration", but doesn't show notable differences across 4 of the 5 challenges, which is surprising. If the reason for this lies in the lack of literature, or more specifically in IAMs ignoring these differences, it would be preferable to state that large potentials with SD-co benefits through forest restoration may exist, however they could not be assessed and are omitted from (parts of) the analysis shown here. While we are conscious of the difficulty to define "forests" in a way that makes sense across different biomes and types of management/cultural landscapes, we would like to encourage the authors to better reflect the fundamental differences in ecosystem services between (monoculture) plantations of (fast growing) trees and (old-growth) natural or sustainably managed diverse forest landscapes. [Germany]</p>

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2408	0				In the list of integrated response options, and therefore throughout the report and the SPM, we miss a discussion of demand-side/product cycle and production changes for forestry products. We welcome the extensive discussion how changes in dietary patterns influence land use, however wonder why a similar consideration for harvested wood products has not been included. A shift in demand for forestry products from short-lived (e.g. pulp and paper) and direct energy use towards long-lived products that potentially substitute for carbon-intensive other products (such as cement, steel) is not included in the analysis, beyond a cursory mentioning in section 2.7.1.2. The option of cascading wood use (extended material use followed by energy use instead of direct use for energy) is not even mentioned. The mitigation potential from letting degraded secondary forests and abandoned agricultural land regrow to mature forests is discussed in the literature and also included in the analysis, as is the mitigation potential of sustainable forest management. However, if these measures are to be successful on large scale, demand has to be adjusted in a way that a) provides long-standing mitigation (product life time) and b) is in line with volumes which can be sustainably supplied (i.e., without deforestation and allowing secondary forests to regrow to some extent). This is a lamentable omission. We would appreciate if the authors could at least point to this conundrum, e.g. by stating something along the lines of: "shifts in demand and use of wood products could potentially lower the amount of harvest and lead to higher accumulation of carbon in stocks in forest. However uncertainty about optimum mitigation strategies in managed forests is high" (see 2.7.1.2) or "Carbon storage in long-lived wood products and reductions of emissions from use of wood products to substitute for emissions-intensive materials also contribute to mitigation." (TS P24 L 32-33) [Germany]
2410	0				The SR1.5 showed and this report re-emphasizes that beyond 1.5C warming, risks are high for land ecosystems, land degradation and food production specifically in arid and tropic regions, including risks from extreme heat, drought and wildfire. There is clear scientific evidence, also summarized in SR1.5, that unless the current level of mitigation ambition (as reflected in countries NDCs) is not improved and well before 2030, 1.5°C will be unattainable. Therefore, ambitious and rapid mitigation across all sectors is a prerequisite for any sustainable land future. This important causal link should be highlighted more clearly in the SPM. [Germany]

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2412	0				<p>One of the main challenges in the land-sector is to maintain or restore ecosystem resilience, given multiple, increasing stressors, including climate change and extreme weather. Resilient ecosystems support more resilient communities and are vital for climate change adaptation, intimately connected to all efforts to reverse land degradation, including desertification, and to the conservation of biodiversity, as laid out in the recent IPBES report. However, ecosystem resilience doesn't seem to have a role in framing the outcomes of this report, and isn't even prominently included in the text. While resilience is mentioned in the headline statements of B2, C1, C3 and D3, there are no findings directly related to the concept of resilience or underpinning those high-level statements with measures and actions that would result in fostering more resilient forests, agro-ecosystems, other landscapes or rural communities. Given the title of the report, one might have expected that the interplay between healthy, fertile (carbon-rich) soils, sustainable water resources, high biodiversity, sustainable food production, interconnected, integrated diverse landscapes and human well-being would feature prominently and maybe even provide the red thread connecting climate change and land. Also, whether mitigation and adaptation actions increase overall system resilience is an important consideration in designing climate-resilient development pathways. In that sense, we kindly suggest to the authors to consider using the concept of resilience as a guiding principle when revising the SPM. [Germany]</p>
2414	0				<p>Apart from a reference to "woman farmers" in C2.1, there is no mentioning of (smallholder) farmers and herders in the whole SPM. Given the focus of the report on drylands, land degradation and food security, and the high vulnerability of the rural poor in developing countries, little explicit consideration is given to this particular group. While we recognize the high-level statements on the importance of local knowledge, involving people in decision-making, or indigenous agricultural practices, we find the absence of dedicated information on measures and approaches that increase resilience for (dryland) farming communities, such as agroecological practices and livelihood diversification strategies (s. 5.2.3.2 TS4) surprising. We are aware that the concept of SLM may cover many of the strategies that would enhance resilience, however would find it useful to see more detailed information for particular regions and/or groups spelled out clearly, in particular with regard to resilience to (future) climate change. [Germany]</p>
2416	0				<p>Sustainable Land Management refers to a specific concept and should please be written in capital letters. [Germany]</p>

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2418	0				Assessment of sustainable mitigation potentials of land based mitigation options and CDR: The SPM currently does not provide quantitative estimates for mitigation potentials in the land sector, with the exception of the Food System. Figure SPM.3 reports very broad mitigation/sequestration rates (e.g. > 3 Gt CO ₂ eq/y), however without a time-span and/or cumulative magnitude, and without any feasibility or sustainability constraints. The TS does report very broad ranges of different potentials found in the literature (Figure TS.6), however the authors do not provide any assessment of these numbers. The SR1.5 highlighted potentials reported in a recent meta-analysis (Fuss et al., 2018) who narrowed the extremely wide literature range for CDR-technologies through screening for sustainability, feasibility and cost considerations (and a quality check on the underlying literature). This kind of information is very helpful for policy makers. We would appreciate if the authors could consider to include estimates for sustainable and feasible CDR, based on the discussion in Chapter 2.7.1. and the SR1.5 and compare to ranges of deployment in 1.5°C, 2°C and baseline pathways in order to give policymakers an indication about viable potentials and upper limits for carbon dioxide removal. We are concerned that providing no quantitative estimate in the SPM, and reporting numbers that are different from those just recently published by the IPCC might lead to confusion and hurt the credibility of both reports. [Germany]
8870	0				Given the definition of "desertification" adopted in this report (cf. Glossary) it is never clear in the various mentions to desertification done by this SMP if we are referring to anthropogenic or natural desertification. Could this confusing situation be improved? [Liechtenstein]
1380	0				Luxembourg would like to thank the authors for the present draft of the SPM of the Special Report on Climate Change and Land. The SPM, and in particular the figures have improved from the previous version and we find that the SPM is overall in good shape. [Luxembourg]
1382	0				We do find that the SPM is quite long in the current state. However we would like to keep the contents as they are, but some sections, in particular B, C and D contain some overlaps. We will point out some possibilities in our specific comments. [Luxembourg]
1384	0				We also find that the high level messages could be made clearer and should better reflect the bullet points that follow. We will make comments accordingly. [Luxembourg]
1386	0				The SPM, uses a series of specific concepts and definitions. In order to make these concepts accessible for non experts of the land sector, we propose to include a box that explains these concepts. [Luxembourg]
1388	0				We would like to stress out that aspects of circular economy and its relative importance as climate change decelerator could be developed in the report. [Luxembourg]
1390	0				We would like to have further stressed out the importance of plant and animal genetic resources both in terms of climate change adaptation and mitigation and the importance to set up efficient conservation measures. Genepools should be conserved for future needs (e.g. creation of new lines, varieties adapted to heat stress, disease resistance, but also as backup for traits with high value in terms of mitigation aspects e.g. ruminants with less methan production, plants with high removal of CO ₂). Many of those traits are genetically anchored and thus heritable. The same comment applies to forest genetic resources. [Luxembourg]
1392	0				Aspects which may deserve further development are the use of alternative protein sources in particular in terms of animal feed (insects, algae, watercress, ...) [Luxembourg]
8572	0				The New Zealand Government thanks the authors and the TSU for preparing this draft, and for the opportunity to review it [New Zealand]

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1844	0				It is expedient to explain somewhere that if a scale of source/sink of GHG is not specified, the global flux is implied. [Russian Federation]
8734	0				Given the definition of "desertification" adopted in this report (cf. Glossary) it is never clear in the various mentions to desertification done by this SMP if we are referring to anthropogenic or natural desertification. Could this confusing situation be improved? [Switzerland]
64	0				The text should avoid affirmations and claims which do not have at least a medium confidence qualifier. [Spain]
66	0				Surface units should also include hectares, in addition to km2. [Spain]
5056	1	0	1	0	In the title, '~ Greenhous gas fluxes ~' change to '~ Greenhous Gas Fluxes ~'. [Republic of Korea]
428	1	1	31	1	Given its importance as a carbon reservoir more information on peatland should be included in the SPM [Ireland]
430	1	1	31	1	Text on vulnerability of pastoral productions should be in SPM Chapter 5, page 5 lines 31 and 32 [Ireland]
5342	1	1	31	5	The report so far fails to mention the key policy relevant concept of the SDGs, in which all land challenges are embedded. The SDG concept is well established and also the outline calls for information on sustainable development as a central theme for Chapter 7. The underlying report includes a lot of information in relation to SDGs (for example Figure 3.9) that could be considered here. [Gambia]
1706	1	1	31	5	I commend the authors for their hard work thus far in the process. Notwithstanding, the SPM still contains a few problematic points, listed in the comments below, which we strongly recommend should be addressed while preparing the final version. [Saint Kitts and Nevis]
518	1	2	31	5	The development of the report is welcome. The SPM is bringing together linked material from the underlying report to provide a narrative on agriculture and land issues and this can be further developed to reduce the length and strengthen messages [Ireland]
520	1	2	31	5	The purpose of the report is to assist governments in addressing climate change under the Paris Agreement the information provide should reflect this purpose as far as possible. [Ireland]
522	1	2	31	5	A box on how this report links to the SR1.5C report that shows cross-over points and differences would assist [Ireland]
524	1	2	31	5	The report should assist in informing the ongoing NDC process and the pathway to balancing emissions. [Ireland]
526	1	2	31	5	The report should tabulate in a clear manner emissions and removals associated with AFLOU and its components. This can inform consideration of distance from and actions to achieve a Carbon balance and wider balance of GHG emissions and removals [Ireland]
528	1	2	31	5	The section header text should be short and summarise key messages from the underlying sections. This is not always the case [Ireland]
536	1	2	31	5	The Figures are useful and add to the report however, these are complex and contain a lot of text that could be included in the SPM rather than in the figures [Ireland]
5340	1		31		Thank you to the authors for this very comprehensive SPM. We appreciate their work and we think that the SPM is looking in good shape, with a lot of important information. In particular, the information on limits to adaptation is very useful. However, the SPM would benefit from more specific regional level information. [Gambia]

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1394	1				We would like to underline the link of this report to the IPCC Special report on Global Warming of 1.5°C. It would be useful to make stronger links between the two reports, in particular concerning the balance of greenhouse gases needed to stabilize temperatures. This could be done in the form of a box or throughout the text. [Luxembourg]
5590	2	1	2	14	Add: Recognizing knowledge gaps identified in desertification, desert dusts due to lack of literature. [Algeria]
2420	2	1	2	14	The current text groups GHG fluxes and SLM and discusses these in relation with adaptation, mitigation, desertification, land degradation and food security. The logic behind this structure is unclear: why is a physical process (fluxes) and a certain management approach (SLM) contrasted with climate change response options (adaptation, mitigation) and characteristics describing certain conditions (desertification, land degradation and food security)? We recommend replacing this rather confusing statement by an explanation of the scope of the SRCLL, i.e., assessing climate change issues (GHG fluxes, impacts, response options) with a special focus on land-related issues (SLM, desertification, land degradation and food security). [Germany]
4874	2	2	2	3	Could omit "responds to... cycle. It", so as to focus the message on what the report addresses, as a statement of fact. How it came into being is not essential here. [Sweden]
3968	2	2	2	9	KEY ISSUE [TERMS]: Somewhere early on in this SPM there should be a definition of land degradation and food security, at the very least, in the context of this report. To cite other reports is not sufficient for the general reader. [United States of America]
2422	2	3	2	3	The report does not directly respond to proposals for issues for Special Reports but to the Panel decision which took into account these proposals. Please modify the statement accordingly. [Germany]
432	2	3	2	3	The gases addressed by SRCLL include non-GHG with climate impacts so this statement should be broader. [Ireland]
5416	2	3	2	5	the request was to address the fluxes in terrestrial ecosystems and sustainable land management. The SPM report emphasizes the discussion on land management by agriculture and deforestation, solely, ignoring land use changes by urbanization, mining, roads, reservoirs, etc. It could be considered incomplete in this sense, and raise the discussion regarding if the report has met the ToR or not. [Brazil]
1518	2	5	2	5	Please give definition of 'desertification' in footnote in SPM, because glossary is not included in SPM. [Belgium]
5050	2	5	2	7	Delete "The report sits alongside other IPCC reports, including the Special Report on Global Warming of 1.5°C, and related reports from other UN Bodies," [Iran]
5418	2	7	2	9	we acknowledge the efforts to identify existing publications on the matter of discussion. However, as pointed out occasionally on the report, regarding discrepancies, insufficient models, or insufficient evidence or not existing knowledge regarding some statements. We would suggest a more in depth discussion on voids and unanswered questions, as well as regional (hence authoral) interests and tendencies, that could actually promote a more balanced and transparent approach regarding conclusions as well as regarding potential future studies (and publications) and knowledge development. such approach could give a more balanced message regarding some debatable proposals, usually based in more regional approaches, that loose meaning and sustainability once considered globally. [Brazil]

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5420	2	10	2	14	we understand that this special report should not be prescriptive. Nevertheless, there are concrete undergoing efforts towards sustainable production systems, that address technical, scientific, productive, economic, social, and environmental aspects positively, that are not highlighted. Instead, there is a strong emphasis on the destructive aspects of land use and land use change, particularly related to agriculture systems (which has been the emphasis of the report, although it should have addressed LUC more broadly...). While it is critical to address the issues, that are still very large and critical, inform progress and paths to concrete and effective solutions is as important as. It shows that there is ongoing efforts in research, in technical information, in political initiatives as well as multilateral instruments that are promoting positive changes. For those that are working with these initiatives, it is highly frustrating when the sector is only depicted negatively, when documents ignore the positive developments that where already made, and give concrete message that yes, it is possible to improve the development path to a more sustainable scenario, as we have concrete evidence that we can do it. we would strongly recommend a general revision of the SPM - and the whole report - in order to reconsider language and message, not only highlighting the problems that still need to be addressed urgently but showing that indeed it is possible to do so. [Brazil]
5422	2	16	2	16	FOOTNOTE 1: different font from the rest of the text. [Brazil]
5424	2	16	2	16	FOOTNOTE 4: explain briefly and more clearly the criteria and scientific evidence for these probabilities. This will make the report more understandable for policymakers. [Brazil]
1822	2	1	31	5	The language and the use of terms and concepts is not consistent throughout the document. For instance, the sections B1 through B6 include a variety of adaptation and mitigation options (e.g. conservation agriculture and increased C storage in soils in B 2.3). However, when it comes to results from SSPs in B7 the text is mainly about large-scale reforestation/afforestation and BECCS. What happened to the variety of other options? Technically, it is due to the SSP's and underlying models, but the potential and challenges of different options should be assessed at least qualitatively in the SPM, as it is done in Tables 6.5 to 6.9 of CH 6. [Finland]
1824	2	1	31	5	The readers of the SPM would benefit from a figure or a table illustrating the magnitude (area, mitigation potential) and location (region) of the reponse options (e.g. those listed in Figure SPM 3). For instance, there are various options that are applicable to most of the regions and others that are more applicable to certain regions only. In addition, some mitigation options may have a small per-hectare footprint in terms of emissions/sequestration, but may involve large areas of land etc. This relates to a general comment concerning SPM: In the current form the text indicates nicely how things could change in developing countries, i.e. how we could improve the situation of degraded lands, stop desertification etc. However, the land sector activities also in developed countries have great potential. We have not marginal amount of e.g. agricultural land in Europe and USA where loosing soil carbon is continuous. What kind of change we should see there in order to be able to support steady flow of agricultural products, timber etc. and in same time increase carbon sinks. So, please consider for possibility to enhance the indication of the need for transformative change in land-use sector also in developed countries. [Finland]
8650	3	1	3	1	The title (and aim) of the first section might be made clearer if it specifically identified what this section is about. Eg, is it about impacts, or critical human dependencies on land? [New Zealand]

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2428	3	2	3	2	We have several issues with this first paragraph that is particularly important for the framing of the report: - Considering the definition of land in this report, we question, why A1. starts off with "Land resources ..."? It should be sufficient to say: "Land provides the basis for ..." In addition, this first sentence seems to exclude ecosystem services and material provisions through land, by listing only economic, cultural, spiritual and health benefits. This is adding odds with the start of the first para that follows (A1.1) that stresses the role of terrestrial ecosystems in providing food, fibre etc. We suggest to substitute the first sentence by the following quote from the TS p4 ln 27, amended by the reference to economic, cultural, spiritual and health benefits : "Land, including its water bodies, provides the basis for human livelihoods and well-being through primary productivity, the supply of food, freshwater, and multiple other ecosystem services, as well as economic, cultural, spiritual and health benefits (high confidence)." - The reference to the finiteness of the land area and hence the need for sustainable use that is included in the first paragraph of the Technical Summary (TS CH1 L7-8): "The Earth's land area is finite. Using land resources sustainably is fundamental for human well-being (high confidence)." We urge the authors to add these crucial statements to the SPM and include them in one of the very first paragraphs of the SPM helping the reader understand the relevance of action on the land sector right from the beginning. [Germany]
4876	3	2	3	2	Is "land resources" the same as ecosystem services? If not - what is the difference? Suggest a glossary within the SPM or suchlike to introduce key concepts. [Sweden]
624	3	2	3	3	Food supply is the first basis for human livelihoods and it is not clear under which benefits it appears in the second part of the sentence. It might be "health" but it is too restrictive. Therefore, we suggest to replace "... via economic, ..." with "... via food, economic, ...". [France]
626	3	2	3	3	In this statement, benefits from land are not seen as mediated, in part, by biodiversity and ecosystem services although this is well established in other UN reports (i.e. IPBES). Terrestrial biodiversity and ecosystems provide land based services for livelihoods. Biodiversity is mentioned later in section A and this dimension therefore needs to be present in the introductory section A.1. ("Neither our individual or societal identities, nor the world's economy would exist without the multiple resources, services and livelihood systems provided by land ecosystems and biodiversity" 1.1 (4-5)) We suggest to rephrase it as ""Supported by biodiversity and terrestrial ecosystems, land provide the basis for human livelihoods via food, economic, cultural, spiritual and health benefits." [France]
2426	3	2	3	3	Please add in accordance with the assessment in the underlying report the word "social" in the first sentence. [Germany]
3976	3	2	3	3	While land resources provide the basis for many elements of human livelihoods, the current draft implies that land resources are the basis for all elements of human livelihood. This should be redrafted to not imply that land resources are the only basis for human livelihoods. Recommend the following: "Land resources provide the primary basis for human livelihoods via economic, cultural, spiritual, and health benefits." [United States of America]
8034	3	2	3	6	Is land inclusive of freshwater here? [European Union (EU)]
360	3	2	3	6	Text is quite vague in places and could be replaced by much of the material in line 7-9 of from highlevel statements in Chapter 1 [Ireland]

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362	3	2	3	6	land and biosystems are also a sink for aerosols and ozone which impacts on their health [Ireland]
7662	3	2	3	6	This subtopic focuses on land ecosystem services, and basis for human livelihoods and ecosystem services, and land as sources of emissions is described in the paragraph A1.1 and A1.3, respectively. However, land as a sink for GHGs is not addressed in detail here. Thus, please take into account adding a new paragraph, A1.4 that describe and illustrate the role and trends of land on carbon sinks. [Norway]
7002	3	2	3	6	This paragraph needs reordering. The 2nd sentence seems somewhat out of place in the middle of the first and 3rd. [United Kingdom (of Great Britain and Northern Ireland)]
7006	3	2	3	6	For ease of use alongside the recent IPBES Global Assessment it would be useful if a footnote could be added explaining the different terminologies that are used. The IPBES Global Assessment uses the term 'nature's contributions to people' as a broader concept that includes 'ecosystem services'. [United Kingdom (of Great Britain and Northern Ireland)]
7004	3	2	3	15	Given that this report talks about 'services' frequently, it might be helpful to indicate what they are in the headline statement, which could be merged with some of the more important messages from A1.1 to read "Land resources provides the basis for human livelihoods via economic, cultural, spiritual and health benefits via the land ecosystem services they provide (such as food, feed, fibre, fuel and freshwater). Without these services, human society, and its economy, could not exist." This last sentence (previously found in A1.1 is more impactful than what is currently included in the headline message and thus should be elevated. I would suggest deleting the sentence "Land contributes to climate regulation through sources and sinks of greenhouse gases, sources of aerosols and sources of sinks of water and energy" as this is predominantly covered in A4. A1 should be simply about setting out the importance of land for society. [United Kingdom (of Great Britain and Northern Ireland)]
3978	3	2	3	22	The opening section of the SPM begins with very broad context setting about the importance of land to human civilization. This is arguably a broader context setting than is necessary or appropriate for the Summary for Policymakers of an IPCC report on Climate Change and Land. Recommend that the authors consider deleting the first line of A1, and paragraphs A1.1 and A1.2, in order to focus directly on the topic at hand – i.e., the relationships among climate change, land and land use, and food security. [United States of America]
3980	3	2	3	22	Given that policymakers may not even read all 29 pages of the SPM, recommend including the most important points for Section A in A1. These would be (i) the relationship between land and emissions (as in A1.3), (ii) climate change impacts on land (as in A3), and (iii) economic and other impacts to people as a result of land-based emissions and climate change impacts. Alternatively, these could be A1, A2, and A3, with sub-sections – reserving background/context and harder-to-understand science in the latter half of A. [United States of America]
7664	3	2	3	34	We feel that the importance of land resources to human existence and well-being is well covered in this version of the SPM. However we feel that the importance of the land sector in the climate system and especially for mitigation should also be emphasized. It would also be good to link the importance of the land sector in the climate system to the IPCC special report on 1,5C, stating that in most scenarios removal of CO2 from the atmosphere is needed to limit global warming to 1,5C and 2C and that the level is dependent on how fast the emissions are reduced. In addition, the IPBES assessment report states that climate change now is the third highest threat towards biodiversity. Hence mitigation options related to the land sector may as well be an important option in order to protect the land areas from the adverse effects of climate change. We feel that these perspectives could fit nicely in the part of the report (A1). [Norway]

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3982	3	2	3	34	A1 covers various aspects of the value of land, including contributions to human well-being and climate regulation. Perhaps the two can be discussed in separate sections: (i) A1 focuses on land's contributions to human well-being (economic, health, cultural, spiritual); and (ii) climate regulation related discussion can be integrated with the GHG flux discussion. [United States of America]
3984	3	2	3	34	A1 can focus discussion on land's contributions to human well-being. Suggest to use the following sequence and sub-bullets to discuss each aspect: economic, health, cultural, spiritual, and intrinsic value, respectively. Currently the discussions are mixed and not easy to follow. In addition, discussion of various benefits of land to humans is unbalanced. There should be more on economics, in addition to agricultural production. Cultural, spiritual, and intrinsic benefits are brought up but there is little discussion. [United States of America]
4878	3	3	3	3	It would be helpful to include the definition on "land", in a footnote and otherwise. [Sweden]
7008	3	3	3	3	Is it possible to find another way of saying "climate regulation"? It's possible that some might misinterpret it as referring to policy regulations. [United Kingdom (of Great Britain and Northern Ireland)]
628	3	3	3	4	The way it is phrased let people think that there is no sink of aerosols. It would be clearer to write "through sources and sinks of greenhouse gases, aerosols, ... [France]
2430	3	3	3	4	Please add that land also regulates climate through albedo effects, not only through GHG fluxes. [Germany]
7010	3	3	3	4	Sentence could be made simpler by referring to sources and sinks of GHGs, aerosols, water and energy (rather than separating out aerosols as "source only" since vegetation provides a deposition sink for aerosols) [United Kingdom (of Great Britain and Northern Ireland)]
8036	3	4	3	4	the text "sources and sinks of water and energy" looks a bit strange, and inconsistent with the glossary ("Sink: Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere"; " Source: Any process or activity which releases a greenhouse gas, an aerosol or a precursors of a greenhouse gas into the atmosphere). We suggest replacing with "by playing an essential role in the water cycle and the energy balance of the Earth" [European Union (EU)]
5058	3	4	3	4	In accordance with the Convention and Kyoto Protocol, 'sink' definte generally as removal or arsob aspect. Therefore the meaning of 'sinks of water and energy' is a little bit curious. What is a specific sink of energy? [Republic of Korea]
1836	3	4	3	4	Suggestion: replace 'sources of aerosols and sources and sinks of water and energy ' with 'sources and sinks of aerosols, water and energy ' . [Russian Federation]
7666	3	4	3	6	It is important to emphasize the importance of nature for human existence and well-being. The word "support" could be replaced with a word that underlines the importance of ecosystem services, eg. "essential" or "indispensable". The sentence could then read "Collectively, land ecosystem services, and the biodiversity upon which they depend, are indispensable/essential for human subsistence and well-being." [Norway]
68	3	4	3	6	Human subsistence might depend on ecosystem services but it is not the case for biodiversity. The biotic component is inherent to the definition of the term "ecosystem" and therefore it also contributes to ecosystem services [Spain]
7012	3	4	3	6	Final sentence seems unnecessary as it is covered in first sentence too. Please consider deleting [United Kingdom (of Great Britain and Northern Ireland)]

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8652	3	5	3	6	The argument made could be stronger. Rather than saying that ecosystem services and biodiversity 'support human subsistence', would it be more accurate to say that they 'are critical to continued human existence'? [New Zealand]
7014	3	6	3	6	Should this be "very high confidence"? Please amend. [United Kingdom (of Great Britain and Northern Ireland)]
3986	3	6	3	6	Delete the final phrase "where AFOLU is the dominant source". The point being made is true – that methane and N2O emissions are primarily from AFOLU – but it makes the sentence very confusing. [United States of America]
3988	3	6	3	6	This should read 'very high confidence' that human subsistence depends on ecosystem services. [United States of America]
7016	3	7	3	9	Maybe the first sentence could be flipped, i.e. start with 'human society could not exist...'. [United Kingdom (of Great Britain and Northern Ireland)]
7020	3	7	3	9	First sentence is broad and vague, probably unnecessary. Please consider deleting [United Kingdom (of Great Britain and Northern Ireland)]
3990	3	7	3	9	This sentence could be strengthened by writing in the affirmative: "Human society, and its economy, could not exist without the food, feed, fibre, fuel and freshwater and ecosystem services provided by ..." [United States of America]
630	3	7	3	15	This section does not allow to develop a clear understanding of the term "ecosystem services" neither a clear distinction of different categories of ecosystem services. We propose to better use existing typology such as MEA's typology of ecosystem services (supporting, regulating, provisioning, cultural), or IPBES's Nature Contributions to Peoples (regulating, material, non-material) as presented in Cross-Chapter Box 8, Chapter 6, pages 6-113 to 6-117. The expression "ecosystem services" could also be marked with an asterisk so that readers can use the glossary for precise definitions. [France]
2432	3	7	3	15	Why are you singling out the GDP contribution of agriculture over that of other land based industries, e.g. forestry? Could this statement be introduced in a more generic manner, e.g. something like "These services contribute substantially to global economic output, with e.g. the agricultural sector generating up to 25%....and forestry up to ..." [Germany]
8654	3	7	3	15	Suggest adding 'indigenous' before 'biodiversity'. Introduced species may contribute to overall biodiversity, but not necessarily contribute to ecosystems services in the same way - especially cultural and spiritual values. Additionally, introduced species may be pests or weeds that decrease overall biodiversity. [A1.1 - applies throughout the document: A2, A3.6, B7.3, and C1.3] [New Zealand]
7668	3	7	3	15	Please consider to include information regarding contribution of pollination and pollinators to FS and ecosystem services, and the estimated annual value of the world's total terrestrial ecosystem services (~ USD 75–85 trillion, Ref. 1.2.1). Apiculture, for instance, contributes to household food security and ecosystem services. "Pollinator-dependent crops contribute up to 35% of global crop production volume and are important contributors to healthy human diets and nutrition" (5.2.2.4 Impacts on pollinators). Currently, IPBES has published that (1) >75% global food crop types that rely on animal pollination, and (2) US\$235 to US\$577 billion: annual value of global crop output at risk due to pollinator loss. (https://www.ipbes.net/news/Media-Release-Global-Assessment). [Norway]

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7018	3	7	3	15	The previous draft of the SPM contained the finding that by 2010, around 3 billion people derived income and employment from agriculture-related activities. It would be helpful to include this finding in A1.1 once again to demonstrate the importance of agriculture to the world economy, along with the GDP figures mentioned. [United Kingdom (of Great Britain and Northern Ireland)]
3992	3	7	3	15	What about expansion of human settlement patterns, which also impacts food production? [United States of America]
8778	3	7	3	15	This paragraph is very interesting. The main idea is about the importance (value) of land ecosystems it's biodiversity and services. However, it introduces two ideas that look out of context. First, and more important, it indicates the value of the ecosystems services in economic terms in a global GDP scale, although previously mentions the impossibility of human existences without biodiversity and ecosystem services (that should be enough reason to be valuable), those ideas are contradictories, even more considering the idea of intrinsic value of the ecosystem that following them. Therefore, I suggest deleting the idea of an economic comparison between GDP and ecosystems services. Second, and less important, the idea of agriculture is an orphan idea in this context, because agriculture is very specific (although very important) service of the land ecosystem and the paragraph is in regards to services in general, maybe is better to pas this Idea to de section A4 or maybe mentioned as an important example. [Venezuela]
5062	3	7	3	22	Focusing on land, ecosystem service, and biodiversity, not addressing in the context of climate change. It would be better to mention the ecosystem service from land would be deteriorated due to climate change. [Republic of Korea]
7022	3	7	3	33	A1.1 and A1.2 could be combined or rearranged, at the moment the points about value (economic or otherwise) and impacts on health are jumbled [United Kingdom (of Great Britain and Northern Ireland)]
8038	3	8	3	8	Delete ", and its economy,". It is trivial that the economy could not exist without human society (and other social constructs like culture could also be listed as potentially at risk). [European Union (EU)]
2434	3	8	3	9	The very first paragraph of the Technical Summary of chapter 1 (TS page 4 line 29) refers to individual or societal identities, which might not be encompass using the term "human society", which refers to a group. We recommend to use the wording from the technical summary and to add reference to the importance of land also for the individual existence. [Germany]
8740	3	9	3	9	High confidence in GDP values seems unncesary. These are global, reliable data ? [Chile]
632	3	9	3	9	Would it be possible to replace the range of 1-25% of the GDP "in many countries" by the comprehensive range found in all the countries of the world (or at least for those where such data is available...?) [France]
70	3	9	3	9	GDP (Gross Domestic Product) could be defined the first time used, even if the abbreviation is quite common [Spain]
4880	3	9	3	9	The finding would seem to be a certainty, and a confidence statement thus not be needed. [Sweden]

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Comment No	From Page	From Line	To Page	To Line	Comment
8040	3	9	3	10	The sentence on the contribution of agriculture to GDP should be revised or deleted. Reasons: - It undermines the strength of message above ("food [...] without which human society [...] could not exist"). - The figures on agriculture contribution to GDP are different from those in section 5.1 (%s, years). - To avoid focusing exclusively on GDP, add a statement on the amount of livelihoods agriculture generates - The % range provided adds little value: it does not indicate how many countries do not fall in this range, and how many of those are above or below the range. - Agriculture is a key sector to land, but not the only one relevant to GDP. Beyond other economic sectors (like forestry), changes in the sheer value of land is of key economic importance. - For balance, the damage costs related to agriculture's externalities (eutrophication, acidification, etc.) should also be included. [European Union (EU)]
1628	3	9	3	10	"Agriculture generates between 1% and 25% of GDP in many countries, with a world average of about 4% in 2016 (high confidence)". According to the World Bank data in 2016, however, there are 20 countries in the world registering a 26-58% proportion of agriculture in GDP, which is inconsistent with that of 1-25% mentioned in this sentence. It is suggested to check the accuracy of relevant data and make appropriate modifications. [China]
364	3	9	3	10	Can "many" be replaced by a number or some quantification of this. [Ireland]
158	3	9	3	10	Some values in SPM A1.1, "Agriculture generates between 1% and 25% of GDP in many countries, with a world average of about 4% in 2016." don't correspond to those of Chapter 5 (p. 5-8, line 4-7). We suggest using numbers consistent between SPM and Chapter 5 and to replace 25% with 60%, and 2016 with 2017. [Japan]
7024	3	9	3	10	The sentence "Agriculture generates between 1% and 25% of GDP in many countries with a world average of about 4% in 2016" is not reflective of the underlying report (chapter 5.1), which states that "Agriculture as an economic activity generates between 1% and 60% of national GDP in many countries, with a world average of about 4% in 2017 (World Bank 2019)". It would be more impactful to rephrase this in the SPM to "Agriculture generates up to 60% of GDP in many countries, with a world average of about 4% in 2016." [United Kingdom (of Great Britain and Northern Ireland)]
5428	3	9	3	12	It is necessary to change the order of the sentences. Considering that the first sentence in the paragraph is related to terrestrial ecosystems, it must follow by the 3rd sentence on the paragraph..."The total economic value of the world's terrestrial ecosystem...." And then the other "Agriculture generates" [Brazil]
8766	3	9	3	13	"Agriculture generate between 1% and 25% of GDP in many countries" please mention what countries, how many and wich type (developing or developed) [Chile]
3994	3	10	3	10	Presumably this refers to the annualized valuation of terrestrial ecosystem services, but not clear. [United States of America]
366	3	10	3	11	Expand on what total economic value is and provide some estimates - numbers are provided in the underlying chapter. [Ireland]

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Comment No	From Page	From Line	To Page	To Line	Comment
8042	3	10	3	12	<p>The comparison of ecosystem service value to GDP must be re-framed or else deleted.</p> <p>i) It needs to demonstrate some link to climate change or its drivers in order to have relevance in this report.</p> <p>ii) Rather than use the 110-125% of GDP figure (which gives a spurious impression of precision), it would be better to talk about the regulating and material functions of ecosystem services (as described in chapters 1, 5 & 6), the channels through which they affect economic livelihoods, and how these are threatened by climate change (in addition to the intrinsic and non-material value of ecosystem services already mentioned in this paragraph).</p> <p>iii) It ignores the considerable literature that questions whether such comparisons to GDP can be meaningful.</p> <p>iv) The statement that ecosystem services, once monetised, are roughly as valuable as GDP has little practical meaning to policymakers (and such numbers from Costanza et al have been available for many years). Ultimately the value of all ecosystem services is too great to monetise. Section 1.3.1.2 states that land degradation is equivalent to 10% of GDP. Does this really mean that GDP could be 10% larger in the absence of this degradation?</p> <p>v) The meaning/definition of 'total economic value' is unclear. [European Union (EU)]</p>
1630	3	10	3	12	<p>“The total economic value of the world's terrestrial ecosystem services has been estimated to exceed annual global GDP by more than 10%, and possibly up to 25% (medium confidence)”. The data of 25% in this sentence is incorrect.</p> <p>According to the literature (Costanza et al, 2014), the annual average value of global total terrestrial ecosystem services in 2011 is estimated to be about US\$75-85 trillion, as indicated in lines 5-8 on page 1 of the Executive Summary (ES) of Chapter 1 and lines 32-34 in Section 1.2 on page 3 of Chapter 1. However, according to Table 3 in the literature, US\$75 trillion is the value of services per unit area in 2011 multiplied by the area of global terrestrial ecosystems in 2011, while US\$85 trillion is the value of services per unit area in 2011 multiplied by the area in 1997. Therefore, the annual average value of global total terrestrial ecosystem services in 2011 should be estimated at about US\$75 trillion instead of US\$75-85 trillion as indicated in the underlying report.</p> <p>Therefore, it is incorrect that the total estimated value of global terrestrial ecosystem services may exceed the average annual global Gross Domestic Product (GDP) by as much as 25% as calculated with US\$85 trillion as a dividend. It is suggested to check and revise the calculation. [China]</p>
160	3	10	3	12	<p>We would like to suggest following points for this part;</p> <ul style="list-style-type: none"> - Referring to the specific period when the total economic value of terrestrial ecosystem services and annual global GDP have been estimated (we can see this information in chapter 1, page 1-1, line5-7) , because these values are changing over years. - Clarifying whether the non-material services are included or not in the total value. - Clarifying the reference of "25%", because the figure seems not to be found in 1.2. - To ensure consistency between the level of confidence of this sentence ("medium") and Executive summary of chapter 1("high" page1-1, line 8). [Japan]

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3996	3	10	3	12	KEY ISSUE [CONFIDENCE]: The estimates of the value of ecosystem services is largely derived from a single paper (Costanza et al., 2014) and should be accorded a low confidence level. The paper's results are incorrectly stated here in the SPM. Costanza et al. (2014) estimates global terrestrial ecosystem services in 2011 at US\$ (2007) 75.1 trillion/year, or approximately equal to global GDP in 2011 [which Costanza et al. (2014) cites as \$75.2 trillion], not 10-25% higher than global GDP as the SPM suggests. Costanza et al. (2014) notes that the technique used for estimating the value of ecosystem services – benefit transfer – provides "a crude first approximation at best." Further, Cross-Chapter Box 10 notes that "Many of these ecosystem services may be difficult to estimate in monetary terms." This would seem to provide a strong basis for assessing the confidence level in this estimate as "low." Given this, authors should strongly consider excluding this estimate from the SPM. [United States of America]
3998	3	10	3	14	The following phrasing more accurately reflects the evidence and has also been edited for readability: "Land and its biodiversity have economic, non-material (e.g., spiritual) and intrinsic value (high confidence). The economic value of the world's terrestrial ecosystem services is difficult to estimate. One estimate indicates that it exceeds annual global GDP ..." Ensure that the numbers and confidence level are reflective of the science. [United States of America]
4882	3	12	3	12	The text "have intrinsic value and also" should be deleted. The intrinsic value of nature is a philosophical issue and not something to be addressed through uncertainty estimates. [Sweden]
5430	3	12	3	13	Remove "Land and its biodiversity have intrinsic values and also support" [Brazil]
4000	3	12	3	14	Current language implies definitive interpretation of the value of land and biodiversity. Suggest redrafting to not make this implication: "Land and its biodiversity are considered by many communities to have intrinsic value and also support non-material ecosystem services, such as cognitive and spiritual enrichment, and aesthetic values." [United States of America]
4002	3	12	3	14	This sentence raises a different point about value of ecosystem services and intrinsic value, which perhaps is better placed in a separate paragraph. [United States of America]
434	3	12	3	15	The point regarding land and non-material services is very subjective and should be removed [Ireland]
604	3	13	3	13	It is not clear what is meant by "spiritual enrichment". It will be useful to clarify [United Republic of Tanzania]
5592	3	13	3	14	To what extent, provide quantification, percentage. [Algeria]
5432	3	13	3	14	Sentence modified "Non-material ecosystem services, such as cognitive and spiritual enrichment, and aesthetic values have declined at the expenses of.... [Brazil]
4004	3	13	3	15	It's established science (anthropology, archeology, hominid evolutionary science, etc.) that cognitive enrichment has absolutely not declined with increases in food production. Quite the contrary, human median cognition has consistently increased relative to pre-agrarian civilizations. [United States of America]
8044	3	14	3	14	It should be clarified what "These services" refers to. It is not only the spiritual and aesthetic services that have declined but also the regulating services, while the provisioning services have been prioritised. [European Union (EU)]
8046	3	14	3	15	replace "at the expense of" with "due to, inter alia,". [European Union (EU)]
1136	3	14	3	15	Last sentence about loss of services should be moved to section A2 which is on the topic of loss of services. A1 is about provision of services. [Canada]

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634	3	14	3	15	Would it be possible to specify the time frame? Would it be since the apparition of agriculture? [France]
542	3	14	3	15	The comment that "the ecosystem services have declined due to material services such as food production" needs to be expanded. The food production is also one of the provisioning services. The decline in ecosystem services due to other activities such as mining, industries etc must be highlighted. [India]
368	3	14	3	15	Either develop e.g. what is material? Or delete as this does not add substance to the report [Ireland]
8872	3	14	3	15	Write: "These services have declined in the last decades at the expenses ...". Furthermore, regarding the consequences induced by the "increase in material services such as food production", distinction should be made between the impact of typically large-scale monocultures and of more diversified small-scale production systems [Liechtenstein]
8796	3	14	3	15	Write: "These services have declined in the last decades at the expenses ...". Furthermore, regarding the consequences induced by the "increase in material services such as food production", distinction should be made between the impact of typically large-scale monocultures and of more diversified small-scale production systems [Switzerland]
7026	3	14	3	15	How does this sentence relate to climate change? Please elaborate. [United Kingdom (of Great Britain and Northern Ireland)]
7028	3	14	3	15	You are making an important point here, but I feel that it is currently written in somewhat opaque language that will not necessarily resonate with the reader. Basically you are saying that the natural world is damaged and declining because we are degrading it. However, saying that a "service" is declining as a result of increased "material services" feels like a very abstract way of saying that the natural world is in serious trouble. Moreover the language used here is somewhat inconsistent with IPBES, which talks more in terms of species richness and biodiversity - these are still scientific terms, but they are a little more tangible to the average reader. [United Kingdom (of Great Britain and Northern Ireland)]
7030	3	14	3	15	Over what period have the services declined? [United Kingdom (of Great Britain and Northern Ireland)]
4006	3	14	3	15	In addition to food production, can add other examples of material services. [United States of America]
8048	3	15	3	15	At the end of the sentence after "food production" add "as well as land take for settlements and infrastructure". [European Union (EU)]
4884	3	15	3	15	The sentence regarding declining services at the expense of the increase in material services such as food production would benefit from a few more examples than solely food production. For example: mineral extraction, and "deforestation" which of course is related to inter alia food production, but reminds of the fact. [Sweden]
636	3	16	3	16	Instead of "through access to ecosystem services", please consider "through ecosystem services". [France]
1058	3	16	3	17	Please consider rephrasing as "health and psychological wellbeing" (ref p6-178) [France]
7034	3	16	3	17	Language is a bit convoluted and technical. What does 'through access to ecosystem services' mean. In what way does land provide that access, and does this imply control of access through ownership? Please clarify for the general reader. [United Kingdom (of Great Britain and Northern Ireland)]
1472	3	16	3	22	We have doubts on the 'exact' numbers (821, 613). What is the reference year ? We suggest using more general numbers. The numbers come from different articles. Substituting anemy (in the article) by iron deficiency iseems not to be correct. [Belgium]

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Comment No	From Page	From Line	To Page	To Line	Comment
2436	3	16	3	22	This whole para is missing a clear red thread and message. It jumps from health to food production to positive effects of being in the natural environment. Please reconsider the information provided taking into account our further comments, and streamline the whole para. [Germany]
7670	3	16	3	22	Please consider revising the relevance of describing food insecurity challenges in the A1 paragraph. Thus, paragraph A1.2 could be presented in A2 subtopic where resource exploitation over recent decades and livelihoods of people is the main focus. [Norway]
7032	3	16	3	22	Would suggest that this paragraph (A1.2) is not necessary and can be removed, in the interests of shortening the SPM. The previous paragraph (A1.1) makes it clear that land provides important services in terms of human health and wellbeing. In an ultimately climate and environment focused report, it is not necessary in the SPM to go into the details of human obesity, for example (also, it's somewhat unbalanced here to just talk about negatives - people are becoming more obese but over the past decades, life expectancy around the world has increased significantly) [United Kingdom (of Great Britain and Northern Ireland)]
606	3	16	3	22	The Entire A1.2, We think it is controversial and need to be improved. The first sentence, "Through Access to ecosystem services, land is an important mediator of human physical and psychological health". This is not clear, not clear what is meant by Mediator? what is the key message? [United Republic of Tanzania]
4008	3	16	3	22	The key message of this paragraph is confusing. It starts with discussion of health benefits of land and ecosystem services without much supporting detail, then the discussion moves on to health problems due to food insecurity. Suggest to rewrite and reflect the key messages in the underlying chapters. [United States of America]
1138	3	16	3	34	The benefits of ecosystems/nature in protecting communities from climate change impacts could be highlighted here. e.g., mangroves protecting from coastal erosion and storm surge, wetlands and forests limiting impacts of flooding and extreme precipitation, etc. [Canada]
8050	3	17	3	19	should also include reference to any health impacts of eating certain types of food, notably related to animal products, which is relevant to the SR. [European Union (EU)]
1474	3	17	3	19	The sentence tries to link numbers from different sources and context and refer to different population categories. Please ensure consistency with the underlying chapters as well as solid numbers. 613 million does not refer to iron deficiency. [Belgium]

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5434	3	17	3	19	<p>the number of people suffering from hunger and malnutrition are still unacceptable and need a strong and effective intervention. To address a problem, and implement effective solutions, is essential to have clear its causes. Establishing correlations that are not based on strong evidences can mislead actions, and maintain the problem, often increasing it. Further, identifying efforts that are already in place, that are producing positive results, are essential, in order to reinforce positive actions, and as well making evident those undergoing efforts. with this in mind, we suggest some edditng: Food production has increased, AND YET, DUE TODIVERSE AND COMPLEX CAUSES, an estimated 821 million people are STILL undernourished and 613 million suffer form iron deficiency while 2 billion adults are overweight or obese.</p> <p>Consider that the State of Food Insecurity (FAO 2013) states that "Under MDG 1, which aims to eradicate extreme poverty and hunger, the world sought to halve, between 1990 and 2015, the proportion of people who suffer from hunger. (...) These successes demonstrate that, with political commitment, effective institutions, good policies, a comprehensive approach and adequate levels of investment, we can win the fight against hunger and poverty, a necessary first step to arrive at the other development milestones set by the MDGs. (FAO, IFAD and WFP. 2013. The State of Food Insecurity in the World 2013.</p> <p>The multiple dimensions of food security. Rome, FAO.) Further, The 2018 edition, cited in chapter 1, states that the " failure to reduce world hunger is closely associated with the increase in conflict and violence in several parts of the world, and that efforts to fight hunger must go hand in hand with those to sustain peace. (FAO, IFAD, UNICEF, WFP and WHO. 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome, FAO. Licence: CC BY-NC-SA 3.0 IGO.)</p> <p>Therefore, a sentence that leads to the understanding that the increase of food production is not effective to solve food security issues is misleading. To increase food production - under sustainable systems - is essential to fight food insecurity. Has to go hand in hand with several other concerns, such as those mentioned in this report (reducing food waste, soil and water management, market issues, etc). However, is essential, as it has enabled humanity to address several issues, including improving access and reducing food prices to the final consumer. It is essential to identify and understand that there are effective actions, already undergoing, that bring out positive results is essential, hence validating the existing national and multinational efforts, and further strenghtening the need and effectiveness of action. [Brazil]</p>
638	3	17	3	19	<p>Please re-evaluate the positioning of this sentence in this section, be consistent in the use of numbers by using only one significant figure (or formula such more than 800, more than 600, about 2), and specify the year for which the findings are given. [France]</p>
162	3	17	3	19	<p>The value of 613 million in SPM A1.2 includes only women and girls aged 15 to 49 (Chapter 5, page 5-14, line 19), of which the scope is different from those of other values (821 million, 2 billion) that include men. We suggest adding this information to avoid misunderstanding of the data. [Japan]</p>

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4010	3	17	3	19	This statement appears entirely lacking in any historical context. The daily per capita supply of calories has increased from around 1,500 kcal to in excess of 3,000 kcal throughout much of Europe since the 13th century. Globally it has increased by almost 1,000 kcal since 1960 alone. This has accompanied a continual decline in the share of the population that is undernourished (see www.OurWorldindata.org). While famine does still occur, it is at a historical low point on a per capita basis and continues to decline in large part due to modern agricultural practices. While obesity is a growing problem to be sure, historically speaking it's a far better dilemma than the historical norm where starvation was a prevalent condition. It would be more genuine to include mention of this fact while stating the undernourished figures so as to afford some accurate context. [United States of America]
1632	3	18	3	18	The expression of "613 million suffer from iron" in this sentence is inconsistent with the underlying report. According to the relevant elements of the ES on page 5 of Chapter 5 of which, it is suggested that the "... 613 million..." be reworded as "... 613 million women and girls aged 15 to 49..." in order to increase the accuracy of the reported conclusion and avoid misleading policy makers. [China]
8874	3	19	3	19	"cities" and "natural environment" are not well defined in this context,, especially if here "natural environment" is an environment perceived / considered as natural by the inhabitants of cities. Are "natural environments" green urban areas, mixed urban-rural areas, rural areas, agricultural areas, isolated / preserved areas? [Liechtenstein]
4886	3	19	3	19	Is "natural environment" in this case the same as "land", or something else? Nature? Green space? Biodiversity? This could be clarified. [Sweden]
8798	3	19	3	19	"cities" and "natural environment" are not well defined in this context,, especially if here "natural environment" is an environment perceived / considered as natural by the inhabitants of cities. Are "natural environments" green urban areas, mixed urban-rural areas, rural areas, agricultural areas, isolated / preserved areas? [Switzerland]
4012	3	19	3	19	Consider making this statement more quantitative or nuanced. How much interaction and for how long? [United States of America]
1476	3	19	3	21	Sentence is not clear. 'When people living in cities and interact with natural environment'..... What does it mean exactly? Is 'mortality a health condition? Please rewrite. [Belgium]
2442	3	19	3	21	It is not entirely clear what the message in this statement is. Particularly "when people living in cities interact with the natural environment" seems an odd expression. We suggest reformulating the sentence, for example, as follows: "In urban environments access to natural areas increases subjective well-being and improves health conditions by reducing mortality, cardiovascular disease and depression". [Germany]
608	3	19	3	21	"When people living in cities interact with the natural environment, health conditions such as mortality, cardiovascular disease and depression decrease and subjective well being increases" We think this is also subjective and confusing due to the following reasons. What is meant by cities and why only cities, what is meant by natural environment. Natural environment is subjective and some other natural environment such as Desert may significantly affect health conditions and cause more depression. It will be useful to consider this and be more precise in our articulation. [United Republic of Tanzania]
4014	3	19	3	21	The discussion of urban health issues, while of general policy importance, is outside the scope of this report, and should be deleted here. [United States of America]

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8052	3	19	3	22	This may not be a top-level message when compared to other important statements not represented. The meaning of "interact with natural environment" should be specified. [European Union (EU)]
370	3	19	3	22	The intent of the statement is of some value but its wording is odd for an IPCC report and confidence level is high for such a statement [Ireland]
436	3	19	3	22	The point regarding the interaction of people living in urban areas with the natural environment is subjective and should be removed [Ireland]
72	3	19	3	22	The interaction of urban population with the natural environment may also result in severe distresses such as infections, diseases, and even death, especially in less developed countries [Spain]
4016	3	22	3	22	Typo. Leaves out the word "services" after "ecosystem". [United States of America]
1478	3	23	3	23	GHG: first use: acronym needs to be spelled out [Belgium]
1142	3	23	3	23	Since this paragraphs only reports on anthropogenic sources and sinks, clarify this in the first sentence: Land is both a source and sink for ANTHROPOGENIC GHGs. [Canada]
440	3	23	3	23	This point should begin "Agriculture and land use are both a source and sink..." [Ireland]
1560	3	23	3	23	A rewording of the first sentence could be beneficial to improve the general understanding. The following modification is suggested: "Land is both a source and sink for GHGs affecting global climate" to be modified to "Land acts as both a GHGs source and Carbon sink, affecting global climate" [Italy]
8876	3	23	3	23	Write: "...global climate; climate change also affects ..." [Liechtenstein]
8800	3	23	3	23	Write: "...global climate; climate change also affects ..." [Switzerland]
1140	3	23	3	24	Delete phrase "climate also affects many land-based ecosystem services." This is not wrong but there is nothing in the paragraph that is presented to support this. Only the last sentence is about regional climate and it describes impacts OF land processes on climate not the other way around. [Canada]
1820	3	23	3	24	A1.4. Here authors write "Most modelled pathways that limit global warming entail the large-scale deployment of land-based climate change mitigation measures (high confidence)." The term "land-based climate change mitigation measures" is first time introduced here. Please define the meaning of that term. If possible, list potential measures to conduct land-based mitigation. [Finland]
7036	3	23	3	24	This sentence should be separated into two separate points (if I have understood it correctly): "Land is both a source and sink for GHGs. Around 22% of total GHG emissions..." and "Climate affects many land-based ecosystem services such as..." (including an example). [United Kingdom (of Great Britain and Northern Ireland)]
4018	3	23	3	24	KEY ISSUE [FLUXES]: Does this report also assess changes in physical forcings to the climate system, such as changes in land use albedo, surface roughness, surface temperatures, e.g., changes in nighttime temps, etc.? This might be more of a regional or local effect, but cumulatively has been found to be significant. [United States of America]
372	3	23	3	25	For comparision to the AR5 it would be usefull to include the % that AFLOU contributes if SAR values were used. [Ireland]
438	3	23	3	25	This is a key point and should be considered for inclusion in A.1 [Ireland]

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5064	3	23	3	28	When it describes emission for agriculture or vegetation, it should be explained that agriculture and vegetation have function to absorb atmospheric CO2 and to convert into biomass. And the amount of CO2 absorbed by crops and plants is larger than emission compared with GHG. It needs to balance between absorption and emission in agricultural sector. It is very unfair to report on emission in agriculture and AFOLU sector only. [Republic of Korea]
8054	3	23	3	34	If keeping the current A1 section, the current statement A1.3 should become statement A1.1, with some of its messages reflected in the headline statement. It provides key, climate-related information that policymakers and stakeholders may not be aware of. Paras A1.1 & A1.2 are more general and less directly related to climate change and climate policy. [European Union (EU)]
1514	3	23	3	34	A1.3 is similar to A4. It is a matter of structure. Could it be simplified? could overlap be avoided by deleting A.1.3? [Belgium]
1758	3	23	3	34	Section A1.3 is very technical and the contents appear to fit better under section A4. [Denmark]
2444	3	23	3	34	Already, the headline statement A4 with its paragraphs encompass some figures of greenhouse gas emissions (e.g. 22% of anthropogenic GHG; net land sink of 11.7 GtCO2...) that are mentioned here again. We kindly ask the authors to revise statement A1.3 with respect to redundancy with A4 and streamline accordingly. [Germany]
7672	3	23	3	34	In addition to AFOLU fluxes, please consider to show the FOLU fluxes separately. Also consider to indicate if the reference to around 22 % is related to current emission levels or another time frame. E.g. if the work "current" could be inserted after "22 % of total". [Norway]
76	3	23	3	34	The paragraph should specify whether data for emissions are gross or net. [Spain]
4888	3	23	3	34	Some of this is also brought forth in A4 headline statement and subsequent statements. It is important to mention on these aspects in section A1 that highlights major aspects of climate and land. Actual numbers could, perhaps be cited in section A4 rather than here. [Sweden]
7038	3	23	3	34	A1.3 is a very important paragraph to include and its findings should stay in the SPM. However, there is significant overlap with A4 (some of the findings e.g. the 22% figure are duplicated), and I would suggest moving A1.3 to be the first paragraph under A4 (i.e. a new A4.1), and any subsequent duplication removed. As a result A1 will simply focus on the importance of land to society, and its interactions with climate are introduced later on. [United Kingdom (of Great Britain and Northern Ireland)]
4020	3	23	3	34	KEY ISSUE [FLUXES]: A1.3 discusses deforestation but does not mention forest degradation (only peatland degradation addressed). The 10-15% contribution to global emissions is a net emission, it includes regrowth and afforestation. But the text implies the 10-15% is gross emission because it lists only deforestation and peatland degradation. This needs to be checked and corrected. [United States of America]
4022	3	23	3	34	KEY ISSUE [FLUXES]: It's unclear why permafrost is excluded in this section, especially since they are critical high carbon systems that are experiencing major carbon shifts. [United States of America]
4024	3	23	3	34	KEY ISSUE [FLUXES]: AFOLU descriptions can lead to some misleading conclusions if one doesn't understand that agriculture, forestry, and other land use are not similar. Two emit GHGs; one (forestry) tends to sequester. It needs to be blantly clear the impacts of each sector in order to make wise policy decisions. Therefore simply using AFOLU can be confusing. [United States of America]
4026	3	23	3	34	Consider separating the GHG flux discussion from this section, and combine/coordinate with A4 which focuses on GHG emissions and sinks. [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
4028	3	23	3	34	KEY ISSUE [FLUXES]: A1.3 begins by discussing how land is both a source and a sink for GHGs, but little is mentioned regarding land as a sink. It may be worth mentioning the amount of GHGs sequestered by forested lands (as ag is mentioned specifically as an example of a sink). [United States of America]
4030	3	23	3	34	KEY ISSUE [FLUXES]: It may be useful to also cite the recent studies (Griscom et al, and others) that estimate that mitigation in the AFOLU sector accounts for as much as one-third of the pre-2030 mitigation potential. [United States of America]
8056	3	24	3	24	Due to the different interpretations of "AFOLU" discussed in A4.1 and A4.2 (see also comments on those sections), A1.3 should use a more circumspect language regarding its GHG emissions. Giving just one estimate can be seen as favouring one interpretation over others. Also, providing a figure of 22% without an uncertainty range may give a false sense of precision and certainty about that estimate. If providing such figures here, refer also to further elaboration in Section A4 [European Union (EU)]
1480	3	24	3	24	22% is for what year? [Belgium]
8742	3	24	3	24	Footnote indicates that global warming potential from the AR5 are used. Looking at SR1.5 it looks like in that report different GWP were used. Is there a way to understand the effect on the carbon budget of these differences? [Chile]
7986	3	24	3	24	Here 22% is mentioned, while in Fig SPM.1 section E 24% is used. Please be consistent [Netherlands]
74	3	24	3	24	More insight should be provided in the text so the reader could understand the apparent inconsistency between the estimate around 22% of total anthropogenic GHG emissions from AFOLU given in this line, and the figure of 25-30% for the global food system stated in page 17, line 24, section B,4 [Spain]
4032	3	24	3	24	KEY ISSUE [FLUXES]: The estimate that AFOLU contributes around 22% of total anthropogenic GHG emissions does not match the estimate in Figure SPM.1 E (24%). Also, this is redundant with A1.3. [United States of America]
2890	3	24	3	25	Suggest this sentence be better qualified. Currently it implies that forestry in general is a net contributor to GHG emissions. Sustainable forestry is widely acknowledged as an effective tool for GHG mitigation, especially when the system boundary is expanded beyond the forest to include the positive contribution of wood products. This also ignores literature that shows that in some instances forest cover has increased with an increase in demand for biomass. Suggestion would be to replace "forestry" with "deforestation and unsustainable forestry practices". [Australia]
640	3	24	3	25	We suggest to precise the time period for which this figure is relevant : 2007-2016, as provided further in the SPM (line 1 page 6). [France]
164	3	24	3	25	It would be better to refer the specific period when the contribution of AFOLU emissions was around 22% in the SPM (we can see this information in chapter 2 (in its Executive Summary, it is mentioned that "in 2007 to 2016") , because the global GHG emissions and its share of the sectors are changing over years. [Japan]
4034	3	24	3	25	KEY ISSUE [FLUXES]: The text here states that "around 22% of total anthropogenic GHG emissions arise from agriculture, forestry and other land use (AFOLU)." It does not mention if this value reflects gross or net accounting. Based on Chapter 2 (Section 2.4 and Table 22), it seems that it should be gross. However, text at the end of page 5 (lines 44-45) indicates that this represents a net value (an error?). The discourse in Chapter 2 is also ambiguous and often times is not clear about net versus gross (e.g., Table 22 is not explicit ... it just says that average annual flux/total land use emissions were 11.02 for 2007-2016). See related comment pertaining to page 5 / line 44 to page 6 / line 12. [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
1144	3	24	3	30	What dates or decades do the reported values in this paragraph apply to? Later in para A4, similar values are reported from the period 2007-2016. [Canada]
8744	3	24	3	31	The medium confidence for AFOLU emissions refers to the 22% ? Something else? Why don't use a confidence interval? Same question for the other values given in this paragraph [Chile]
7674	3	25	3	25	Please consider to insert "sector" after (AFOLU). Furthermore consider if there is a need to clarify what is meant by forestry eg. in the glossary. Does it include deforestation and forest degradation? [Norway]
1500	3	25	3	28	N2O emissions by agriculture are not due only to fertilisation (see Fig 2.11), thus add ",mainly" before "due to nitrogen". [Belgium]
642	3	25	3	28	Why not explain also just after these affirmation that agriculture is also a part of the solution with high mitigation potential (Chapter 2: Land-Climate Interactions 1.5-2 GtCO ₂ e y ⁻¹ robust evidence, [France]
166	3	25	3	28	Suggest deleting this sentence based on the following reasons. 1) Similar information is available in A4.3. 2) The background information that "Agriculture is responsible for about half of global anthropogenic methane emissions (high confidence)" is not found in sections 1.2, 2.2, 2.4, 2.6. It seems only the referenced information of this is in lines 41-42 in section 5.4.1 which saying "methane gas emissions within the farm gate represented about half of the total CH ₄ emitted by all sectors" (Tubiello 2019), however, the data and/or numbers supporting this information is hardly found in chapter 5. Thus, it was also hard to understand the above information is considered high confidence. 3) There is inconsistency in the judgement of confidence in the executive summaries in chapter 2 and chapter 5 for the estimation of GHG from AFOLU sector. The lines 23-24 of page 5-6 in chapter 5 and the liens 15-18 of page 2-4 in chapter 2 address the same data (original source is Table 2.2 in chapter 2), however, the confidence is referred "high" in chapter 5 and "medium" in chapter 2. It would be better to resolve this inconsistency. [Japan]
4036	3	25	3	28	What is included in this figure of three-quarters? According to standard IPCC accounting methodologies, which this special report should adhere to, the manufacturing of fertilizer is not an agricultural emissions source of reactive atmospheric nitrogen. It should not be treated as such here. [United States of America]
4038	3	26	3	26	The term "threat multiplier" is commonly used in the specific context of security and conflict. Suggest the following language: "Climate change and land degradation can exacerbate and contribute to challenges to those with already precarious livelihoods..." [United States of America]
7040	3	26	3	27	It would be useful to provide percentage values for the share of emissions from ruminant livestock and rice cultivation respectively. Percentage values are provided in all the other sentences and it would be useful to know the difference between the two given that agriculture makes up ~ half of all global anthropogenic methane emissions. [United Kingdom (of Great Britain and Northern Ireland)]
168	3	27	3	28	It would be better to move this information from A1.3 to A4.3 where the summary information on AFOLU N ₂ O emissions is provided. [Japan]

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Comment No	From Page	From Line	To Page	To Line	Comment
1634	3	28	3	30	The conclusion of this sentence lacks a time limit. According to the relevant literature (see below), the carbon dioxide emissions from deforestation and peatland degradation in 1997-2006 are about 15% of the world's total. It is also pointed out in this sentence that "Deforestation and peatland degradation contribute about 10-15% to total anthropogenic carbon dioxide (CO2) emissions (medium confidence)", the conclusion of which lacks a time frame. It is suggested to revise the corresponding conclusion by adding the time limit. Ref: Achieving forest carbon information with higher certainty : a five, Environmental Science & Policy, 2010, 13,249-260 [China]
644	3	28	3	30	We suggest to check if this finding is expressed in CO2 emissions or in CO2 equivalent emissions (see footnote 5 of this page SPM-3) and to better reflect if this figure includes also the emissions linked to other land use or land-use changes such as forest degradation, or not. Ideally, in order to be consistent with the report, we suggest to provide both total gross and net amount of emissions all land use and land-use changes included, as provided lines 43-45, page 2-4: "The gross emissions from AFOLU (one third of total global emissions) are more indicative of mitigation potential of reduced deforestation than the global net emissions (13% of total global emissions), which include compensating deforestation and af forestation fluxes (high confidence)". [France]
170	3	28	3	31	It does not seem clear from the current formulation whether or not the "30%" that land has removed is a net figure taking into account the "10-15%" emission through deforestation and peatland degradation. Provided that they are separate, we would suggest adding for clarification, for instance, "other than deforestation and peatland degradation" after "through biophysical processes". Also, we would like to suggest replacing "10 – 15%" with "8 – 10%" in order to be consistent with Chapter5 Page6 Line19. [Japan]
1482	3	29	3	29	How 10-15 % is calculated ? Only deforestation or net balance deforestation - reforestation, or land use change in general? [Belgium]
8630	3	29	3	29	nitrogen fertiisation - does it include nitrogen from dung and urine from ruminant animals ? [New Zealand]
8060	3	30	3	30	Insert "ecosystems" after "land" to read: "land ecosystems removed". All removals on land depend on ecosystem functions. [European Union (EU)]
1486	3	30	3	30	30%: how should policymakers interpret this number? [Belgium]
8746	3	30	3	30	Is this estimate of 30% in line with CO2 capture by ocean in the SROCC report and what remains in the atmosphere? [Chile]
7042	3	30	3	30	In what way does 'land' remove CO2 emissions? It would be more accurate to say that terrestrial ecosystems remove CO2. Also this is 'net', an important clarifier. [United Kingdom (of Great Britain and Northern Ireland)]
1484	3	30	3	31	Land: what is meant? Is it terrestrial ecosystems/sinks? [Belgium]

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5436	3	30	3	31	It would be useful to elaborate further the significance of "land", in the sentence that affirms that "land removed nearly 30% of total anthropogenic CO2 emissions....". How does land remove the emissions? Are these part of the 22% of emissions originated by land use, mentioned before, +other sources 8%? are these extra 30%? is there a specific type of land? is it managed land (that has a anthropogenic effort to counterbalance earlier actions?), or untouched land? this could be an opportunity to highlight undergoing actions to control and remove emissions. [Brazil]
1636	3	30	3	31	Terrestrial CO2 removal is a biogeochemical rather than biogeophysical process. It is suggested that "biogeophysical" be replaced by "biogeochemical". [China]
7676	3	30	3	31	The statement "Globally, for 2008-2017, land removed nearly 30% of total anthropogenic CO2 emissions through biogeophysical processes". Please consider to clarify if the biogeophysical processes are both anthropogenic and/or natural in this case. Maybe also biogeophysical processes should be defined in the glossary. You can also consider if these issues can be dealt with in a new subtopic (A 1.4 bis) that also explain the potential anthropogenic sinks such as re/afforestation, wetland and soil restoration, biochar application, etc. In addition, illustrating the global/regional carbon budget might be relevant. [Norway]
1838	3	30	3	31	Suggestion: replace the phrase 'Globally,...(medium confidence)' with 'Globally, for 2008-2017, land removed the amount of nearly 30% of total anthropogenic CO2 emissions through biogeophysical processes (medium confidence)'. This helps to avoid the impression that land physically removes a subset of emitted molecules. [Russian Federation]
8062	3	31	3	31	it should read 'biogeochemical' instead of 'biogeophysical' [European Union (EU)]
648	3	31	3	31	To be better consistent with the findings in the report (line 41 page 2-5 for example), we suggest to use "biophysical and biogeochemical processes". [France]
1562	3	31	3	31	The use of the word "biogeophysical" is not appropriate here and should be changed with "biogeochemical" (see for ex. Ch 1, cross-chapter Box 2) [Italy]
172	3	31	3	31	We would suggest replacing "biogeophysical processes" with "biogeochemical processes", since in the underlying chapter, the 'exchanges of greenhouse gases between the land and the atmosphere' are referred to as 'biogeochemical' interactions in the context of the Box 2.1 in Chapter 2. [Japan]
5066	3	31	3	31	biogeophysical → biogeochemical [Republic of Korea]
1794	3	31	3	33	A1.3. The non-GHG forcers have also global climatic effect, not only regional, e.g. the atmospheric effect of aerosols. Please consider removing the term "regional" from the sentence. [Finland]
646	3	31	3	33	This sentence should be reformulated in order to highlight the importance of land, and to include the impacts on global climate. Please consider the following wording: "In addition, land surfaces play an important role on global climate and regional climates through *biophysical* processes, such as exchanges of moisture, energy and momentum, and by aerosols...". An asterisk could be added to biophysical to highlight the presence of a definition in the glossary. [France]
8064	3	32	3	32	Replace "biophysical" with "biogeophysical", as most of these effects have a mixed origin. [European Union (EU)]
374	3	32	3	34	It should be clear that land is a sink for aerosols as well see work of CLTAP for analysis of wet and dry deposition [Ireland]

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8066	3	35	3	35	Replace "The rate" with "The increase in the rate" to harmonise with the following sentence, which refers to "rate changes". [European Union (EU)]
376	3	35	3	35	Replace 'exploitation' with 'use' [Ireland]
7678	3	35	3	35	Land degradation affects land components, such as soil, forest, water, etc both qualitatively and quantitatively. Thus, it would be policy relevant to illustrate the association between water availability/quality and food security, land degradation and regional stability in this SPM. The IPBES assessment report concluded that nearly 75% of freshwater resources are now devoted to crop or livestock production. Parallel to expansion of dams, irrigation and agricultural intensification, water availability and quality might be affected and the continued competition between different water usages lead to the exploitation of water resources and this has negative socioeconomic and environmental implications, such as down vs. upper streams water users' conflicts (e. g., the case of Nile river), water/soil pollution, infrastructure stability, immigration, etc. [Norway]
4040	3	35	3	35	The word exploitation has a negative connotation in English, along the lines of "misuse" and "abuse." In this sentence, do the authors mean to specify that only the growth of the misuse of land and resources leads to negative results, or that the overall growth in the use of land and resources leads to negative results? [United States of America]
5438	3	35	3	36	how does the exploitation relate to the increase of human population? It would be useful to have clearer sentences that can better contextualize the affirmation. [Brazil]
2446	3	35	3	36	In the underlying report, the OVER-exploitation of land is explicitly mentioned (TS p8 ll. 10-12). We strongly suggest to use this wording, to help the reader assessing the unprecedented global exploitation of land and freshwater. [Germany]
4042	3	35	3	36	Section A2 begins, "The rate and geographic extent of global land and freshwater resource exploitation over recent decades is unprecedented in human history." The term 'exploitation' is overly judgmental and should be replaced with 'use'. As noted in Section A1, land resources provide the basis for human livelihoods, and without the food, feed, fibre, fuel, freshwater and ecosystem services they provide human society, and its economy, could not exist. To term all land and freshwater use as 'exploitation' is pejorative. Sustainable land management still involves land and freshwater use. [United States of America]
650	3	35	3	39	The notion of tipping points* should be added in this part (see glossary page 1-53 and lines 6-10 page 4-70). [France]
652	3	35	3	39	Please consider reflecting that these findings are highly variable in space. See lines 21-22 page 3-3, lines 39-46 page 4-57. [France]

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2448	3	35	3	40	Please consider improving the headline statement A2 with clearer statements from the TS: "Climate change exacerbates the rate and magnitude of several ongoing land degradation processes and introduces new degradation patterns (high confidence)." from (TS P22 L40-41) and specific information on the drivers of degradation from "Land use changes and unsustainable land management are direct human causes of land degradation (very high confidence), with agriculture being a dominant sector driving degradation (very high confidence). Soil loss from conventionally tilled land exceeds the rate of soil formation by >2 orders of magnitude (medium confidence). Land degradation affects humans in multiple ways, interacting with social, political, cultural and economic aspects, including markets, technology, inequality and demographic change (very high confidence). Land degradation impacts extend beyond the land surface itself, affecting marine and freshwater systems, as well as people and ecosystems far away from the local sites of degradation (very high confidence)." (TS P22 L31-38) [Germany]
7984	3	35	3	40	The bold text would improve if some numbers would be added, i.e. the 72% in A2.1 or the complete 1st sentence of A2.1. [Netherlands]
7044	3	35	3	40	I would suggest deleting the phrase "area and rate" for clarity, and inserting the phrase ", health and wellbeing" after "increasingly affects the livelihoods" in order to highlight the impact of food insecurity on health. [United Kingdom (of Great Britain and Northern Ireland)]
4044	3	35	3	40	A2 focuses on current and past processes. Citation of 4.5 does not make sense given that this section focuses on projections. [United States of America]
4046	3	35	3	40	KEY ISSUE [ALIGNMENT/ACTION]: The key message of A2 does not seem to reflect the underlying report chapters. In the Technical Summary and elsewhere in the report, the roles of human-driven activities and land use and land change are highlighted as key drivers that contribute to the multiple challenges discussed in the report. Here, the key message should reflect the underlying chapters and emphasize the roles of human-driven activities. [United States of America]
8780	3	35	3	40	This key finding is very important, however, is not related to climate change that is the main issue of the report in its relation to GHG and land. I am imaging that this should be changed to communicate how the human impact on land degradation exacerbates the climate change impacts and climate feedback to land changes and degradation. This is well documented in the report. In fact, I would expect something like the final idea in A2.3 "Climate change and land degradation act as threat multipliers for already precarious livelihoods (very high confidence), leaving them highly sensitive to extreme climatic events, with consequences such as poverty and food insecurity (high confidence)" as key finding. [Venezuela]
610	3	36	3	36	Not clear what is meant by "These area". We need to improve the flow and linkage of information [United Republic of Tanzania]
4050	3	36	3	36	This should read 'very high confidence' that resource exploitation is unprecedented in human history. [United States of America]
4052	3	36	3	36	"rate and area changes" consider an alternative "This expansion and acceleration of exploitation ..." [United States of America]

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5440	3	36	3	39	the sentence emphasize the loss and degradation that affect the livelihoods, but ignores that some of the changes were made to actually increase well being. The issues and problems need to be highlighted, however, it is important to understand the objectives of change - that often have a concern related to solve and issue, being it food or better environment, as primary objectives, and not an intention of destruction. the later is a consequence, due to priority or to ignorance, that needs to be solved. So, highlighting only the destructive part weakens the idea that humanity has as well an ingenuity and a capability to make good decision to solve its issues - need just to consider carefully further consequences, having a more sustainable set of principles in mind. [Brazil]
8070	3	37	3	37	What has intensified - the use of fertilisers, pesticides to produce more crops, tillage? Suggest adding "intensification" as an entry in the glossary (currently, only "sustainable intensification" is included). [European Union (EU)]
1150	3	37	3	37	The phrase "intensification of land management" is not defined or explained. I think it is intended to mean "increase in intensity of human land-use often with negative consequences" but some may take it to mean "improvement in management practices" to offset negative effects. [Canada]
2450	3	37	3	37	Please change "intensification of land management" either to "unsustainable intensification of land management" or to " poorly implemented intensification of land management" This important differentiation is also used in the TS P23 L45-46. [Germany]
2452	3	37	3	37	This paragraph seems to be inconsistent with the definition of land degradation because it mentions loss of biodiversity and ecosystem services at the same level as land degradation (LD) while according to the glossary P 33 the first two are components of LD. In addition, we suggest to start the para with a general introduction to LD taken from CH1 P14 followed from part of the current text: "Land degradation is driven to a large degree by unsustainable agriculture and forestry, socioeconomic pressures, such as rapid urbanisation and population growth, and unsustainable production practices in combination with climatic factors. The rate and geographic extent of global land and freshwater resource exploitation over recent decades is unprecedented in human history (high confidence). The acceleration of land degradation and desertification increasingly affects the livelihoods of people (high confidence)." [Germany]
4054	3	37	3	37	KEY ISSUE [INTENSITY]: The reference to "intensification of land management" as a driver of environmental damage should be changed to "unsustainable intensification of land management" since intensification of agricultural production can be sustainable (leading to higher yields with fewer inputs and less land expansion and negative externalities) or unsustainable (higher input use and externalities with negligible yield gains). This observation is reflected later in the document, where the authors differentiate sustainable from unsustainable intensification and promote sustainable intensification. For example, in B5.3, line 38, note that only "Poorly implemented intensification of land management contributes to land degradation." And, in the green pathway scenarios (e.g., page 22), "Increased food production is assumed to be achieved through sustainable intensification rather than through application of additional external inputs such as mineral fertilizers and other agrochemicals." In the box on page 27: "SSP1 has the lowest agricultural land expansion and is characterised by low population growth, sustainable land management, achieving land degradation neutrality targets, sustainable intensification, ..." [United States of America]

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7680	3	37	3	40	Intensification of agriculture and adaptation of high input technologies such as insecticides, herbicides, fertilizers and modified crop cultivates might affect apiculture and pollination dynamics. Pollination ecosystem services are also most likely to be affected by human and natural factors such as land degradation, desertification, climate change, pollution, etc. Please consider to include this relevant issue in the final report of the SPM. [Norway]
378	3	38	3	38	Is food production an ecosystem service in this report? [Ireland]
2892	3	38	3	39	Suggest including a reference for the statement that there has been an "acceleration of ... desertification". Need to show evidence that there has been a [global] 'acceleration' of desertification. Figure SPM 1d is not clear in showing an acceleration of desertification. [Australia]
8072	3	39	3	39	It could be specified that this is a negative effect, i.e. "negatively affects" [European Union (EU)]
7046	3	39	3	39	The final sentence of the headline A2 message should state the fact that these changes affect not only the livelihoods but also the health and wellbeing of people. [United Kingdom (of Great Britain and Northern Ireland)]
4056	3	39	3	39	Suggest to add at the end of the sentence "that increasingly affects the livelihoods of people, particularly the most vulnerable people and social groups." [United States of America]
8032	3	1	4	29	General Comment: Sections A1 & A2 - scene-setting and introduction Most of sections A1 and A2 is not specific to climate change. The introductory sections should have more focus on how this report adds value in the climate-land nexus (in the context of other reports by IPBES, UNCCD etc). Suggestions: * focus the first sections more on the most policy-relevant, high confidence findings from the report: such as B3.3, B3.4, the fact that agriculture can contribute up to 4 GtCO ₂ e to global mitigation (in B4.1), the benefits of early action (D2.1) and the finding that impacts seem to be greatly reduced (and resilience increased) in the more sustainable socioeconomic pathways (Figure SPM 2 & elsewhere). * identify high-level synergies and common messages with the recent IPBES Global Assessment where appropriate. For example, key message D8 of the IPBES GA SPM states that protection and restoration of ecosystems and other nature-based solutions with safeguards can make a significant contribution to the overall mitigation effort. [European Union (EU)]
8656	3	1	4	29	The key messages of the first two sections could be made stronger by including more of the implications and the 'impacts of the impacts', as currently is reads as very dry. Eg, what does 'degradation' really mean - is it a time limit on future harvests, a permanent loss of fertility or life-supporting capacity? Is biodiversity loss going to be 'permanent'? Would it take 10,000-plus years to restore lost soil carbon? In other words, it would be good to answer the policy makers' question in relation to all of these facts, which is - 'So what?' [New Zealand]
2438	3	16	4	11	It would be useful to join the information on the food in one para. Please join the information on under/overweight in A1.2 with the information on per cap food calories in A2.1 [Germany]
5068	3	35	4	10	ditto. At least A2. should mention climate change. [Republic of Korea]

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8068	3	35	4	29	General comment, section A2. As per previous comments, this section needs to be linked more explicitly to climate change. The concept of climate change as a threat multiplier (in lines 28-29, which is also the first time the report mentions climate change at all) could be brought to the front of the section thereby becoming a framing concept for the section's discussion of degradation related to climate change. [European Union (EU)]
1146	3	35	4	29	Section A2 discusses historical land use change, and land degradation, and increased human pressure. For balance and to set in context possible future land management mitigation options, it could also include some information on positive policy actions on land management already instituted by Parties to the UNFCCC. For example chapter 1 assesses the climate and ecological benefits of protected areas, such as those which have been put in place across a range of biomes 'The management of protected areas that reduce deforestation also plays an important role in climate change mitigation and adaptation while delivering numerous ecosystem services and sustainable development benefits' (1.4.2.1). Such policies are in part responsible for the stabilization of LUC emissions discussed in Chapter 2, and have led to reduced LUC emissions, land degradation and ecosystem impacts compared to those which would have occurred with no such policies. The re-growth of mid-latitude forest has also contributed to a reduction in LUC emissions, and could also be included in this section. [Canada]
4048	3	35	4	29	KEY ISSUE [INTENSITY]: Section A2 states that "The rate and geographic extent of global land and freshwater resource exploitation over recent decades is unprecedented in human history (high confidence). These area and rate changes together with the intensification of land management have led to the loss of biodiversity and ecosystem services and the acceleration of land degradation and desertification that increasingly affects the livelihoods of people." The section fails to acknowledge the role increasing yields (e.g., a 350% increase in cereal crop yields since 1960) have played in minimizing the amount of land needed to meet the world's demand for food, fuel, feed, and fibre produced by the land. Yes, land intensification can have adverse impacts leading to land degradation; however, land can be intensified sustainably (e.g., Figure SPM4 on page 27 discusses sustainable intensification in SSP1, and Section 5.6.6.4 Sustainable Intensification), and increases in yields enable global demands to be met without further extensification converting ever expanding unused land area into used land area. [United States of America]
1148	3	30	5	43	Water quality issues and implications on human health is important to capture here. Increased incidence of water-borne illness associated with drought and extreme precipitation events. E.g., leptospirosis, cholera, schistosomiasis, blue-green algae blooms, [Canada]
530	3	1	10	6	The opening of the report is important, however, this is very long and contains material that is not related to climate change. Consider shortening to provide key context including referring to SR1.5 and text in Paris Agreement that is relevant for this report. [Ireland]
532	3	1	10	6	A high level table with framing information on key land uses, associated emissions and removals as well as trends could reduce the need for text here. [Ireland]
534	3	1	10	6	A box on key concepts used in the report e.g. key pillars and land neutrality and sources for these would be useful [Ireland]
3970	3	1	10	8	It's unclear why there is not mention of biofuels here and only in the mitigation. This is important since the feedback to land-climate could be strong (and not just in terms of the mitigation strategies). [United States of America]

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56	3	24	11		On page 3, the sentence states "Around 22% of total anthropogenic GHG emissions arise from agriculture, forestry and other land use (AFOLU)." On page 11, the sentence states "An estimated 24% of total anthropogenic greenhouse gas emissions (2003-2012) derive from land use." It would be beneficial to align the two numbers. [Denmark]
3972	3	1	14	21	Section A does not accurately describe the extent and severity of land degradation and its major causes in the United States. Three major causes of land degradation in the U.S. that are not adequately depicted and summarized follow: 1) Extended (and warmer) wildfire seasons, during which communities have experienced unanticipated burning and destruction of towns and cities on the urban-wildland boundary; 2) Overdraft of groundwater aquifers in agricultural regions of the semi-arid western U.S., leading to land subsidence and soil degradation of many kinds; 3) Subsidence (sinking; in addition to erosion) of coastal wetlands and urbanized land near coastlines, putting local communities at greater risk from sea level rise. [United States of America]
3974	3	1	14	25	This section goes back and forth between broad generalizations and regionally specific inferences. The geographic relevance is critical, because something that may be a global trend is not necessarily an issue in some locations. A table that addresses this could be helpful. [United States of America]
1732	3		14		This section fails to highlight the effects on the Arabian Peninsula that have already been reported in the underlying report (chapter 3). Please add: The frequency and intensity of dust storms are increasing due to land use and land cover changes and climate-related factors (2.5) particularly in some regions of the world such as the Arabian Peninsula (high confidence). (from chapter 3, (3.5.2.3) Impacts on Human Health through Dust Storms) [Saudi Arabia]
1734	3		14		This section fails to highlight the effects on the Arabian Peninsula that have already been reported in the underlying report (chapter 3). Please add: On the Arabian Peninsula and in North Africa, climate change is projected to have substantial and complex effects on oasis areas. To illustrate, by the 2050s, the oases in southern Tunisia are expected to be affected by hydrological and thermal changes, with an average temperature increase of 2.7°C, a 29% decrease in precipitation and a 14% increase in evapotranspiration rate. In Morocco, declining aquifer recharge is expected to impact the water supply of the Figuig oasis as well as for the Draa Valley. Saudi Arabia is expected to experience a 1.8–4.1°C increase in temperatures by 2050, which is forecast to raise agricultural water demand by 5-15% in order to maintain the level of production equal to that in 2011. The increase of temperatures and variable pattern of rainfall over the central, north and south-western regions of Saudi Arabia may pose challenges for sustainable water resource management. Moreover, future climate scenarios are expected to increase the frequency of floods and flash floods, such as in the coastal areas along the central parts of the Red Sea and the south-southwestern areas of Saudi Arabia. (from Chapter 3, 3.8.4. Oases in Hyper-arid Areas in the Arabian Peninsula and Northern Africa) [Saudi Arabia]

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1736	3		14		This section fails to to highlight the effects on the Arabian Peninsula that have already been reported in the underlying report (chapter 3). Please add: Water supply is likely to become even scarcer for oasis agriculture under changing climate in the future than it is today, and viable solutions are difficult to find. While some authors stress the possibility to use desalinated water for irrigation, the economics of such options, especially given the high evapotranspiration rates in the Arabian Peninsula and North Africa, are debatable. Many oases are located far from water sources that are suitable for desalination, adding further to feasibility constraints. Most authors therefore stress the need to limit water use, e.g. by raising irrigation efficiency, reducing agricultural areas or imposing water use restrictions, and to carefully monitor desertification. Whether adoption of crops with low water demand, such as sorghum can be a viable option for some oases remains to be seen, but given their relatively low profit margins compared to currently grown oasis crops, there are reasons to doubt the economic feasibility of such proposals. While it is currently unclear, to what extent oasis agriculture can be maintained in hot locations of the region, cooler sites offer potential for shifting towards new species and cultivars. Especially for tree crops, which have particular climatic needs across seasons. Resilient options can be identified, but procedures to match tree species and cultivars with site climate need to be improved to facilitate effective adaptation. There is high confidence that many oases of North Africa and the Arabian Peninsula are vulnerable to climate change. While the impacts of recent climate change are difficult to separate from the consequences of other change processes, it is likely that water resources have already declined in many places and the suitability of the local climate for many crops, especially perennial crops, has already decreased. This decline of water resources and thermal suitability of oasis locations for traditional crops is very likely to continue throughout the 21st century. In the coming years, the people living in oasis regions across the world will face challenges due to increasing impacts of global environmental change. Hence, efforts to increase their adaptive capacity to climate change can facilitate the sustainable development of oasis regions globally. This will concern particularly addressing the trade-offs between environmental restoration and agricultural livelihoods. Ultimately, sustainability in oasis regions will depend on policies integrating the provision of ecosystem services and social and human welfare needs. (from Chapter 3, 3.8.4. Oases in Hyper-arid Areas in the Arabian Peninsula and Northern Africa) [Saudi Arabia]
2424	3	1	20	24	While land based mitigation options are a crucial part of all stabilization pathways, and key to 1.5/2C-pathways, they are neither a substitute for mitigation in other sectors nor a viable stand-alone option. Please include in the Framing Section A and in Section B (adaptation and mitigation responses) clear language that indicates that to fulfil the goals set out in the Paris Agreement, all sectors must undergo a rapid transition towards GHG-neutrality. You may consider using the language that was in the FOD of the SPM on p.13 B1.4 "Land has an essential role to play in mitigating and adapting to climate change but improved land management is not sufficient by itself. Without rapid reductions in anthropogenic GHG emissions across all sectors, altered management practices in cropland, pastures and managed forests are insufficient to achieve the long-term temperature goal in the Paris Agreement (high confidence)." [Germany]
5060	3	6	31	5	always add "." at the end of each paragraph [Republic of Korea]
1738	3		31		The SPM does not report on any of the literature covering the Arabian Peninsula/West Asia, although the region is referenced repeatedly in chapter 3. Several other regions are mentioned in the SPM but the Arabian Peninsula/West Asia is not. [Saudi Arabia]

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5426	3	8			Include words "...addition to many other material and non-material ecosystem services..." [Brazil]
2888	3	18			Suggest this sentence might be more impactful and have better flow without this additional detail (involving iron deficiency specifically). [Australia]
2440	3	18			This statement informs about the issues of undernourishment, overweight, and iron deficiency. It would be much clearer to contrast either over- with underweight or over- with undernourishment. Also, please remove the reference to iron deficiency. This specific nutrition deficiency seems out of context and distracts from the main finding (undernourishment/obesity), and is probably not the sole nutrition deficiency. [Germany]
8058	3	28			add 'mainly': mainly due to nitrogen fertilization. [European Union (EU)]
8074	4	1	4	1	Humans affect 100 %: higher CO2, deposition, changing temperature/precipitation. Please consider a refinement e.g. "human use DIRECTLY affects". If accepted, it should be implemented also in Fig SPM1 [European Union (EU)]
654	4	1	4	1	The precise figure "72 % (likely 69-76 %)" cannot be found in the report. To improve consistency with the report, we suggest to repeat the sentence "By 2015, about three-quarters of the global ice-free land surface was affected by human use (line 14-15 page 1-1). [France]
442	4	1	4	1	Replace "human use" with more standard wording [Ireland]
7048	4	1	4	1	Is it possible to be more precise regarding "human use" - presumably, through climate change, we are affecting to some extent all of the land surface? Does this mean direct human use? [United Kingdom (of Great Britain and Northern Ireland)]
4058	4	1	4	1	What does "human use" mean in this context? By many accounts, human activity affects 100% of the Earth's surface (e.g., through nitrogen deposition). Do the authors here intend "land cover" here rather than "human use?" [United States of America]
8076	4	1	4	2	Please find ways to make these statements about the extent of human influence on the natural world more policy relevant. E.g. humans use 25-33% of primary production. Do we know how this compares to a 'safe limit'? or how much this has increased in the past decades? Or whether there are any efficiency trends (i.e. do we at least obtain more useful goods & services per % of primary production than in the past?) [European Union (EU)]
382	4	1	4	3	Does this sentence mean management by humans? Otherwise improve the clarity of meaning. [Ireland]
1686	4	1	4	11	In paragraph A2. the topics of food quality and changes in nutrient composition of food could also be mentioned (5.2.4.) because it is in connection with the loss of biodiversity and ecosystem services as well. [Hungary]
384	4	1	4	11	A simple table could replace much of this text. This would increase accessibility. [Ireland]
7052	4	1	4	11	In order to make this paragraph more concise, the elements not directly related to land use could be deleted. For example, the sentences "Since the early 1960s... more than doubling." and could be deleted, and "At the same time, global average... of total food produced." could be moved into B4 or B4.3 where it would be more relevant. [United Kingdom (of Great Britain and Northern Ireland)]
8782	4	1	4	11	This finding has no relation to climate change. [Venezuela]
8078	4	1	4	12	The largest factor is not mentioned; the large increase in human population leading to increased demand of land resources [European Union (EU)]

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7050	4	1	4	29	The paragraphs in A2 are extremely long - please consider shortening/splitting to improve readability. [United Kingdom (of Great Britain and Northern Ireland)]
656	4	2	4	2	Please consider adding "feed" after "food" [France]
2454	4	2	4	2	Please explain "potential NPP" for the non-expert audience of the SPM. [Germany]
1396	4	2	4	2	The concept of "terrestrial potential net primary production" could be part of a definition box that we suggested. [Luxembourg]
7054	4	2	4	2	Please explain net primary production (again, glossary or footnote might work). [United Kingdom (of Great Britain and Northern Ireland)]
1568	4	2	4	3	The statement that human use is affecting one quarter to one third of NPP is unclear and could mislead policy makers to think that there is still margin to a full use of NPP, while it is well known that the exploitation of natural resources has largely crossed the sustainability limits. We therefore suggest to provide more context to the statement or otherwise to remove it. [Italy]
174	4	3	4	3	It might be true that the area based estimations of wood-producing forest have some uncertainty and the confidence is judged as "medium". However, wood harvesting volume itself have been covered by FAOSTAT and so the fact of increasing of harvesting volume at the global level is relatively easy to pursue. It is questionable to judge the fact of "wood harvest has increased by about one third since 1970 as "medium confidence". [Japan]
8748	4	3	4	4	There is good evidence for increased drought projections in Chile as well: Bozkurt et al 2018, Boisier et al 2018, Rojas et al 2019. 7. Boisier, J.P., Alvarez-Garretón, C., Cordero, R.R., Damiani, A., Gallardo, L., Garreaud, R.D., Lambert, F., Ramallo, C., Rojas, M. and Rondanelli, R., 2018. Anthropogenic drying in central-southern Chile evidenced by long-term observations and climate model simulations. Elem Sci Anth, 6(1), p.74. , 8. Bozkurt, D., M. Rojas, J.P. Boisier and J. Valdivieso, 2018: Projected hydroclimate changes over Andean basins in central Chile from downscaled CMIP5 models under the low and high emission scenarios. Climatic Change, 150:131-147, DOI: 10.1007/s10584-018-2246-7, 5. Rojas, M., F. Lambert, J. Ramirez-Villegas, and A. Challinor, 2019: 21st century emergence of robust precipitation changes across crop production areas, PNAS, www.pnas.org/cgi/doi/10.1073/pnas.1811463116 [Chile]
1638	4	3	4	4	The conclusion that "Wood harvest has increased by about one third since 1970 (medium confidence)" in the SPM, which is not supported by the underlying report, is suggested to be checked and modified. [China]
7682	4	3	4	4	"Wood harvest has increased by about one third since 1970 (medium confidence), with more than two-thirds of the global forest area under human use". What is included in these numbers for wood harvest? Volume or area? Does wood harvest include timber from both managed forest and from deforestation? [Norway]
4060	4	3	4	4	How does harvest compare with both the extensification and intensification of forest management? Maybe harvest is in line with increased forests, maybe it's declined with deforestation? [United States of America]
7684	4	3	4	11	Please consider updating with the number from the IPBES assessment report, stating "45% increase in raw timber production since 1970 (4 billion cubic meters in 2017)". [Norway]
1840	4	3	4	11	The time period is unclear: is it since early 1960s to presents with respect to all changes mentioned? It should be clarified. [Russian Federation]

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5444	4	4	4	6	IF the report wants to evaluate health, it should be done completely (and not just on specific issues, that could show partiality...). Regarding the sentence in question, it would be interesting to mention as well how life expectancy has changed, what is the affordability of food, such as meat, changed in that period of time, etc. [Brazil]
2456	4	4	4	6	We appreciate the information on the supply of global per capita food calories. However, we kindly request the authors to clarify that there is a significant overconsumption of food of about 20% calories as depicted in panel f of Figure TS.10 and reported in chapter 1: "Globally, overconsumption was found to waste 9-10% of food brought." (Ch. 1 p. 33 ll.31-32). Reducing overconsumption is a multiple win-win option, e.g. reducing emission, avoiding food-related health burdens, freeing land and improving food security as found in the underlying report ("changing consumer behaviour to reduce per capita overconsumption offers substantial potential to improve food security by avoiding related health burdens and reduce emissions with extra food. (5.5.2.5. p. 80 ll.26-29)"). We encourage the authors to put overconsumption into context of the global food system and emphasize the reduction of overconsumption as one of the no-regret response options. The issue of overconsumption might be also relevant to the statement A1.2 of the numbers of overweight or obese adults. We suggest to merge these information into one statement. [Germany]
2458	4	4	4	6	The time series of meat calories consumed and the prevalence of overweight increase seems to be quite parallel over the last decades (c.f. SPM.1 Panel B), which is also reflected in the increase of daily food supply (c.f. TS.10 Panel f). We are wondering, if the increase of food consumption relates to the nearly doubling of the prevalence of population, who are overweight or obese (c.f. TS.10 Panel g) and kindly ask the authors to discuss such dependence in the SPM as reported in table 6.74 ("overnutrition contributes to worse health outcomes, including diabetes and obesity") and chapter 5 ("overconsumption also can lead to severe health conditions such as obesity or diabetes", Ch. 5, p. 80 ll. 45-46). This could be done here or in A1.2 by simply adding reasons for obesity and overweight. It might be also helpful to combine this discussion in one statement. Our text suggestion for a inclusion here would be: "Since the early 1960s, the supply of global per capita food calories increased by one third to about 2800 kilocalories, which is about 20% higher than the calories required for medium physical activity, with per capita consumption of vegetable oils and meat more than doubling (high confidence). This overconsumption of food in particular of meat, fat and sugar can lead to severe health conditions such as obesity or diabetes, by which a few hundred million people were affected in the last decades." [Germany]
446	4	5	4	11	This point is quite complex and could be better expressed in a table [Ireland]
1564	4	5	4	11	Are all the percentages and amount increase of fertilizer, irrigated croplands and food waste referred to early 1960s? If this is the case, then the sentence can be left as it is, otherwise clarification should be provided. [Italy]
2460	4	6	4	7	Inorganic nitrogen fertiliser use "increased by nearly nine-fold globally" is inconsistent with the underlying chapter. In the Technical Summary of CH5 it is said it increased by 800%. [Germany]
1334	4	6	4	9	"fresh-water use": As it is a controversial topic, is it possible to add "water uses" in the glossary, and to explain if in this report it encompasses the water taken from rivers or groundwater, or if it is water actually evapotranspired (never given back to a river or groundwater)? Then water-use could be followed by * to show that it is defined in the glossary. [France]

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7686	4	6	4	9	Please consider to relate the application of inorganic inputs and its effect on land and water quality. Moreover, please consider to describe the current and future challenge of water demand for both domestic and irrigation and water competition, for instance a study has shown that urban water demand will increase by 80% by 2050 (Flörke et al. 2018, https://www.nature.com/articles/s41893-017-0006-8) [Norway]
1398	4	6	4	11	These sentences speak of a increase in inorganic fertilizer use and of food waste, but it would be important to specify over which time period this has happened [Luxembourg]
8080	4	7	4	7	It is unclear what period the "nine-fold" increase is referring to. Previous sentences have different base years. [European Union (EU)]
658	4	7	4	8	Please check if the expression "volume of the world's irrigated cropland" is correct. Isn't it "the area of the world's irrigated cropland and the volume of irrigated crops roughly doubled"? Additionally, some grasslands are also irrigated (French Pyrenees or Rhone valley for instance), how are they taken into account if not neglected? [France]
7056	4	7	4	8	Please state if the increase in frequency and intensity of heavy precipitation events refers to an increase globally or in specific regions as per the other extreme event examples in this statement. [United Kingdom (of Great Britain and Northern Ireland)]
4062	4	7	4	8	KEY ISSUE [LAND-COMPETITION]: This is important. Later in the report, there is a discussion on the tension between ag for food versus ag for fuel. It should probably be given a mention here as land and water resources are in direct conflict with each other for land use. [United States of America]
444	4	7	4	9	Reword to make link between volume and irrigation clearer. [Ireland]
8082	4	8	4	8	"volume" should be deleted (cannot apply to land) or a reference to water (used? abstracted?) should be inserted. [European Union (EU)]
5446	4	8	4	8	informing that the irrigated area has doubled does not inform the actual impact. What is the % of area irrigated, related to the total of productive area? how much is that considering the total of land surface? this 70% (a number that has been repeated in several publications, without much more detail, however), comes from which source? how much of this water actually contributes to the needed water intake of population? How is the water management done in such areas? How much the irrigated areas are undergoing rain reduction and water insecurity due to climate change? [Brazil]
662	4	8	4	8	To be sure : irrigated land and not equipped for irrigation ? [France]
660	4	8	4	9	We suggest to improve consistency with the report by repeating the sentence "Irrigation is responsible for 70% of ground- or surface-water withdrawals by humans" (line 29 page 1-9) and to indicate a level of "high confidence" instead of "medium confidence" as there are many references. [France]
612	4	9	4	9	What is meant by Food Waste? [United Republic of Tanzania]
5594	4	9	4	11	Time reference, is it since the early 1960s [Algeria]
5070	4	11	4	11	SPM Fig. 1 → Figure SPM 1 [Republic of Korea]
1400	4	12	4	12	The concept of "degradation" could be part of a definition box that we suggested. [Luxembourg]
7690	4	12	4	12	Please consider to add a footnote explaining whether "seasonal / temporal" ice-cover land use is included in the "Earth's ice-free land area". [Norway]

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7062	4	12	4	12	It would be helpful to separate the issues of land degradation and desertification here, as the reader will not be clear how the two are linked. After making the changes to A2.2 relating to attribution and causes in the comment above, it might be helpful to start a new paragraph, [United Kingdom (of Great Britain and Northern Ireland)]
4064	4	12	4	12	KEY ISSUE [TERMS]: Define degradation here. This term may not be broadly understood. [United States of America]
5072	4	12	4	18	These sentences need to add reference periods of the results. [Republic of Korea]
7060	4	12	4	19	At no point in this SPM is there a statement attributing land degradation to anthropogenic (and also separating into climate or other causes) or non-anthropogenic factors. This was specified in the scope of the report and is imperative for understanding its causes which are also not well explained. Given that the underlying report states that "In this report, land degradation is defined as a negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity or value to humans.", A2.2 could state that "About a quarter of the Earth's ice-free land is subject to degradation, entirely as a result of direct and indirect human activities such as land use changes, unsustainable land management and anthropogenic climate change, affecting about 3.2 billion people in multiple complex ways" (with the 3.2 billion people statistic taken from underlying chapter 4.4.1, and the other examples of causes being taken from line 12 page 4 of underlying chapter 4.1). This statement should then be elevated into the headline A2 statement as it is a key message of the report (How much land has degraded? is of similar importance in this report as, for example, how much has the planet warmed?). This also makes the link between land degradation and climate change front and centre It would then be helpful to start a new paragraph to talk about desertification separately, as the reader may not know how the two are linked. This could start with the definition of desertification found at the beginning of chapter 3 - "Desertification is land degradation in arid, semi-arid, and dry sub-humid areas, collectively known as drylands, resulting from many factors, including human activities and climatic variations." before then stating "In 2015, about 500 million people lived within areas undergoing desertification; an increase of approximately 300% since 1961." as already stated in A2.2. The sentence "Soil loss from conventionally.... two orders of magnitude." is less relevant here and could be deleted. [United Kingdom (of Great Britain and Northern Ireland)]
1640	4	12	4	20	As concluded in A2 of lines 35-40 on page 3, this paragraph should include descriptions of groups and regions that are particularly vulnerable to desertification and land degradation. However, when referring to land desertification in arid areas in Chapter 3 and land degradation in non-arid areas in Chapter 4, it gives a textual description of only "vulnerability to land degradation" with no relevant description of areas of particular vulnerability to desertification. In order to enhance the comprehensiveness of the reported conclusion, it is suggested to supplement the relevant elements. [China]
2462	4	12	4	20	8-14% biodiversity loss compared to what reference period? Also, biodiversity loss sits somewhat squarely between two statements on degradation. It's not clear whether biodiversity loss is considered equivalent to or part of degradation here? On the last sentence, is the increase of 300% due to population growth in the same area, or due to increasing areas being desertified? This should be specified to avoid misinterpretation. [Germany]

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7688	4	12	4	20	Please consider to support this with numbers that show the proportion of land area that is subjected to degradation out of the total size of the ice-free land area (130 Mkm ²). Since human use affects 72% (69-76%) of the global, ice-free land surface (130 Mkm ²), ice-free land area subjected to degradation is therefore about three quarter (3/4) assuming land degradation and human use are interrelated. Please consider to refer to the IPBES assessment report, which shows "75%: terrestrial environment "severely altered" to date by human actions". [Norway]
7058	4	12	4	20	Is the information in here on degradation and biodiversity loss consistent with that in the IPBES report? Please check. Very important that the two are aligned with each other on the basic facts regarding biodiversity [United Kingdom (of Great Britain and Northern Ireland)]
4066	4	12	4	20	KEY ISSUE [TERMS]: The SPM needs to include definitions of both degradation and desertification, especially given the multiple meanings of degradation and the recent increase in recognition of how much degradation contributes to GHG emissions. [United States of America]
8784	4	12	4	20	This finding has no t relation to climate change. [Venezuela]
2464	4	13	4	13	Please rephrase "Global terrestrial biodiversity loss based on species richness": it leads to a misunderstanding that species richness is leading to biodiversity loss. [Germany]
386	4	13	4	13	Replace "Species Richness" with more standard wording, perhaps diversity? [Ireland]
7064	4	13	4	13	Concepts like species richness should be explained - perhaps a footnote or small glossary (such as in SR1.5?) [United Kingdom (of Great Britain and Northern Ireland)]
7066	4	13	4	13	The meaning of the phrase 'global terrestrial biodiversity loss based on species richness' is unclear. This should be changed to "Biodiversity losses from past global land-use change have been estimated to be about 8–14%" as stated in page 11 of underlying chapter 1.2.2.3. [United Kingdom (of Great Britain and Northern Ireland)]
8084	4	13	4	14	It is unclear what time period or status the loss is compared to, or what period "past land-use change" refers to. In the absence of that, the text suggests this to be the total loss since prehistoric times, which does not seem realistic. [European Union (EU)]
1642	4	13	4	14	Lines 21-22 of ES 1.1 on page 1 of Chapter 1 of the underlying report indicate that "Land use caused global biodiversity to decrease by around 11–14% (medium confidence)", while line 44 on page 11 to line 1 on page 12 of Chapter 1 indicate that "Biodiversity losses from past global land-use change have been estimated to be about 8–14%...". The two data of 11–14% and 8–14% represented respectively give an inconsistent conclusion. Lines 13-14 on page 4 of the SPM further indicate that "Global terrestrial biodiversity loss based on species richness has been estimated to be around 8-14%". It is suggested that the accuracy of the above three data be checked and revised. [China]

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1060	4	13	4	14	<p>We suggest to precise the time period for which this statement is valid and to be better consistent with the latest IPBES Global Assessment report (may 2019), which doesn't frame their findings in the same way but, instead of a global statement, divides the numbers regionally. If the SRCL uses another wording, this could sound like a new finding on global terrestrial species loss. At least, it could be difficult to prove that both IPBES GAR and IPCC SRCL are consistent.</p> <p>For a new formulation, we propose to use the following elements, quoted from the SPM of the IPBES GAR:</p> <p>- page 4 "B1. For terrestrial and freshwater ecosystems, land-use change has had the largest relative negative impact on nature since 1970, followed by the direct exploitation, in particular overexploitation, of animals, plants and other organisms mainly via harvesting, logging, hunting and fishing. In marine ecosystems, direct exploitation of organisms (mainly fishing) has had the largest relative impact, followed by land/sea-use change."</p> <p>- page 16 "10. Today, humans extract more from the Earth and produce more waste than ever before (well established). Globally, land-use change is the direct driver with the largest relative impact on terrestrial and freshwater ecosystems, while direct exploitation of fish and seafood has the largest relative impact in the oceans (well established) (Figure SPM.2) {2.2.6.2}. Climate change, pollution and invasive alien species have had a lower relative impact to date but are accelerating (established but incomplete) {2.2.6.2, 3.2, 4.2}."</p> <p>See also the figure page 12 of the SPM of IPBES GAR. [France]</p>
7068	4	13	4	14	<p>Species richness is only one narrow aspect of biodiversity which includes variation at levels of genes, species and ecosystems. Are these figures consistent with IPBES assessments? Please check as it is important that the two reports are consistent. [United Kingdom (of Great Britain and Northern Ireland)]</p>
7070	4	13	4	14	<p>What's the time frame for this change? [United Kingdom (of Great Britain and Northern Ireland)]</p>
388	4	14	4	14	<p>Unclear whether "past land use change" refers to since the industrial revolution or a different time period. Provide specific time reference. [Ireland]</p>
5596	4	14	4	15	<p>People living in dry lands are highly vulnerable to land degradation and biodiversity through desertification. This needs to be stated in this subsection. [Algeria]</p>
664	4	14	4	15	<p>We suggest to improve consistency with the report by better reflecting that it is global warming that exacerbates land degradation on these ecosystems, as explained lines 21-34 page 4-4.</p> <p>Please consider the following wording: "Climate change exacerbates the rate and magnitude of several ongoing land degradation processes and introduces new degradation patterns (high confidence), particularly in low-lying coastal areas, river deltas and permafrost areas (high confidence). The majority of affected people are living in poverty in developing countries (medium confidence). [France]</p>
5448	4	14	4	16	<p>what is the amount of people living in the mentioned areas (coastal, deltas, permafrost...). Probably the two sentences should be separated, as they are not necessarily correlated. [Brazil]</p>
562	4	14	4	16	<p>Vulnerability to land degradation is also particularly high in arid, semi-arid and desert areas. Please include them along with the low-lying coastal areas, river deltas. [India]</p>
7072	4	14	4	16	<p>This is a slightly confusing sentence. Do you mean that low-lying coastal areas etc are inherently more vulnerable to land degradation? Or do you mean that the poor people living in these areas are more affected by land degradation? Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]</p>

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4068	4	14	4	16	The examples of vulnerable areas seem to focus on areas vulnerable to climate change, not land degradation in general. If this is the intention, it would be better to include more general examples. If the intention is to highlight areas vulnerable to climate change-related land degradation, suggest amending the sentence to begin "Vulnerability to CLIMATE-RELATED land degradation..." [United States of America]
1490	4	14	4	19	Aren't area's undergoing desertification also vulnerable as are river areas and permafrost areas? [Belgium]
8086	4	16	4	16	Grammatical issue regarding "the majority of people living in poverty". The sentence appears to suggest that the majority of people in permafrost areas live in poverty. The intended meaning is probably that vulnerability to degradation is greatest for those people living in poverty in these areas . Please clarify. [European Union (EU)]
2894	4	16	4	17	Suggest including soil loss from land clearing and conventionally tilled land vs soil formation would provide a more appropriate comparison. [Australia]
666	4	16	4	17	To improve the accuracy of this sentence, we suggest to repeat the sentence from the report (lines 18-20 page 4-45) : "Erosion rates of conventionally tilled agricultural fields is estimated to exceed the rate at which soil is generated by one to two orders of magnitude (medium confidence)". Please consider that "Soil loss" is rather unclear [France]
2896	4	16	4	18	Suggest clarification for non-scientists. Can you say "more than 100 times" instead of "more than two orders of magnitude" in the following sentence? "Soil loss from conventionally tilled land is estimated to exceed the rate of soil formation by more than two orders of magnitude (medium confidence)." [Australia]
4070	4	16	4	18	There should be some acknowledgement that the rate of soil formation, or pedogenesis, occurs on the order of centuries to thousands of years. The important point to make is that for what takes hundreds or thousands of years (except in APi, or plowed soil horizons, where this occurs on the order of decades) tillage is a hockey-stick like change to soil structure. [United States of America]
1492	4	17	4	17	Two orders of magnitude: not easily understandable by policy makers [Belgium]
2466	4	17	4	18	Please rephrase "Soil loss from conventionally tilled land is estimated to exceed the rate of soil formation by more than two orders of magnitude (medium confidence)." to explain in the sentence, if this a global statement, independent of climate zone, etc. and if the rate of soil formation is related to tilled land or all land worldwide. Furthermore, please add information about how new soil is formed. [Germany]
668	4	18	4	19	Please check the consistency of this sentence and its level of confidence with the findings of the report, in particular with the following : "While less than 10% of drylands is undergoing desertification, it is occurring in areas that contain around 20% of dryland population (Klein Goldewijk et a., 2017). In these areas the population has increased from ~172 million in 1950 to over 630 million today." (lines 4-6 page 3-9) [France]
8660	4	18	4	19	Should this low confidence statement be included in the SPM? [New Zealand]
7692	4	18	4	19	Please consider adding more information on the currently cover of drylands (46.2%) of the global land area and total population (3 billion) indirectly / directly influenced by desertification. This could perhaps be relevant to illustrate in an independent paragraph that illustrates indicators and rate of desertification and socioeconomic and environmental implications. Moreover, this might be illustrated in association with extent of salt affected soils/land, water and air pollution and consequences on human health and rate of mortality, e. g., 402 000 people yr-1 (Ref. TS.3 L.22-36). [Norway]

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7074	4	18	4	19	This statement is, as currently written, too weak to be included in an SPM (notwithstanding the low confidence). It requires further clarification as at the moment it is unclear what the circumstances surrounding the situation are and there could be a number of explanations as to why they are living in an area undergoing desertification (e.g. have they moved there? Is it due to climate change? Is it the result of human causes other than climate change?) Either this should be strengthened to include a high or medium confidence statement with more clarity, or it should be removed. [United Kingdom (of Great Britain and Northern Ireland)]
7076	4	18	4	19	"In 2015, about 500 (+/- 120) million people" The error bars on this statistic here are enormous - can anything be done to reduce this? Also, the % increase is then given without error bars, which is inconsistent. [United Kingdom (of Great Britain and Northern Ireland)]
4072	4	18	4	19	Does the assignment of low confidence apply to both findings in this sentence? [United States of America]
4074	4	18	4	20	KEY ISSUE [ALIGNMENT/ACTION]: The estimate of the population trend since 1961 in areas undergoing desertification does not appear to be traceable to the underlying report. It should be deleted or revised to more clearly correspond to the underlying report. [United States of America]
8088	4	19	4	19	To what extent is the 300% increase cited is due to population growth or expanding desertification? Bearing in mind that the global population has increased by this order of magnitude over the same period, what is notable about this statistic? [European Union (EU)]
16	4	19	4	20	These fluxes particularly refer to emissions from land use and management (e.g. Forest Land and woody Grassland). Suggest to be very specific in referring to these fluxes to correct the understanding that these fluxes exclude emissions from livestock management, rice cultivation, and agricultural soils. Suggest to write " These fluxes from land use management are affected simultaneously by natural and human drivers" [Philippines]
5598	4	20	4	20	State the impact of desertification on the biodiversity loss. [Algeria]
5074	4	20	4	20	SPM Fig. 1 → Figure SPM 1 [Republic of Korea]
452	4	20	4	21	This point on adaptive capacity is a key message and should be included in A.3 [Ireland]
4076	4	21	4	21	"Technological development" should not be classified here as a driver of negative outcomes since, as is discussed later, technological change can have positive impacts and is a key element in successful pathways – for example as described on page 8, "Pathways with ... higher rates of technological change result in lower risks of water scarcity in drylands, land degradation, and food insecurity." [United States of America]
7700	4	21	4	22	Please consider to use another term for "technological development", since technological development may as well be positive for the environment, eg. cleaning technology. A better way could be to link this finding to industrial and energy production which quite often demand water, examples are coal and nuclear power station, onshore oil and gas production and industries. [Norway]

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8090	4	21	4	25	<p>The sentence is partly recursive and should be significantly clarified and simplified.</p> <ul style="list-style-type: none"> - It seems trivial that "drivers of land-use change" "amplify" land use change, such as "conversion of natural ecosystems". The intended argument seems to be that socio-economic drivers of land use change also create other problems. - It is not clear why "technological development" is listed as the number one driver, or whether it has even been a major driver of LUC in recent times. Most land-use changes follow old patterns (expansion of food production, expansion of settlements, etc.) and are mostly driven by quantitative changes (population growth and consumption patterns), and not by qualitative changes in technology. Technology may increase LUC (e.g., where new mineral extraction methods allow exploration in areas where it would not have been feasible), but it may also reduce land requirements (e.g., when higher yields reduce the area needed to meet food demand). - insert "services" after "ecosystem" to read "multiple ecosystem services" - "rapid urbanisation" should be changed to "rapid loss of productive land to urbanisation", to emphasize that the main concern here is the encroachment of urban areas and infrastructure on biologically active land. The loss of productive land and soil sealing (which is often irreversible within policy-relevant time-frames) should be given due recognition in the SPM. "Urbanisation" includes qualitative changes to settlements that seem to be of lesser concern here and may even have positive effect (e.g., replacing single-story houses with highrises can reduce the need for land for housing). [European Union (EU)]
2900	4	21	4	25	Suggest rephrasing this sentence. It is very long and the focus is unclear. [Australia]
1760	4	21	4	25	Long and difficult sentence. [Denmark]
670	4	21	4	25	<p>The general sense that socio-economic drivers can amplify existing environmental and societal challenges is policy-relevant and should be kept. However the first part of this sentence is unclear (particularly the expression "demand for multiple ecosystem") and greatly needs improvement.</p> <p>We suggest to consider clearer and simpler alternative wording while some of the findings of the report should be better reflected, in particular:</p> <ul style="list-style-type: none"> - the importance of changes in consumption patterns as a driver of land degradation (see lines 15-17 page 4-46 and Cross-Chapter Box 1 page 1-21 ("Trends in consumption, for example, diets, waste reduction, are also fundamental in affecting land use change") and the key messages of IPBES Global Assessment report.) - the importance of poorly managed land management intensification as a driver of land degradation (see lines 22-24 page 4-5) - the importance of the long-term loss of natural vegetation as a process linked to land degradation (see lines 36-37 page 4-9). [France]
7696	4	21	4	25	This is a long sentence. Please consider to split up for improved readability. Also, please consider to explain or rephrase "per capita demand for multiple ecosystem". It is somewhat unclear what this means. [Norway]
4078	4	21	4	25	Since the drivers listed do not necessarily always amplify environmental and societal challenges, suggest that the sentence begin: "IF POORLY MANAGED, ..." It is also worth considering including more specific information about how the listed drivers can amplify environmental and societal challenges. For example, technological development also has the ability to minimize or reduce these challenges. [United States of America]

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8878	4	21	4	29	Would it be possible to make a distinction between "primary" and "secondary" drivers of land-use change? [Liechtenstein]
7694	4	21	4	29	Please consider mentioning additional drivers like political instability, lack of well-organized institutions, lack of good governance and mismanagement of natural resources, policy gaps and land competition for different uses, etc. Currently, regional / local conflicts are challenging ecosystem services and socioeconomic stabilities. [Norway]
7698	4	21	4	29	Throughout the SPM, cities and urbanization is described as a problem. However, cities can also play an important role in land management. Good planning of land use, infrastructure and housing can reduce pressure on land. Please consider to add also the potential positive effects of urbanization for the topics relevant to this report and the need for good urban planning / land-use planning in this regard. We suggest a more balanced perspective on cities and urbanisation in A 2.3, but there are probably several chapters in which this can be included. [Norway]
8802	4	21	4	29	Would it be possible to make a distinction between "primary" and "secondary" drivers of land-use change? [Switzerland]
4080	4	21	4	29	KEY ISSUE [LAND-COMPETITION]: The examples of drivers here could be much stronger. Examples that could (probably should) be included: land tenure systems, capacity of local governance institutions including traditional authorities, competition among different institutions within and outside of governments, concentration of power in some institutions (e.g., wealthy businesses) rather than others (e.g. indigenous communities), availability of finance for land managers including smallholders. Factors currently listed – technological development, increasing per capita demand, and even population growth – would all be much more manageable in the absence of these other factors that determine how land is used and managed. [United States of America]
2902	4	22	4	22	Suggest clarification: "... demand for multiple ecosystem can amplify ..." is a word missing? Suggest it read "... demand for multiple ecosystem services can amplify ..."? [Australia]
2470	4	22	4	22	It should read: "...demand for multiple ecosystem services can...", reasoning: "demand for ecosystems" would not make sense. [Germany]
1566	4	22	4	22	We suggest to change " ecosystem" with "ecosystems" [Italy]
176	4	22	4	22	"multiple ecosystem" in section A2.3 seems to correctly be "multiple ecosystem services" (we can see this information in chapter 1, page 1-1, line 33-37). This difference changes the meaning of the text. [Japan]
8596	4	22	4	22	Uncertain about what is meant by 'ecosystem' -- should the sentence be demand for ecosystem services? [New Zealand]
8632	4	22	4	22	presume 'ecosystem' means 'ecosystem services' [New Zealand]
7078	4	22	4	22	"increasing per capita demand for multiple ecosystem" - what does this mean? [United Kingdom (of Great Britain and Northern Ireland)]
4082	4	22	4	22	missing the word "services" after "multiple ecosystem" [United States of America]
4084	4	22	4	22	"...per capita demand for multiple ecosystem can amplify..." is incomplete and unclear [United States of America]
2472	4	23	4	23	For better understanding please replace "challenges, including" by "challenges. These include" [Germany]

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78	4	23	4	23	Consider deleting or reformulating the words "conversion of natural ecosystems into managed lands", as in many cases land management has more benefits than no management (assuming that management implies consideration of sustainability criteria; otherwise it wouldn't be management), in terms of maintaining the potential of the land to fulfil, now and in the future, relevant ecological, economic and social functions, and thus achieve the objectives of climate change mitigation and adaptation. [Spain]
7080	4	24	4	25	Is rapid urbanisation inherently an environmental and societal challenge? Clearly it can be, but is it always? Feels somewhat out of place as an example alongside obvious problems such as pollution. Please consider whether it is necessary to include this [United Kingdom (of Great Britain and Northern Ireland)]
2474	4	25	4	25	Please change "intensification of land management" to "UNSUSTAINABLE intensification of land management". [Germany]
4086	4	25	4	25	KEY ISSUE [INTENSITY]: "Intensification of land management" should be changed to "Unsustainable intensification of land management" since it is only unsustainable intensification that is problematic. In fact, sustainable intensification is an important element in a successful pathway, as noted in the box on page 27: "SSP1 has the lowest agricultural land expansion and is characterised by low population growth, sustainable land management, achieving land degradation neutrality targets, sustainable intensification..." [United States of America]
4088	4	26	4	26	At the end of the sentence, consider to add "for already precarious livelihoods and vulnerable populations." [United States of America]
4090	4	26	4	26	The reference to threat multipliers for livelihoods is an odd phrasing. Suggest rephrasing this. [United States of America]
8092	4	26	4	27	Unclear how "very high confidence" (rather than merely "high confidence") is justified. [European Union (EU)]
8094	4	26	4	29	Recommend turning the sentence around to make it more inclusive and broader: "Climate change and land degradation act as threat multipliers with consequences such as deepening and accelerating poverty and food security, in particular for precarious livelihoods which are already highly sensitive to weather extremes." [European Union (EU)]
2476	4	26	4	29	We request to clarify the statement of the last part of the sentence "[...] with consequences such as poverty and food insecurity (high confidence)." The impact on food security is still rather uncertain. The studies cited in the underlying chapter 5 did not include CO2 fertilization, which should be clarified. We also request the authors to flag that increase in income due to changed prices (with positive income effect with higher prices) is not considered. In addition, it should be clarified that price elasticities, estimated based on expenditure and not on physical calorie basis, likely overestimate physical demand elasticity. [Germany]
448	4	26	4	29	The point on threat multipliers is a key point and should be drawn into A.2 in bold [Ireland]
7702	4	26	4	29	We see the finding related to climate change and land degradation as a threat multiplier as a very important finding, and suggest that you consider to this finding in the bold text in A 2. The term precarious livelihoods does not seem very clear to us and is not defined in the glossary. hence we propose that you consider another language eg. building on the multiple stress concept, including water and air pollution. [Norway]
178	4	28	4	28	Please modify "1.43" to "1.4.3". [Japan]
7704	4	28	4	28	Please consider to add water scarcity after "poverty". [Norway]

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5076	4	29	4	29	SPM Fig. 2 → Figure SPM 2 [Republic of Korea]
7988	4	30	4	30	Bold text would improve if " faster" is quantified, i.e more than 1.5 times faster [Netherlands]
8096	4	30	4	31	This is one of the key message,and should be highlighted more prominently (e.g. mention the 1.41°C vs 0.87°C warming mentioned fig SPM1-F also in the bold part of section A3) [European Union (EU)]
2904	4	30	4	31	Suggest clarification: "The globally averaged land surface air temperature has risen faster than the global mean surface temperature..." *faster*? Meaning greater rate of change? Or a greater magnitude? Or both? [Australia]
672	4	30	4	31	We suggest to mention here the figure 1.52°C (range 1.39-1.66°C) in order to better highlight this very policy relevant and well documented information. [France]
1402	4	30	4	31	In order to make the message more concrete would prefer to say "land surface temperature has risen nearly twice as fast than the global mean..." [Luxembourg]
7084	4	30	4	31	The message within the first sentence of A3 is quite obscure due to the use of highly scientific terms It is also unclear as to whether this difference is because of the land/ocean difference, or the surface temperature / surface-air temperature difference. This could be resolved by prefacing the statement with a more simplified statement such as that from SR1.5 - "Warming is generally higher over land than over the ocean." or the text from the executive summary from chapter 1 "Warming over land has occurred at a faster rate than the global mean" and then using the exact text from the underlying report "It is certain that globally averaged land surface air temperature (LSAT) has risen faster than the global mean surface temperature (i.e., combined LSAT and sea surface temperature) from preindustrial (1850–1900) to present day (1999–2018)." [United Kingdom (of Great Britain and Northern Ireland)]
4092	4	30	4	31	This statement appears to require a confidence statement. [United States of America]
5600	4	30	4	34	Forest fires in increased warming have a significant consequence on land degradation. It should be stated. [Algeria]
1496	4	30	4	34	What means impacts on permafrost degradation or landdegradation ? [Belgium]
4094	4	30	4	34	It would be more clear if this section points out that temperatures over land are increasing faster than those over water. Saying X is larger than the mean of X and Y isn't overly clear unless one does the algebra. [United States of America]
1152	4	30	4	35	Recommend 'near-surface air temperature over land' rather than 'land surface air temperature'. The temperature concerned is measured in the air at 2m height, whereas 'land surface air temperature' sounds as though this property is measured at the land surface. [Canada]
180	4	30	4	39	It may be better to use the consistent terminologies for the global mean surface temperature (GMST) and for the land surface air temperature (LSAT) in section A3.1 of SPM, SPM Figure 1 (F) of SPM, in Executive summary in chapter 2, and section 2.3.1 in chapter.2. [Japan]
80	4	30	4	40	An explanation of the reason behind the difference between the land surface air temperature value and the global mean surface temperature value (in relation to land based parameters, such as vegetation cover) would be helpful for policy makers. [Spain]
4098	4	32	4	32	"Impacts are already observed" should perhaps be "Impacts have already been observed" – that is, it has already happened. [United States of America]

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674	4	32	4	33	Climate change impacts are already observed for terrestrial biodiversity which has implications for land based challenges and this dimension is missing from this statement Observed impacts of climate change on plant and animal terrestrial species are mentioned in Chapter 2 and they need to be mentioned in this statement. ("In a warming climate, many species will be unable to track their climate niche as it moves, especially those in extensive flat landscapes with low dispersal capacity and in the tropics whose thermal optimum is already near current temperature" 2.2.4 (19-21)) We suggest to rephrase it as : "Impacts are already observed on natural terrestrial ecosystems, plant and animal species, permafrost degradation, desertification, land degradation and food security." [France]
4100	4	32	4	33	This statement appears to require a confidence statement. [United States of America]
1154	4	33	4	34	Suggest phrasing the last sentence about extreme events in terms of both observed and projected changes, consistent with supporting para A.3.2. For some extreme events (eg. heavy rainfall), there is not yet high confidence in observed changes but there is high confidence in future changes with additional warming. [Canada]
7088	4	34	4	34	The final statement of A3 should read "The frequency and intensity of some extreme events has also increased and are projected to increase further" to fully reflect the underlying statements. [United Kingdom (of Great Britain and Northern Ireland)]
454	4	34	4	36	This point on food security is a key message and should be included in A.3 [Ireland]
1502	4	35	4	35	add 'globally averaged' before land surface air temperature. [Belgium]
8880	4	35	4	35	Write: "...extensive dataset, the average land surface air temperature ..." [Liechtenstein]
1404	4	35	4	35	Please make sure that the way temperature changes in this sentence and in the rest of the report are fully in line with those from the Special Report of Global Warming of 1.5°C. In particular it should use the same method, the same datasets and the same reference period. [Luxembourg]
7706	4	35	4	35	The purpose of A3.1 seems to describe observed temperature increase over land. However, it can be confusing with two different numbers; 1,52 on line 36 and 1,41 on line 39. Please consider to choose one number to present. [Norway]
8804	4	35	4	35	Write: "...extensive dataset, the average land surface air temperature ..." [Switzerland]
450	4	35	4	37	The global mean increase referred to (0.86) is not consistent with the one degree referred to in the SR on 1.5' [Ireland]
8098	4	35	4	40	An important paragraph, but it needs a simpler message. How does this compare with the temperature findings of the recent 1.5C report. Better to lead with the finding that multiple lines of evidence place the LSAT increase at 1.4°C, with the most extensive single-source suggesting >1.5°C compared to pre-industrial. Readers can refer to the Technical Summary or underlying report for detailed information on datasets. Maybe a statement on the temperature rise over the ocean and in high latitudes and high altitudes could be added to complement the information provided. [European Union (EU)]

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2482	4	35	4	40	Please provide information in a way similar to the SR1.5 which referred to different time periods in its Section A1.1. In addition, what is "the spread in the datasets' median estimate" and how does it compare to the "likely ranges" that are normally provided by the IPCC? It is very important that the IPCC does not provide confusing information on the global temperature increase to the general public. Please modify. [Germany]
182	4	35	4	40	In section A3.1, it is referred that global mean increase of air temperature is "0.86°C". However, in the referenced figure (SPM Fig.1 (F), in page SPM 11), the global mean warming of the same period is expressed as "0.87°C". In addition, we could not find the text explanation about the increased temperature of GMST of "0.86 or 0.87" about Figure 2.2 (the source of SPM Fig.1 (F)) in section 2.3.1 of chapter 2. Japan suggests 1) using the consistent value for the increase of GMST between in A3.1 and in SPM Fig.1 (F) and 2) including additional explanation of this GMST value in section 2.3.1 of chapter 2 in order to allow us to find the background information of the referred values in the SPM. [Japan]
4890	4	35	4	40	It is not clear what added value the provision of both the "single" dataset based finding and the later period covered by the four datasets. It would seem to be clearer to focus on one period on the SPM level. (A 0.1 degree difference would seem to be comparable to uncertainty related to choice of reference period.) Also, it is confusing to cite a very likely range for the one and coin the other "spread in the datasets' median estimates for the other. The results should be as easily comparable as possible, if multiple findings are quoted. [Sweden]
7090	4	35	4	40	Are there projections for GMLST? It might be useful to see how this is projected to increase under 1.5°C, 2°C scenarios (compared to 3°C or 4°C). [United Kingdom (of Great Britain and Northern Ireland)]
7092	4	35	4	40	There are many different numbers given in this paragraph without any explicit explanation of why it's important to include them all. For example, is it better to use the single dataset that has the longest record, or is it better to use a number derived from multiple datasets? Is the difference in temperature from having a longer temperature record important? For an SPM, it would better to give one. [United Kingdom (of Great Britain and Northern Ireland)]
7094	4	35	4	40	It would be helpful to include a value for the global mean warming between 1880-1900 v 1999-2018 to compare the 1.41C value with - figure SPM1 seems to give this as 0.87C (though the reference period is one year different - this should be harmonised is possible. [United Kingdom (of Great Britain and Northern Ireland)]
2484	4	37	4	37	Please replace "global mean increase" by "global mean surface temperature increase" (see A 3) [Germany]
390	4	37	4	37	Text on shifting of climate zones and impacts on land-use Chapter 2: page 3 lines 23-26 could be better reflected here. [Ireland]
7096	4	37	4	37	The global mean increase given in this report is different from the one in the SR1.5 and this opens up risks of misinterpretation or misunderstanding. We assume that the slightly lower estimate is due to the longer time period over which it is averaged (1999-2018 vs 2006-2015 in SR1.5), however, it's too easy for readers to wrongly assume that the global mean increase has been lowered as a result of including the most recent year. It would be helpful to explain the different from the SR1.5 value in a footnote. [United Kingdom (of Great Britain and Northern Ireland)]
1494	4	37	4	40	Overlap with previous sentence: could be deleted [Belgium]
4102	4	37	4	40	Could include the global mean increase of 0.87°C here since it is reported in Figure SPM1 E. In the text the date range is "1880-1900" while in Figure SPM1 E the date range is "1881-1900". [United States of America]

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8882	4	38	4	38	Write: "...extensive dataset, the average land surface air temperature ..." [Liechtenstein]
8806	4	38	4	38	Write: "...extensive dataset, the average land surface air temperature ..." [Switzerland]
184	4	39	4	39	Please check "1880-1900". (Table 2.1 says "1881-1900".) [Japan]
8884	4	40	4	40	It would be informative to add that the increase in temperature will be uneven across the different regions / countries [Liechtenstein]
5078	4	40	4	40	SPM Fig. 1 → Figure SPM 1 [Republic of Korea]
8808	4	40	4	40	It would be informative to add that the increase in temperature will be uneven across the different regions / countries [Switzerland]
4104	4	41	4	41	Typo. Should read "The frequency and intensity of some extreme events have increased..." Subject-verb disagreement. [United States of America]
392	4	41	4	42	Can "some" be explained or quantified? Is this same as Page 5 line 7 to 8 [Ireland]
4106	4	41	4	42	"some extreme events" and "level of warming" are vague. Could be a bit more specific here as to what type of events. Is this referring to the specific events listed in the text below? What level of warming? [United States of America]
7082	4	30	5	40	Section A3 as a whole mixes up observed and projected impacts from climate change. It might make more sense to separate these out so that some of the points deal only with observed impacts and others only with projected impacts as currently it's a bit difficult to follow the narrative. [United Kingdom (of Great Britain and Northern Ireland)]
1644	4	30	5	43	Desertification, which is mentioned as a conclusion in line 33 in the bold A3 on page 4, is not mentioned in subsequent A3.1-3.6 to support the bold text in A3. In order to increase the structural justification of the report, it is suggested to supplement the relevant elements. Lines 36-37 on page 4 state that "...was 1.52°C (very likely range: 1.39°C to 1.66°C)...". The expression of confidence on temperature in this sentence (very likely range: 1.39°C to 1.66°C) does not meet the requirements of IPCC for the preparation of a report. It is suggested that the "very likely range" be revised as an appropriate IPCC confidence level as required by IPCC in this connection. [China]
2478	4	30	5	43	In this section A3, some effects are reported both for observations and projections, while for others, only one of the two is given. It's confusing to the reader and leaves open questions: if only one of the two is given, does this mean the other is not affected, or that we don't have sufficient data to say something? e.g. in A3.4 (p5 ln7-8) it is not clear why heavy precipitation events are only mentioned for observations, not projections? For consistency, and because it is important to know where knowledge gaps and uncertainties lie, we would like to encourage the authors to keep a consistent format. From the headline statement of this section, one would expect to find only observations not projections in A3. This should be adjusted in order to be consistent with the content that follows. [Germany]
2480	4	30	5	43	Please add a new sub paragraph to section A3 providing the important information "Important knowledge gaps remain in understanding how plants, habitats and ecosystems are affected by the cumulative and interacting impacts of several stressors, including potential new stressors resulting from large-scale implementation of negative emission technologies." (TS P28 L14-179) [Germany]

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Comment No	From Page	From Line	To Page	To Line	Comment
7086	4	30	5	43	There is a significant mix of observed impacts and projected impacts here. It would be useful to separate these such that all observed impacts are contained within A3, and all projected impacts, such as lines 3-6 of A3.2 and lines 30-32 of A3.5 are instead contained within A6, where other projected impacts are also found. The remainder of A3 (which should then only contain observed impacts) should then be moved and inserted between the current A5 and A6 - such that section A flows more coherently with the section concerning how land influences the climate coming before the impacts of that climate change (first observed, then projected). [United Kingdom (of Great Britain and Northern Ireland)]
4096	4	30	5	43	A more quantitative picture of land-climate feedbacks is suggested. For example, the SPM does not mention how the land energy budget via changes in latent and sensible heat are affected by land use and land cover. [United States of America]
7708	4	35	5	8	Please consider to include the arctic region here, since the temperature is rising faster in the Arctic than any other region. The sentence could read "The globally averaged land surface air temperature has risen faster than the global mean surface temperature (GMST) from pre-industrial (1850-1900) to the present day (1999-2018), particularly in the Arctic region. [Norway]
676	4	39	5	8	The current wording of the paragraph is confusing because it mixes elements of a very different nature. Deficiencies and incorrect reference to a section of the report are also to be reported. We suggest that the paragraph be improved as follows: - reorganize the presentation of findings by clearly distinguishing between observations, projections, temperature-related impacts and precipitation-related impacts; - supplement the elements relating to the decrease in productivity with elements relating to the decrease in production services (food, wood, fiber); - replace reference 2.2.5, which does not exist, with reference 2.3.5. [France]
5344	4	41	5	8	There is a mention of the regions where an increase in droughts is projected, but could the authors also include mentions of the specific regions for which there is "high confidence in observed drought increases" (i.e. the Mediterranean and West Africa, as mentioned in the ES of Chapter 7) [Gambia]
4108	4	41	5	8	There seems to be a logical disconnect between Sections A3.2 and A3.5. In A3.5 the impact of increasing extremes is considered to be known with high confidence, here these extremes themselves are generally thought to be increasing with medium confidence. Section A3.2 probably understates the confidence in many cases. For example, the science around increasing precipitation extremes, both modeled and observed, is quite strong (high confidence). The impact of increased heat within droughts is also quite well established. [United States of America]
8100	4	41	5	43	Key messages 3.2-3.6 are all qualitative and leave the reader uninformed and unimpressed on the issues. Consider using well chosen quantitative results. In particular for A3.2, these messages are quite general, similar to those from SR1.5 and do not specify the links to land conditions. Better to bring more specific or tailored messages from the underlying report. e.g. This statement from Ch2 could be a headline Changes in land conditions modulate the likelihood, intensity and duration of many extreme events including heat waves (high confidence) and heavy precipitation events (medium confidence). The paragraph could then elaborate with more specific examples from Ch 2, 4 & 5. [European Union (EU)]

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4110	4	42	5	3	Specify for which (or all as the case may be) scenarios this projected increase holds true. [United States of America]
8730	4	1	31	4	Carbon losses or enhancements in soils and biomass provides a key link between mitigation and adaptation actions which can be used to assess effectiveness of these actions in these areas and this cross-over warrants consideration in the SPM [Ireland]
5442	4	2			Include words "production for food. FIBRE, FRESHWATER, and" [Brazil]
2468	4	18			Please include the issue of water depletion at the end of the sentence on soil degradation. After "... magnitude (medium confidence)" it would read as follows ", and over-extraction of water is leading to groundwater depletion (high confidence)." (This proposed additional information is extracted from CH3 P3 L14-15). [Germany]
2898	4	19			Suggest clarification. Is the = 300% increase from more people or more desertification? [Australia]
5450	4	22			Include word "...for multiple ecosystem SERVICES can amplify..." [Brazil]
5452	4	33			Include word (concept). "and food and WATER security" [Brazil]
5454	4	33			Reference associated to Water security and climate change. R. Betts, L. Alfieri, C. Bradshaw, J. Caesar, L. Feyen, P. Friedlingstein, L. Gohar, A. Koutroulis, K. Lewis, C. Morfopoulos, L. Papadimitriou, K. Richardson, I. Tsanis and K. Wyser. Changes in climate extremes, fresh water availability and vulnerability to food insecurity projected at 1.5°C and 2°C global warming with a higher-resolution global climate model. Phil. Trans. R. Soc. A 376: 20160452. http://dx.doi.org/10.1098/rsta.2016.0452 [Brazil]
1764	5	44	4	44	Comma missing. Agriculture, forestry [Denmark]
8886	5	1	5	1	What is predominantly observed, higher frequency or increased intensity? [Liechtenstein]
8810	5	1	5	1	What is predominantly observed, higher frequency or increased intensity? [Switzerland]
5456	5	1	5	2	Sentence modified "...due to anthropogenic warming and are projected to increase in frequency, intensity and duration in most land regions." [Brazil]
5602	5	1	5	4	How about North Africa. [Algeria]
4112	5	1	5	8	Please consider adding, "when a drought occurs, increased temperatures are likely to exacerbate the impact of precipitation deficits (medium confidence)". [United States of America]
82	5	3	5	3	Consider adding "duration" (related to probabilistic criteria or absolute values), in addition to "frequency" and "intensity", as it could be the most relevant feature regarding droughts and the severity of its impacts. [Spain]
2908	5	3	5	4	Suggest consideration to include Australia in the following sentence: "The frequency and intensity of drought is projected to increase in the Mediterranean region, central Europe, the southern Amazon and southern Africa (medium confidence)." [Australia]

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8776	5	3	5	4	There is good evidence for increased drought projections in Chile as well: Bozkurt et al 2018, Boisier et al 2018, Rojas et al 2019. 7. Boisier, J.P., Alvarez-Garretón, C., Cordero, R.R., Damiani, A., Gallardo, L., Garreaud, R.D., Lambert, F., Ramallo, C., Rojas, M. and Rondanelli, R., 2018. Anthropogenic drying in central-southern Chile evidenced by long-term observations and climate model simulations. Elem Sci Anth, 6(1), p.74. , 8. Bozkurt, D., M. Rojas, J.P. Boisier and J. Valdivieso, 2018: Projected hydroclimate changes over Andean basins in central Chile from downscaled CMIP5 models under the low and high emission scenarios. Climatic Change, 150:131-147, DOI: 10.1007/s10584-018-2246-7, 5. Rojas, M., F. Lambert, J. Ramirez-Villegas, and A. Challinor, 2019: 21st century emergence of robust precipitation changes across crop production areas, PNAS, www.pnas.org/cgi/doi/10.1073/pnas.1811463116 [Chile]
1740	5	3	5	4	There is a statement that the frequency and intensity of drought in the Mediterranean region, central Europe, the southern Amazon and southern Africa. But the frequency and intensity of droughts in important regions such as asia, middle east, Arabian Peninsula etc is not covered. It should be included particularly after inclusion of new information and data in the "Final Draft" of chapter 3 . [Saudi Arabia]
7098	5	3	5	7	These are projected impacts and could either be moved into a separate point, or at least organise the paragraph so that observed impacts go first followed by projected impacts. [United Kingdom (of Great Britain and Northern Ireland)]
5458	5	4	5	4	Agriculture, forestry and other land use. Use a comma after Agriculture. [Brazil]
8102	5	4	5	8	The statement suggests that GPP only decreases due to compound extreme events, which is incorrect. Likewise, it is unclear why the focus is exclusively on GPP for compound extreme events. E.g, such events can presumably also result in shocks to the food system as a result of harvest impacts. Consider changing. [European Union (EU)]
5604	5	5	5	6	At what magnitude, please provide quantification, percentage. [Algeria]
5080	5	6	5	6	gross primary productivity → net ecosystem productivity [Republic of Korea]
7100	5	6	5	6	Please explain gross primary production (again, glossary or footnote might work). [United Kingdom (of Great Britain and Northern Ireland)]
5606	5	7	5	8	In which regions? [Algeria]
1158	5	7	5	8	Add information expressing the high confidence in projected changes in extreme rainfall. (Ch 2 ex sum 2-10 line 3-4: Extreme precipitation events over most of the mid-latitude land masses and over wet tropical regions will very likely become more intense and more frequent (IPCC 2013a)). [Canada]
7102	5	7	5	8	Why is there no projection for heavy precipitation events? Is this too uncertain? The previous sentences in the paragraph describe both existing and projected trends. [United Kingdom (of Great Britain and Northern Ireland)]
4114	5	7	5	8	Suggest moving this sentence to follow the first sentence in A3.2, to clarify findings based upon observations versus those for projections. [United States of America]
4116	5	8	5	8	There is no section 2.2.5, should this be 2.3.5? [United States of America]
1160	5	9	5	9	Concept of "vegetation greening" is not well-defined here in terms of what it refers to (percentage land cover? Total biomass? Etc.), and is well-supported in terms of this global claim. Suggest therefore alternative language which is more directly addressing the issue at hand - i.e. "vegetation cover has increased in some areas as a result of enhanced photosynthetic activity, etc....". [Canada]

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4118	5	9	5	9	This statement is incorrect. Vegetation greening is from increased leaf area index and/or NDVI. An increase in photosynthetic capacity can only be detected by measuring GPP or SIF. [United States of America]
7710	5	9	5	10	Please consider to mention the effect on invasive species related to this greening process. See technical summary (p11, line 6-15) which shows that greening trends have increased over the last 2-3 decades by 22-33% in some specific regions. It has shown that rising CO2 levels will favour more rapid expansion of some invasive plant species in some regions (ref. 3.1. Executive Summary). Currently, since colonization of invasive species is one of the major global environmental challenges, therefore we feel that it is relevant to mention this effect also in the SPM. [Norway]
4120	5	9	5	10	Presumably this statement is based on observations? If so it would be good to say so. [United States of America]
4122	5	9	5	10	There should be some discussion on the question of the sustainability of increasing greenness and the possibility of a shift-phase transition. [United States of America]
8106	5	9	5	19	A3.3 (see also general comment above on greening and CO2 fertilisation) The greening trend described in paragraph A3.3 needs to be placed in context. What is the unit of greening? (land area?). How does an overall greening trend relate to the widespread degradation and biodiversity loss described in A2.2? Is the paragraph trying to say that on a planetary scale, greening in non-degraded (high latitude) areas is outweighing browning in degraded/degrading (mid/low latitude) areas? Please clarify. On CO2 fertilisation, the statement is somewhat too positive about the productivity gains from CO2 fertilization. In nutrient dilution effect with consequences for nutritional quality of crops needs to be given more weight. [European Union (EU)]
678	5	9	5	19	This paragraph lacks of clarity and is not fully consistent with the paragraph A.4.5 (SPM page 6), with longer and more detailed explanations on positive impact of climate change on vegetation (vegetation greening, CO2 fertilisation) and far less explanations on the negative impacts of climate change (browning, increase of mortality due to drought or extreme heat, desertification, ...). There also inconsistency with the main report, for example with lines 32-34 pages 2-2 to 2-3. We suggest to refine the wording of this paragraph with the following improvements : <ul style="list-style-type: none"> • to better reflect the negative impacts of climate change on vegetation by reflecting the following findings from the report: lines 21-22 page 2-19 (vegetation browning), section 2.3.5.1 on drought and section 2.3.5.2 on heatwaves and cross-chapter box 3 on forest fires and climate change, pages 2-25 to 2-28; • to provide a definition of “vegetation greening” (possibly by a reference to a definition in the glossary); • alternatively to use wording such as "vegetation greening through enhanced photosynthetic activity 'has been observed' over the last three decades" (the sentence "an increase of vegetation greening" is not true) • to better highlight the importance of soil processes for plant dynamics (in line with section 2.8 pages 2-95 to 2-100), including by providing details about the interactions involving soil nutrients and water availability, and details about which cases the net effect on plant growth is positive or negative; • to add some elements explaining that C and N cycles are highly affected (see Box 2.3 pages 2-46 to 2-48). [France]

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84	5	9	5	19	The issues mentioned in this paragraph are unavoidably linked to other detrimental effects (such as lesser availability of water resources due to higher evapotranspiration, increased respiration rates at higher temperatures, etc.), and therefore its overall effect is likely to be negative (or at least counteracted). This should be explicitly mentioned in this paragraph. [Spain]
7104	5	9	5	19	Can you please explain what greening and browning means? The language of this paragraph could be simplified - 'greening through enhanced photosynthetic activity' is not clear to a layman. You could talk about an increase in the rate of plant growth? [United Kingdom (of Great Britain and Northern Ireland)]
7106	5	9	5	19	https://www.nature.com/articles/s41893-019-0220-7 In addition to the other comment, the other very important finding of this study is that 'human land use has been a dominant driver of global greening', with 6 of the 7 greening 'clusters' seen on satellite data overlapping with intensively cropped areas (including at high latitudes). This seems to contradict some of the paragraph (e.g. on high latitudes). [United Kingdom (of Great Britain and Northern Ireland)]
4124	5	9	5	19	Define vegetation greening and its significance. It is tied to photosynthesis and productivity. These points are missing. [United States of America]
5608	5	10	5	13	In dry land, irrigation is made through ground and non renewable water. Drought in warming climate is exacerbating the demand to use ground water jeopardizing the availability of water for future generation. [Algeria]
7108	5	10	5	13	This states that greening through CO2 fertilisation and land use management has increased over the last three decades. This seems to be in direct contrast to lines 38-43 on the same page, which state that crop yields in lower latitudes are declining, and that food security is being affected in drylands. It's important to ensure that there is consistency throughout the SPM – is it possible to synthesise across these points? [United Kingdom (of Great Britain and Northern Ireland)]
5082	5	11	5	11	including in → including [Republic of Korea]
8110	5	12	5	12	While "co2 fertilization" is well understood by experts, the first time this is introduced in the SPM a more plain language such as "co2 fertilization (due to increased atmospheric CO2 concentration)" would be useful. [European Union (EU)]
394	5	12	5	13	Nitrogen deposition is likely aerosol related. [Ireland]
1406	5	13	5	13	We would like to see "nitrogen deposition" replaced by "nitrogen fertilization" or "nitrogen application" [Luxembourg]
8112	5	13	5	14	These trends are primarily observed- the use of the word modelled may be confusing. Suggest "can be attributed by models" [European Union (EU)]
4892	5	13	5	14	Could provide some quantification of the magnitude of the greening and browning trends, respectively, so as to provide the reader with a better understanding of the issue. [Sweden]
5084	5	13	5	16	There are lots of paper on "Arctic greening", "greening over the high latitude of Northern Hemisphere" with double CO2 condition. It is highly recommended to consider that how to improve "low confidence" to "middle or high confidence" if the sentence is very important in SPM. [Republic of Korea]

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7110	5	13	5	16	Could you please clarify this section. Is it that overall the globe is greening, but that on a regional level high latitudes are greening but mid-lower latitudes are browning? Or is it that mid-lower latitudes are greening, but where browning is occurring this is driven by loss of photosynthetic activity etc? This recent paper (https://www.nature.com/articles/s41893-019-0220-7) says that 30% of the world is greening and 5% is browning (and mid-low latitude countries like China and India play an important role in greening). So presumably it's not that mid-low latitudes are browning as a whole (?). It would be helpful to make this clear. [United Kingdom (of Great Britain and Northern Ireland)]
8786	5	13	5	16	Do you really need a low confidence finding in this section of the SPM? I do not think so. Please delete the finding of greening modelled. [Venezuela]
8658	5	14	5	16	Should this low confidence statement be included in the SPM? [New Zealand]
544	5	16	5	17	The range of percentage increase in plant water use efficiency may be indicated to substantiate the statement. [India]
188	5	16	5	17	Wei et al. (2017; doi:10.1002/2016GL072235) have shown that transpiration fraction is highly influenced by vegetation type and Leaf Area Index (LAI), and we would suggest including this paper also in the reference in the underlying chapter. [Japan]
7112	5	16	5	17	This sentence states that CO2 fertilisation is increasing productivity in drylands, but similarly to lines 10-13 on page 5, this is in direct contrast to lines 38-43 on the same page, which state that crop yields in lower latitudes are declining, and that food security is being affected in drylands. Lines 8-9 on page 8 (point A6.3) also state that desertification and climate change are projected to cause reductions in crop and livestock productivity. It's important to ensure that there is consistency throughout the SPM – could this be synthesised across these points, ensuring the messaging is coherent? [United Kingdom (of Great Britain and Northern Ireland)]
186	5	16	5	18	The main message of SPM A3.3 is different from the sentence in Chapter 4 (p. 4-26, line 1-3). What SPM A3.3 puts emphasis on seems "the net effect is modulated". On the flip side, Chapter 4, "...a driver of land improvement even if the net effect is modulated...", stresses the effect as a driver of land improvement itself. Since this difference may convey inaccurate message to the parties, we suggest that SPM quote the same sentences with each Chapter. [Japan]
4128	5	17	5	17	The WUE change is more like medium confidence. Not sure that the studies showing increased WUE are accounting for uncertainties in leaf canopy, wood 13-C processes, etc. [United States of America]
4894	5	17	5	18	It is rather unclear what the substantive meaning of "The net effect... is modulated by soil nutrients and water availability". Please indicate the substantive significance of this. [Sweden]
7114	5	17	5	18	"The net effect, however, is modulated by soil nutrients..." This sentence needs to use simpler language and include more detail for its meaning (and the paragraph's implications) to be clear to the reader. At the least I suggest clarifying what the net effect actually is: positive or negative? Secondly, I suggest explaining what "modulated by" specifically implies in this context. [United Kingdom (of Great Britain and Northern Ireland)]
7116	5	17	5	18	It is unclear what the implication of the last sentence is. It is also unclear what soil nutrients and water availability modulates. Is it the vegetation productivity or the previously discussed vegetation greening? Overall, this sentence and section could be made clearer. It could be improved by stating what exactly the sentence refers to: i.e. "The net effect on xy, however, is modulated by...". [United Kingdom (of Great Britain and Northern Ireland)]

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4130	5	17	5	18	It would be helpful to clarify whether the net effect is positive, negative, varies in sign, or is unknown depending on soil nutrients and water availability. The statement on page 4-55 "Increases in temperature and changes in precipitation patterns are expected to have impacts on soil quality, including nutrient availability and assimilation (St.Clair and Lynch 2010). Those climate-related changes are expected to have net negative impacts on agricultural productivity, particularly in tropical regions, though the magnitude of impacts depends on the models used." suggests that the net effect is negative, while the statement on page 4-56 "Yet, the interactive effects of soil parameters and climate change on crop yields and food security remain limited, with low evidence of how they play out in different economic and climate settings (e.g. Sundstrom et al. 2014)." suggests that the net effect may yet be unknown. Please clarify. [United States of America]
8114	5	18	5	18	The meaning of "modulated by" should be clarified. [European Union (EU)]
1504	5	18	5	18	we suggest to write "limited" instead of "modulated" [Belgium]
8662	5	20	5	20	"Some biomes' is very weak. Can it say something more like, 'several major geographical areas of the world'? [New Zealand]
2910	5	20	5	21	Suggest clarification: how do we know what the 'adaptive capacity' of biomes are? Or that a biome has 'adaptive capacity'? Organisms, ecosystems, but not clear how we know the adaptive capacity of a biome is. Regarding the statement "Warming has resulted in climate zone shifts, which has exposed some biomes to weather and climate variability, including extreme events, beyond their adaptive capacity ...". [Australia]
1498	5	20	5	21	We suggest to move this sentence to the headline. [Belgium]
1162	5	20	5	21	Proposed edits for clarification purposes: "Warming has resulted in climate zone shifts, which has exposed some ecosystems to new weather (and climate) regimes, including changes in extremes, that have the potential to exceed their ecological resilience." Problems with current text: (1) effects are not uniformly applicable to entire biomes; and weather and climate variability are not new to these biomes. [Canada]
7118	5	20	5	21	Apologies if I've misunderstood the text but it's not clear from the underlying chapter that observed impacts have exceeded some biomes' adaptive capacity. The Executive Summary of chapter 2 states that "Ecosystems in these regions will become increasingly exposed to temperature and rainfall extremes beyond climate regimes they are currently adapted to (high confidence)". If limits to adaptation in some ecosystems have been observed, it would be good for this to be reflected in the underlying chapter; if not, then could lines 20-21 be rephrased to more accurately reflect the underlying text? [United Kingdom (of Great Britain and Northern Ireland)]
1742	5	20	5	24	The projections about warming in semi arid, arid and hyper arid regions should also be included in addition to tropical regions. [Saudi Arabia]

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4132	5	20	5	24	KEY ISSUE [ALIGNMENT/ACTION]: Is there a full biome that is now beyond its adaptive capacity? This first sentence needs to be changed since it does not track with the Executive Summary of Chapter 2. Here is the relevant text from page 2-3, line 23: "Anthropogenic warming has resulted in shifts of climate zones, primarily as an increase in dry climates and decrease of polar climates (high confidence). Ongoing warming is projected to result in new, hot climates in tropical regions and to shift climate zones poleward in the mid- to high latitudes and upward in regions of higher elevation (high confidence). Ecosystems in these regions will become increasingly exposed to temperature and rainfall extremes beyond climate regimes they are currently adapted to (high confidence), which can alter their structure, composition and functioning." Whereas the SPM says that warming has already exposed biomes to weather beyond their adaptive capacity, the text quoted here is referring to projected changes affecting ecosystems to temperatures beyond which they are currently adapted. Even with the projected changes, this does not mean that the full biome would be beyond regimes that they are adapted to. More likely it would be portions of the biome. [United States of America]
5086	5	21	5	21	It states that warming has resulted in climate zone shifts, beyond their adaptive capacity. This means it is impossible to adapt even with adaptation efforts. What is the response option for this case? It is such a strong statement. [Republic of Korea]
7120	5	21	5	21	What is adaptive capacity. How do we know when it has been exceeded? Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
8116	5	21	5	23	A3.4 Surely upward and poleward climate zone shifts are expected in all warming scenarios (not just medium and high emission scenarios). Also, good to provide examples of the biome shifts mentioned. Also, what is the meaning and likely consequence of being exposed to event "beyond their adaptive capacity"? [European Union (EU)]
590	5	22	5	23	Upward shift of climate zone in mountains is not an established fact for most mountain regions; neither it is uniform. In view of this, the 'high' confidence level requires change. [India]
680	5	23	5	23	And even low emission. The sentence should insist on the variation of impacts according to the emission scenario [France]
1796	5	23	5	24	A3.4. New type of climates will be resulted in also e.g. in boreal region since the change in climate variables is unsynchronized, e.g. radiation versus temperature. Please consider a bit more general formulation of this text concerning new climate types. [Finland]
7122	5	23	5	24	It is unclear what is meant by 'new, hot climates' - topical regions are already hot. Does this mean climates that are hotter than any that have so far been observed on the Earth? If so, this should be stated clearly. Also, is it possible to give any indication of timescale? [United Kingdom (of Great Britain and Northern Ireland)]
4134	5	23	5	24	KEY ISSUE [ALIGNMENT/ACTION]: Suggest clarifying by reflecting the language from the underlying report on page 2-18, to read "In tropical regions warming is projected to result in hot climates UNPRECEDENTED IN THE OBSERVATIONAL RECORD (high confidence)." [United States of America]
4136	5	23	5	24	What is meant by "new, hot climates"? [United States of America]
1506	5	24	5	24	clarify ' new hot' [Belgium]
4896	5	24	5	24	The "hot climates" is not clear. Is the intended meaning more akin to "warmer climate", or "hotter climate"? Or is there a clear definition of what is referred to with "hot climate"? [Sweden]

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4138	5	25	5	25	Recommend changing to "Climate change CAN exacerbate land degradation..." What one would expect regardless is a changing biome. This may not necessarily mean degraded. The compounding effects of humans with a changing biome may lead to degradation. [United States of America]
8714	5	25	5	27	higher temperatures may lead to more vegetative growth and more carbon stored in the soil in parts of europe which could combate degradation [Ireland]
4140	5	25	5	27	"Climate change exacerbates land degradation processes through increases in rainfall intensity, flooding, drought frequency and severity, heat stress, wind, sea-level rise and wave action, with outcomes being modulated by land management (high confidence)." This sentence leaves the impression that there is high confidence in increases in flooding, drought frequency, and wind, but that is at odds with the other sections of the SPM and other IPCC reports where there is not high confidence in these changes globally. [United States of America]
4142	5	25	5	30	Pests and diseases moving into new regions with climate change, or having an increased impact due to changing conditions, also affect degradation. This is not reflected in A3.5. [United States of America]
1164	5	26	5	26	Recommend changing "wind" to "extreme winds" or "extreme wind events" [Canada]
190	5	27	5	27	The word of "new regions" in the SPM A3.5 may cause unclarity (about which regions "new regions" represent). We suggest replacing it with "places in which it has not typically been a problem" as noted in Chapter 4 (p. 4-4, line 30-31). [Japan]
7124	5	27	5	27	Suggest an alternative word to "modulated" is used to make it easier for non-native English speakers. [United Kingdom (of Great Britain and Northern Ireland)]
2912	5	27	5	28	Suggest naming the specific 'new regions' referred (even just on continental scale). [Australia]
682	5	27	5	29	Please consider providing details to explain what and where are these new regions. [France]
2486	5	27	5	29	"Coastal erosion is affecting new regions as a result of interacting human drivers and climate change such as sea-level rise (high confidence) and impacts of changing cyclone paths (low confidence)." - Please clarify that "human drivers" refer to non-climate related activities because sea-level rise and changing cyclone paths are also affected by human drivers. [Germany]
7126	5	27	5	29	Land/sea interface may difficult to address fully in a 'land' assessment. This could be removed to reduce length [United Kingdom (of Great Britain and Northern Ireland)]
8664	5	27	5	37	Where 'affecting' is used repeatedly to mean 'damage' or 'negatively impact', can you consider whether a different word, that conveys this, should be used? Eg, is it possible to find an adjective that conveys negative impact, if this is what is actually meant by 'affect'? [New Zealand]
1166	5	28	5	29	Examples are needed in this sentence. It mentions "interacting human drivers" without saying what these are or how they are interacting. Interactions can be found in Chapter 4 "(e.g., expansion of shrimp farms) and rivers (e.g., upstream dams cutting coastal sediment supply), and economic activities causing land subsidence". Suggest a modification like: "Coastal erosion is increasingly widespread as a result of human drivers (e.g., shrimp farming, dams impeding sediment flows, land subsidence) interacting with impacts of climate change, including sea-level rise (high confidence) and changing cyclone paths (low confidence)." Explaining the causes of land subsidence will help reader better understand context. [Canada]
4898	5	29	5	29	Findings on which the confidence level is "low" are not necessarily key for the SPM, except perhaps in the case that they carry a very important policy implication. Please omit or explain the latter. [Sweden]

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1168	5	29	5	30	The statement implies that there has been an observed decrease in areal extent of permafrost but it appears that references to areal extent in the report are for projected changes rather than those that have already occurred. [Canada]
684	5	29	5	30	Please consider the possibility to provide quantified figures about the decrease of the areal extent of permafrost and polar climates. [France]
686	5	30	5	32	We suggest to improve this paragraph by, in addition to yer currently present elements, better reflecting the consequences of permafrost thawing, including the resulting emissions of CO2 and/or CH4 (lines 13-30 page 2-72 and lines 33-33 page 4-51), the resulting soil degradation (lines 24-25 page 4-29), the drought-induced tree mortality (lines 42-44 page 4-42) and the induced collapsing of livelihoods (line 20 page 4-69). [France]
2488	5	30	5	32	The confidence level is missing for the specific statement. [Germany]
4144	5	30	5	32	The last sentence of the paragraph lacks a confidence statement. [United States of America]
4146	5	30	5	33	This statement appears to require a confidence statement. [United States of America]
8118	5	31	5	31	Storms are (and may remain) more relevant than drought in that region. [European Union (EU)]
1170	5	31	5	31	In relation to "increased disturbance in boreal forests", suggest that this be further qualified with the addition of "natural disturbance", given that the increase is in non-anthropogenic impacts as a result of climate change causing drought, increasing pest and disease outbreaks, etc. This does not refer to "human" induced disturbances, so should specify that. [Canada]
7128	5	31	5	31	Is there a simpler, layperson's term for "abiotic"? [United Kingdom (of Great Britain and Northern Ireland)]
1172	5	31	5	32	To improve readability, suggest deleting unnecessary technical language: High-latitude warming is projected to accelerate permafrost thawing and increase disturbance in boreal forests through abiotic agents such as drought and fire, and biotic agents such as pests and disease. [Canada]
1700	5	32	5	32	Missing ref. number [Hungary]
192	5	32	5	32	Suggest modifying ".10.6" to "4.10.6". [Japan]
7130	5	32	5	32	Add loss of pollinators as biotic agents affected by high-latitude warming [United Kingdom (of Great Britain and Northern Ireland)]
4148	5	34	5	34	Consider omitting "Observed" as it is unnecessary. [United States of America]
396	5	34	5	35	The source for the "four pillars" should be included either in text or footnote. [Ireland]
5088	5	34	5	43	We think at this paragraph, the trends of technological development for agriculture would be overcome to decrease productivity for some crops including breeding, cultivation technology, forecasting disease and insect, and so on. [Republic of Korea]
5090	5	34	5	43	the addition of mentioning about the rice [Republic of Korea]
1744	5	34	5	43	Impacts of climate change on Food security in semi arid, arid and hyper arid regions of Arabian Peninsula, middle east and west asia have not been included in the SPM. This should be covered. [Saudi Arabia]
7132	5	34	5	43	A.3.6 - It would be helpful from a policy perspective to state the overall weighting (negative or positive) of these impacts on global food security - i.e. have climate change impacts so far been overall positive or negative? [United Kingdom (of Great Britain and Northern Ireland)]

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Comment No	From Page	From Line	To Page	To Line	Comment
4150	5	34	5	43	Discussion of food security in this paragraph is missing linkage to socioeconomic impacts. Suggest to add discussion on how food insecurity impacts humans. [United States of America]
4152	5	34	5	53	Consider adding mention of the impact of long-term rainfall declines in East Africa and Syria, which have had serious food security impacts in many of the world's most food-insecure areas (https://fews.net/sites/default/files/Food_assistance_needs_Peak_Needs_2019.pdf). FEWS NET studies by Funk et al. have documented the East African declines and impacts since the mid-2000s. Work led by Colin Kelley et al. have documented the Syria rainfall impacts. [United States of America]
4154	5	35	5	35	What's the difference between access and utilization? They could be viewed as the same issue. [United States of America]
688	5	35	5	36	We suggest to better highlight that soil degradation is also one of the consequences of climate change affecting food security. See for example lines 20-24 page 5-31 [France]
5462	5	36	5	36	in reference to chapter 5, fig 5.4, as well reported in the TS, 11: reports changes in yield in the amazon area - should be reviewed, and all the related information reported. This is an area with little to no agricultural production. Specially, the information on wheat yield... Such information could raise serious questions regarding the information brought in this report... [Brazil]
1762	5	36	5	36	affecting versus declining is not consisten. Sign of change at high lattitudes should be indicated. [Denmark]
8120	5	36	5	39	Add that the increase in agricultural productivity in higher latitudes is confined to scenarios with low levels of temperature change. Increasing temperatures are already negatively affecting the crops mentioned in lower latitudes, and that needs to be mentioned, too. [European Union (EU)]
1646	5	36	5	39	"Increasing temperatures are affecting agricultural productivity in higher latitudes, raising yields of some crops such as maize, cotton, wheat, sugar beets, while in lower-latitude regions yields of crops such as maize, wheat and barley are declining", is suggested to be added with the expression of confidence that is not given therein. [China]
44	5	36	5	39	The sentence states: "Increasing temperatures are affecting agricultural productivity in higher latitudes, raising yields of some crops such as maize, cotton, wheat, sugar beets, while in lower-latitude regions yields of crops such as maize, wheat and barley are declining." For Denmark this is not always true e.g. laster year 2018 there was a national drought, which affected both livestock and plant production. Climate change is not always increasing yields in high latitudes it varies from year to year. [Denmark]
690	5	36	5	39	We suggest to improve this sentence by providing additionnal elements about impacts on yields induced by other variable than temperature (precipitations, solar radiation, ...) and by providing orders of magnitudes. [France]
2490	5	36	5	39	If possible quantify the observed losses, as in AR5 WGII. [Germany]
7134	5	36	5	39	This section does helpfully point out where crop productivity increases and decreases, however it does not provide a global picture. It might be useful to insert the text from underlying chapter 5.2.2.1 "At the global scale, climate change between 1981-2010 has decreased global mean yields of maize, wheat, and soybeans by 4.1, 1.8 and 4.5%, respectively, relative to preindustrial climate, even when CO2 fertilisation and agronomic adjustments are considered. For rice, no significant impacts were detected." [United Kingdom (of Great Britain and Northern Ireland)]
7136	5	36	5	39	Is it possible to provide any estimates of the projected changes in yields? [United Kingdom (of Great Britain and Northern Ireland)]

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Comment No	From Page	From Line	To Page	To Line	Comment
4156	5	36	5	39	Consider reversing the order of the sentence phrases – i.e. "temperature increases are decreasing yields in tropical areas, and increasing them in higher latitudes". [United States of America]
2914	5	38	5	39	Suggest clarification: why does it matter to note that the crops are declining - a statement such as ' 30% of global crops such as maize are produced at low latitudes' would be good background to put the conclusions currently stated into perspective and motivate action. [Australia]
7138	5	38	5	39	Are we sure that across all low latitudes yields of basic cereals are universally declining? In some regions, parts of East Africa, there may be increased yields. [United Kingdom (of Great Britain and Northern Ireland)]
4160	5	39	5	39	Consider adding a sentence, "Because most food-insecure people live in the tropics and sub-tropics, the negative impacts on warming temperatures are likely to have a disproportionate effect on poor food insecure populations." [United States of America]
8598	5	39	5	40	Unclear whether this line is specific to higher latitudes or lower latitudes. Also unclear what is meant by pasture declines (i.e., if it means biomass, quality, etc)? Could be linked more closely to A3.3 (i.e., not just negative impacts - also some positive) [New Zealand]
8122	5	39	5	41	Specify in which regions the pastoral systems are most affected [European Union (EU)]
692	5	39	5	41	We propose to add some information on which type of biodiversity it affects, as in the report there is pollinators, death of livestock, etc. [France]
4162	5	39	5	41	The impact of climate change on pastoral systems also varies by region and system; this should be reflected. [United States of America]
7140	5	40	5	41	What aspects of biodiversity are being lost? Could be contradictory since pest and disease are part of biodiversity which is increasing apparently? [United Kingdom (of Great Britain and Northern Ireland)]
7142	5	41	5	41	What does loss of biodiversity refer to with respect to pastoral (livestock production) systems? Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
8124	5	41	5	42	Which indigenous knowledge is providing information on food security? Ch5.2 & 7.3.2 are not very specific on the subject. [European Union (EU)]
7712	5	41	5	43	This is also correct for the Arctic Region. Please consider to also include the arctic among those Indigenous regions, or not to list any region. [Norway]
4164	5	41	5	43	ILK is discussed in various chapters in the report. Given the emphasis on ILK in understanding impacts and developing effective responses, this point should be given more prominence, such as a separate paragraph. [United States of America]
4166	5	41	5	43	By referring to indigenous and local sources of knowledge, are these evidence based or anecdotal? [United States of America]
194	5	42	5	43	SPM A3.6 mentions only Africa, high mountain regions of Asia and South America as the regions where indigenous knowledge is one of the methods to understand the impact of climate change on food security. Chapter 5 (p. 5-26, line 24-25), however, also mentions Europe, Australia and North America, and does not prioritize Africa, Asia and South America. We suggest adding the other regions or reasons why SPM focuses on only three regions with the references. [Japan]
5092	5	42	5	43	what is the confidence level of this sentence? [Republic of Korea]
8750	5	44	5	44	Missing comma between Agriculture and forestry? [Chile]
694	5	44	5	44	"Agriculture, forestry, and.." A missing coma would be misleading here [France]

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696	5	44	5	44	We propose to add AFOLU in the glossary, and to add * after AFOLU in this sentence in order to highlight that it is defined in the glossary [France]
4168	5	44	5	44	The heading for A4 is missing a comma after 'agriculture'. This may confuse some readers who read agriculture forestry and question if it's a typo or a reference to a term of art. [United States of America]
2916	5	44	5	45	Suggest clarification: Is the '22% of anthropogenic GHG emissions' a global number including or excluding oceans? [Australia]
2918	5	44	5	45	Suggest including a qualifier: this statement implies that forestry in general is a net contributor to GHG emissions. Sustainable forestry is widely acknowledged as an effective tool for GHG mitigation, especially when the system boundary is expanded beyond the forest to include the positive contribution of wood products. This also ignores literature that shows that in some instances forest cover has increased with an increase in demand for biomass. Suggestion would be to replace "forestry" with "deforestation and unsustainable forestry practices". [Australia]
1842	5	44	5	45	Suggestion: replace 'is a significant net source of GHG emissions (high confidence), accounting for around 22% of anthropogenic GHG emissions ' with 'is a significant global net source of GHG (high confidence), accounting for around 22% of global anthropogenic GHG emissions '. The scale and type of emissions are extremely important here! [Russian Federation]
4900	5	44	5	45	From a forestry perspective this statement is not entirely correct. Deforestation is not by default linked to forestry, but rather to land-use change. Furthermore, in many areas of the world with managed forests they are rather sinks than sources e.g. in Europe. This is better described in Figure SPM.1 where deforestation is not mixed with forestry. Please revise for accuracy and clarity. At the very least, reference should be to net emissions, not "emissions". [Sweden]
7144	5	44	5	45	This is repetition of A1.3 (line 24-25). Please consider whether or not you need to quantify AFOLU emissions twice. Please consider combining text on emissions into one summary, in order to cut down length of SPM. [United Kingdom (of Great Britain and Northern Ireland)]
698	5	45	5	45	"accounting for around 22% of anthropogenic GHG emissions" : the same sentence is in A1.3, we propose to have it only once. [France]
8004	5	45	5	45	Here 22% is mentioned, while in Fig SPM.1 section E 24% is used. Please be consistent [Netherlands]
7716	5	45	5	45	Please consider to add absolute emissions in ton to make it more relevant for decision makers. [Norway]
7150	5	45	5	45	Says 22% but figSPM1 panel says 24% - is this an error? Please clarify if there is an actual difference [United Kingdom (of Great Britain and Northern Ireland)]
4158	5	38	6	3	As this is a Summary for Policymakers, it would be helpful to explain the concepts of biogeochemical warming and biophysical cooling, as well as the distinction between biogeochemical and biophysical, which are not likely to be obvious to the intended audience. [United States of America]
4170	5	44	6	1	The estimate that AFOLU contributes around 22 percent of total anthropogenic GHG emissions does not match the estimate in Figure SPM.1 E (24 percent). Also, this is redundant with A1.3. [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
8126	5	44	6	4	Due to the different interpretations of "AFOLU" discussed in A4.1 and A4.2, A4 should use a more circumspect language regarding the contribution of AFOLU. Providing a single AFOLU estimate appears to favour one interpretation of AFOLU over others. It would be useful to give a figure for both CO2 and non-CO2, and for CO2 to include a range depending on the definitions. Also, providing a figure of 22% without an uncertainty range may give a false sense of precision and certainty about that estimate. This applies also to A1.3 (but repetition should be avoided). [European Union (EU)]
5464	5	44	6	4	it repeats information on A1.3 [Brazil]
1756	5	44	6	4	This is perhaps thee key message of the report and should be moved to the top of the report. [Denmark]
2496	5	44	6	4	Please revise the last part of second sentence "where AFOLU is the dominant source", since their is a circular reference: AFOLU is a significant net source... Half of the contributions arises from CO2 and the rest CO2 and N2O from AFOLU. We suggest to state from which activities the methane emissions (A4.3: wet/peatlands, ruminant livestock, rice cultivation) and nitrous oxide (A4.4: fertilization) occur. [Germany]
7990	5	44	6	4	Please add first sentence A4.5 to the bold text [Netherlands]
4172	5	44	6	4	KEY ISSUE [FLUXES]: Make it clear which sectors are the emitters and which is the sequesterer. [United States of America]
4174	5	44	6	12	KEY ISSUE [FLUXES]: There is confusion/lack of clarity within this summary point that stems in part from unclear text on GHG AFOLU fluxes in Chapter 2 that should be resolved/made clearer. There are numerous GHG estimates given in this section (and in Chapter 2) but they do not always have clear explanations of what numbers are gross, which are net, which are anthropogenic and which are not (and that distinction oscillates thoroughout Chapter 2), managed or unmanaged, which results are coming from what models, etc. This is an important section in both the SPM and chapter so these items should be clear, concise, and correct. Also, the text here in page 6, lines 5-10, do not exactly reflect the summary point it was derived from in Chapter 2, and the text here is much more confusing than it is in the chapter bullet. Why wasn't the chapter summary point taken verbatim (like most of the other summary bullets)? Summary point A4.1 (page 6, lines 5-10) states "Modelled direct anthropogenic fluxes of CO2 from AFOLU were likely a net emission of 5.5 \pm 2.6 GtCO2 yr-1 during 2008 to 2017 driven by land cover change, including emissions from deforestation and removals from afforestation/reforestation, and by wood harvesting. Vegetation models find a net land sink, likely 11.7 \pm 2.6 GtCO2 yr-1, during 2008 to 2017 primarily due to the indirect effects of environmental change, such as climate change, CO2 fertilisation, and nitrogen deposition on all lands." After reading Chapter 2 again, it seems that the modelled direct anthropogenic fluxes come from bookkeeping models (managed lands only) and the vegetation model represents direct anthropogenic and indirect anthropogenic and non-anthropogenic fluxes on managed and unmanaged lands but that is not clear in the Chapter 2 summary point or this SPM point (and in Chapter 2, sometimes indirect emissions are considered anthropogenic and sometimes grouped in with natural/non-anthropogenic). Key descriptors like that should be included or these are not useful/do not make sense. This should be made clear, especially when adding these results together to get total net fluxes. It's much easier (and consistent) to just use the summary point exactly as written in Chapter 2. [United States of America]

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4176	5	44	6	12	Instead of revising the text in these two summaries from Chapter 2, the authors of the SPM could instead adopt the corresponding summaries on these points from the Technical Summary (page 11, line 37 through page 12 line 10) as it is much clearer. [United States of America]
2494	5	44	6	31	Section A4 might be difficult to understand for non-experts as it constantly jumps between different categories AFOLU/managed land/unmanaged land/"land". We suggest to be consistent and only use one term throughout the SPM as appropriate or please provide a clearer distinction between the categories and what they comprise can improve readability. [Germany]
7714	5	44	6	31	In addition to AFOLU fluxes, please also include the FOLU fluxes separately. [Norway]
8128	5	44	6	37	The A4 headline statement refers only to AFOLU (understood elsewhere as not including non-anthropogenic removal), while the underlying section covers GHG emissions & removals more broadly (both AFOLU, indirect anthropogenic and natural). This should be reflected in the headline statement. Also, it would be sensible to broaden the section itself by including the biogeochemical effects currently mentioned under A5 (since they appear to be mostly GHG emissions/ removals in any case). [European Union (EU)]
1648	5	44	6	37	A4 is confused in expressing the time scale of AFOLU greenhouse gas emission and the emissions of CO ₂ , which tends to mislead policy makers. This section uses data of different decades (or approximate 10 years) such as 2007-2016, 2008-2017, 2005-2014, 2005-2015 and 2010-2016, which cannot be inter-compared with each other. Regarding the CO ₂ emissions from AFOLU, the model for 2008-2017 in A4.1 gives an estimate of 5.5±2.6 GtCO ₂ yr ⁻¹ . In A4.2, the data for 2005-2014 is calculated as 0.1±1.0 GtCO ₂ yr ⁻¹ based on national greenhouse gas inventories. According to the bookkeeping model, the data for 2005-2014 is estimated as 5.1±2.6 Gt GtCO ₂ yr ⁻¹ . The confusion in data leads to low readability. It is suggested that the authors check and unify the time scale and emission data against the underlying report. [China]
1810	5	44	6	37	The current wording of section A4 creates confusion. It puts the sources of emissions and gases into one sentence. Please create two sentences instead, explaining (1) the emissions by source (e.g. deforestation, agriculture, livestock) and then (2) by gas (e.g. CO ₂ , CH ₄ etc.). We would kindly ask to modify the sentence to clarify that 1) the modelled anthropogenic net flux of GHGs attributed to AFOLU are estimated to be around 11 Gt CO ₂ eq/yr, and the sector is thus likely a net emission source, but that 2) there remains great uncertainty in the net anthropogenic CO ₂ estimates, indicating that half of the estimated/modelled (not reported) net emissions arise from deforestation. Please consider also providing the CH ₄ and N ₂ O estimates (in CO ₂ equivalents) in paragraphs 4.3 and 4.4, respectively, so that one can add up the numbers without going to the background report. In particular, please check if the use of "net emissions" and "total emissions" is consistent (this relates also to paragraph A1.3). Adding a table for the AFOLU GHG fluxes could help. [Finland]
546	5	44	6	37	The CO ₂ emission from agriculture is not to be considered for GHG emission estimates from agriculture. There is a need to differentiate the CO ₂ emissions due to deforestation alone and fraction of it attributable to deforestation for bringing land under cultivation. From agriculture, the CO ₂ emissions should not be considered as it is an essential part of crop production. However, the nutrient and water use efficiencies may be given more importance. [India]

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8888	5	44	6	37	Section A4 has a number problems, including methodological issues: it is not easy to the reader to know exactly what is the estimated contribution (emissions and sinks) of each of the components of AFOLU. Therefore, we would request that a clear infication of emissions and sinks be presented for each of the components. In other words, we would like to know what are the emissions and sinks, in absolute values, of agriculture, forest and other land use. this is a request that we did when the outline was approved by the plenary and we repeat it. The other issues have to do with the discrepancies mentionned in paragraph A4.1: managed and unamanged lank are considered together, etc. [Liechtenstein]
1408	5	44	6	37	This section gives a lot of relevant information of fluxes related to the land sector. However they are embedded in the text. A table highlighting these figures and their changes would be more easily accessible. [Luxembourg]
1410	5	44	6	37	It would be more useful to distinguish between the different parts of the AFOLU sector, both in sinks and sources of GHGs: [Luxembourg]
8812	5	44	6	37	Section A4 has a number problems, including methodological issues: it is not easy to the reader to know exactly what is the estimated contribution (emissions and sinks) of each of the components of AFOLU. Therefore, we would request that a clear infication of emissions and sinks be presented for each of the components. In other words, we would like to know what are the emissions and sinks, in absolute values, of agriculture, forest and other land use. this is a request that we did when the outline was approved by the plenary and we repeat it. The other issues have to do with the discrepancies mentionned in paragraph A4.1: managed and unamanged lank are considered together, etc. [Switzerland]
7146	5	44	6	37	This section does very well breakdown how land use has led to specific emissions, but doesn't point out that land degradation itself is a driver of GHG emissions. It would therefore be useful to add the following text from chapter 4 of the underlying report: "Land degradation is a driver of climate change through emission of greenhouse gases and reduced rates of carbon uptake". [United Kingdom (of Great Britain and Northern Ireland)]
7148	5	44	6	37	In general: much of the A4 section is better described in the Executive Summary for Chapter 2. Please consider whether this exec summary can form the basi of the discussion here. [United Kingdom (of Great Britain and Northern Ireland)]
8132	5	45	6	4	Redundant. Has been stated before (in A1.3). Make it one or the other. [European Union (EU)]
8130	5	44	7	34	Sections A4 & A5 would read more cleary if all discussion of biogeochemical effects were contained in A4 (since these appear to be mainly GHG emissions, and A4 is not limited to AFOLU but appears to cover the whole terrestrial net sink). Section A5 could then be dedicated to biophysical effects, and the degree to which they counteract the biogeochemical effects already summarised in A4. [European Union (EU)]
4126	5	11	8	31	Would be good to also highlight positive trends (adaptation and mitigation). For example, the Global Food Security Strategy of the Feed the Future initiative and others could be mentioned to show how these strategies are leading the effort for sustainable food production systems, etc. [United States of America]
2906	5	1			Suggest including wildfires (increased fire season length and severity), which also impacts adaptation and mitigation in the land sector. [Australia]

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1156	5	6			Clarify that 'resulting in reduced terrestrial carbon uptake' here refers to a reduction compared to a baseline without climate change effects on terrestrial ecosystems. The increase in atmospheric CO2 is still projected to dominate land carbon uptake in the 21st century, resulting in an overall increase terrestrial carbon uptake. See for example IPCC AR5 WGI report Figure 6.24. [Canada]
8104	5	8			2.2.5 is mentioned as a source, but this section does not exist in Ch2. [European Union (EU)]
8108	5	11			Delete "in" and "use" to read "including land management" [European Union (EU)]
5460	5	23			Include word "medium and high GHG emission scenarios...." [Brazil]
2492	5	41			We recognize that indigenous and local knowledge (ILK) can make a significant contribution to the development and implementation of solution strategies. However, we doubt that ILK is able to detect the speed and magnitude of climate change and its impacts and to attribute observed change to a particular cause. Detection and attribution in the context of climate change is linked long term trends (>30 years) and statistical attribution of single events to this long term change. This requires methods other than ILK. The current statement does not even have a confident statement. Please delete the reference to ILK or provide a confidence statement and more information why it is relevant for D&A. [Germany]
7156	6	5	5	25	These three paragraphs cover many different averaging periods. For simplicity's sake (and so we can compare them) is it possible to harmonise them? [United Kingdom (of Great Britain and Northern Ireland)]
700	6	1	6	1	Please consider to improve the self-consistency of the SPM by always using the same time period: 2008-2017, as used in SPM subsection A.4.1. [France]
702	6	1	6	4	Please consider adding some element to that interactions between AFOLU and climate also include biophysical effects in addition to GHG emissions and removals, in the spirit of section 2.6 pages 2-54 to 2-74 (Land impacts on climate and weather through biophysical and GHGs effects) [France]
704	6	1	6	4	As methane and nitrous oxide are mainly emitted by agriculture, please precise the part of agriculture in each of those GHG emissions. [France]
8134	6	1	6	31	Five paragraphs use five different time periods. While it is understood that different datasets cover different periods, this is a bit confusing. Can this be harmonized a bit? [European Union (EU)]
8752	6	1	6	31	Very confusing that different years are used for each paragraph of this section A4 [Chile]
1624	6	1	6	37	To enhance the clarity of the paragraph, we strongly suggest to include a table summarizing land fluxes in all their components. [Italy]
4178	6	2	6	2	If deforestation is defined as the conversion of forested land to another land use (the FIA definition of deforestation), that is not "forestry" – it is land use change. Forestry includes reforestation and can include afforestation. The impacts on carbon are very different than what occurs with "deforestation". [United States of America]
8136	6	3	6	3	Suggest to replace "AFOLU" with "Agriculture" to be more precise [European Union (EU)]
7152	6	3	6	3	A4 Headline: This needs to be rephrased to avoid ambiguity: as written, it's not clear whether AFOLU is the dominant source of CH4 and N2O overall or whether this should actually say "where agriculture is the dominant source" (of CH4 and N2O within AFOLU). Please clarify [United Kingdom (of Great Britain and Northern Ireland)]

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1174	6	3	6	4	Suggest clarifying that the net effects of AFOLU on emissions are a result of CO2 emissions from deforestation (as is stated), but then clarifying that the emissions of methane and nitrous oxide are attributable to agriculture and ruminant livestock, instead of simply noting that this is attributed to AFOLU in general. This would increase the clarity of this paragraph and would be consistent with the explanation to Figure SPM.1 on page 12 (line 19-20). [Canada]
4180	6	3	6	4	Make text clearer to reflect that AFOLU is the primary source of CH4 and N2O globally. [United States of America]
1176	6	5	6	7	Clarify what is meant by 'direct anthropogenic fluxes' here. Appears to refer to fluxes of CO2 to the atmosphere, but wood harvesting is included as a source of emissions, whereas its immediate effect is to move carbon from forest to other carbon stocks. [Canada]
2920	6	5	6	8	Suggest rephrasing so that this statement reads: "Modelled direct anthropogenic fluxes of CO2 from AFOLU were likely a source of 5.5 ± 2.6 GtCO2 yr-1 during 2008 to 2017 driven by land cover change, including emissions from deforestation and removals from afforestation/reforestation, and by wood harvesting. Vegetation models find a land sink of 11.7 ± 2.6 GtCO2 yr-1 ..." Then the later statement of a "net removal of 6.2 ...". This ensure the statement is using the word "net" in an unambiguous way. [Australia]
7720	6	5	6	10	Please consider to clarify what is managed and what is unmanaged in these numbers. Please also clarify whether forest management and/or natural forest (protected from deforestation) is included in the 5.5 or the 11.7 number. It can be somewhat confusing that vegetation models find a net land sink of CO2, when the previous sentence stated that modelled CO2 fluxes provide net emissions. Please clarify the distinction. Is it anthropogenic emissions in the first sentence in A4.1 and natural emissions in the second? Also consider if age class effects of forest management are relevant to these numbers. [Norway]
8138	6	5	6	12	A4.1 should make clearer how the three figures quoted (5.5, -11.7, -6.2) relate to each other. i.e. that removal of 6.2 Gt represents the net effect of the other two figures. * As written, the paragraph does not make it clear that the -11.7 GtCO2 "net land sink" is conceptually distinct from the +5.5 (AFOLU). It is merely described as coming from vegetation models. Please attempt simpler definitions for these numbers that do not require prior knowledge of land use/management terminology and differences between model types. [European Union (EU)]
58	6	5	6	12	The numbers for fluxes in this paragraph would be easier to understand, and more useful for policy makers, in a table format with a breakdown showing the contributions from different sources. Also, it is difficult to find the numbers in the background report. [Denmark]
8950	6	5	6	12	Section 4.1 - it is very difficult to understand what this section tries to say. It is not easy to understand what these numbers mean. Please revise. The same applies really for the entire A4. [Estonia]
706	6	5	6	12	We suggest to not use "likely" as it is done currently and instead to indicate confidence levels in a way that is consistent with the rest of the SPM text. [France]
708	6	5	6	12	We suggest to insert the figure given in panel E figure page 11: "CO2 emissions from land-use change (mostly deforestation) decreased in the early 1960s and stabilised at high levels (1.5 ± 0.7 Gt CO2 yr-1, 2008-2017)." [France]
7718	6	5	6	12	Please consider to also include gross numbers for these fluxes [Norway]

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Comment No	From Page	From Line	To Page	To Line	Comment
7154	6	5	6	12	This is a very confusing paragraph for the average reader. You say that AFOLU (which has a precise definition) is a net source of emissions. You then say that "land" (which is a less precise term) is a net sink? This seems contradictory. Is "land" excluding agriculture? You then go on to say that the net land sink is 11.7Gt but the combined land-atmosphere flux is a net removal of 6.2 - I think it would be helpful to clarify the difference between these two values. Overall request is to please review this paragraph to see if you can simplify the discussion of GHG sources/sinks. [United Kingdom (of Great Britain and Northern Ireland)]
7160	6	5	6	12	A4.1: Its currently unclear how these quantities relate to one another. Point A4.1 could be reordered to put the combined flux figure (-6.2Gt) first and then explain that this is comprised of the emissions (+5.5 Gt) and removal (-11.7 Gt) (it's clearer in the Exec Summary of Ch2) [United Kingdom (of Great Britain and Northern Ireland)]
4182	6	5	6	12	KEY ISSUE [FLUXES]: The term ""net emissions"" appears several times but is not used well. It would be better to point out actual sources and sinks, e.g., likely emissions from land cover change and the sinks from nitrogen deposition, CO2 fertilization, etc. Then report the net as the balance among them. Examples of current usage: ""Modelled direct anthropogenic fluxes of CO2 from AFOLU were likely a net emission ... models find a net land sink, likely 11.7 ± 2.6 GtCO2 yr-1, unmanaged lands likely resulted in a net removal of 6.2 ± 3.7 Gt CO2 yr-1 from 2008 to 2017 ..."" [United States of America]
4184	6	5	6	12	Restate to clarify that the sink is a function of photosynthesis, which has been increased by indirect effects. [United States of America]
4186	6	5	6	12	Global Carbon Budget 2018 assigns low confidence to anthropogenic fluxes of CO2, and medium confidence to sinks found by vegetation models; however, the SRCCL report assigns both the same confidence "likely". Why are the confidence levels inconsistent? [United States of America]
4188	6	5	6	12	There is much emphasis on separating anthropogenic and non-anthropogenic emissions in Chapter 2, yet there is also text citing previous IPCC reports saying that this is impossible. Even the Technical Summary highlights this point (page 11, lines 42-43): "These fluxes are affected simultaneously by natural and human drivers, making it difficult to separate natural from anthropogenic fluxes (very high confidence). {2.4}" Yet a large segment of Chapter 2 is devoted to doing just this. It makes for a very confusing, often times contradictory chapter that the lead authors of the report should revisit and reconsider. [United States of America]
4190	6	5	6	12	It is clear in Chapter 2, but not here, that the vegetation models include both anthropogenic and non-anthropogenic fluxes (managed and unmanaged), correct? The preceding sentence is clear about what fluxes are included there (anthro) so it should be included here as well. [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
4194	6	5	6	12	KEY ISSUE [FLUXES]: Section A4.1 needs to be revised and clarified. There are a couple of issues. First, "net" concerns GHG release and associated warming offset by cooling (either by CO2 uptake or via biophysical processes like increased albedo). Historically the two forcings roughly balance out. The text basically is saying "don't worry about land use" when in fact anthropogenic land surface change is responsible for at least 20% of emissions. Second, the text needs to be more explicit about land areas generating contrasting net fluxes. "Net AFOLU emissions" refers to just "managed" lands, while greater "net land sink" refers to ALL ice-free lands? Hence the total net land sink is across ALL lands? It seems like what the authors are saying is: managed lands doing one thing, all lands another thing. Need to spell out more clearly what land area has net emissions vs. sink. [United States of America]
2498	6	5	6	19	It is important to point out discrepancies between GHG inventories and other approaches to measure GHG fluxes in the AFOLU sector. However from the current text, it is not clear whether "modelled direct anthropogenic fluxes" (A4.1) refer to the same source of information as "book keeping models" in section A4.2. Is there a third way to model fluxes that does not involve book keeping (e.g. dynamic vegetation models, cf. Figure 2.5)? Please explain for non-experts the different sources of information (what kind of models, what are bookkeeping models, which inventories?) and the reasons for the differences. In addition, please clarify "direct and indirect effects", in particular why climate change is an indirect effect of environmental change, potentially by rephrasing "...primarily due to the indirect effects of environmental change, such as climate change, CO2 fertilisation, and nitrogen deposition on all lands." [Germany]
7158	6	5	6	19	A4.1 is confusing and it is not clear what key message it is trying to convey - a list of numbers is not helpful without context of how large these emission levels are relative to other areas. This should be removed entirely and replaced with the current text from A1.3, which is much clearer. [United Kingdom (of Great Britain and Northern Ireland)]
4192	6	5	6	19	There are different modelled approaches/models discussed in these summaries, but it is not clear which is being discussed. Add this information. Are these different tools than the bookkeeping models in line 15? Need to make clear why the numbers differ. [United States of America]
8788	6	5	6	19	How do you compare those results (models vs country GHG inventories) in terms of confidence when the modelled result is produced by only one paper (two models)? In other words, the likelihood language used in the modelled result is not a correct use of uncertainty language of the IPCC because the word likely refers to the result of the paper (Le Quéré et al. 2018) and not to the assessment of the literature. Please correct this adding the uncertainty language in a correct way. [Venezuela]

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8140	6	5	6	37	Some important messages from Ch2 concerning the long-term flux trends should be incorporated in A4.1 &/or A4.5. For example: * the fact that gross fluxes are more informative than net when it comes to assessing the timing and potential for mitigation (even though data is more scarce). (High confidence finding p2-4) (Ch 2.4.1.3) * an understanding of what has driven the long-term emission trends (i.e. emissions from AFOLU are increasing over time. While non-AFOLU removals, due to indirect environmental change, have outweighed this increase so far, but there are reasons to expect this to stop in future, either because of increased emissions from vegetation and soils due to climate change and/or because the ocean would release CO2 back into the atmosphere if atmospheric concentrations were to decline). (p2-5) * It would be useful to relate the GHG emissions mentioned here to the emissions and/or reductions needed to limit warming to 2°C or 1.5°C. Could the different figures quoted in this section be combined in a table, also included general emission figures from SR1.5 (for example annual 1.5°C-consistent emissions in 2030), in order to place these flux estimates in context for policy makers. [European Union (EU)]
1184	6	5	6	37	These five paragraphs are overly technical and it is recommended that efforts be made to simplify and short the key points in more plain language, notably removing specific mentions of models and CO2 and N2O Gt or at least add percentages which would make it easier to understand for policy makers. [Canada]
710	6	6	6	6	Please check this standard deviation value "+/- 2,6" as another value is given in the main report (line 41 page 2-36: 5.5 ±3.7). [France]
4196	6	6	6	6	Missing a space between 'Gt' and 'CO2'. [United States of America]
712	6	6	6	7	We suggest to add "forest degradation" to this list of AFOLU emissions drivers (see line 42, page 2-36). [France]
4198	6	6	6	7	This is unclear. Afforestation and reforestation are not "removals"; they are additions. Harvest is a removal. Deforestation is a removal. Maybe substitute something like "uptake" for "removals". [United States of America]
5094	6	6	6	8	Gt CO ₂ yr-1 [Republic of Korea]
7162	6	6	6	8	The time interval here (2008-2017) is inconsistent with that chosen in A4 (2007-2016). This is confusing for the reader. Please use consistent baselines. [United Kingdom (of Great Britain and Northern Ireland)]
196	6	7	6	7	Suggest replacing "Wood harvest" with "forest management (e.g. wood harvest) and other types of land management, including agriculture, grasslands and scrub" in order to be consistent with Chapter2 Page31 Line6. [Japan]
1178	6	7	6	8	Clarify if "vegetation models" refers to models of both managed and unmanaged land. That is, clarify if this is anthropogenic or anthro + natural combined. [Canada]
198	6	7	6	8	Suggest replacing "Vegetation models" with "Dynamic Global Vegetation Models (DGVMs)" due to the incompleteness, or add more explanation on what the "vegetation models" mean. [Japan]
1180	6	7	6	9	The net land sink is driven mainly by the increase in atmospheric CO2, not by climate change, as indicated here. Climate change tends to drive a land source of CO2. See for example IPCC AR5 WGI Chapter 6. [Canada]
8142	6	7	6	10	this phrase could be improved by stating up front that it refers to indirect effects (mirroring the structure of the first phrase) so that the reader is not misled in thinking that vegetations models are contradicting the first phrase [European Union (EU)]

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7164	6	7	6	10	It is surprising (to me) to say that land is a net sink because of ("primarily due to") the indirect effects of environmental change. Is it not a sink because vegetation removes C from the atmosphere and the extent to which it is a sink is then mediated by these indirect factors? Could you please clarify. [United Kingdom (of Great Britain and Northern Ireland)]
200	6	8	6	8	Suggest deletion of "primarily" in order to be consistent with Chapter2 Page4 from line27 to line30. [Japan]
4200	6	8	6	8	Missing a space between 'Gt' and 'CO2'. [United States of America]
86	6	8	6	9	Consider adding natural effects (annual growth of vegetation) as one of the most relevant causes contributing to AFOLU CO2 removals. Indirect effects have less relevance in accounting. [Spain]
8144	6	9	6	9	Climate change, CO2 fertilisation, etc. appear to be a DIRECT effect of environmental change, which in turn is an INDIRECT effect of human activity. "indirect effect of environmental change" seem not fully accurate. Please clarify this, e.g. "indirect human-induced environmental change" [European Union (EU)]
8146	6	9	6	10	If "indirect effects" include legacy effects of past changes in management, they should be mentioned. If legacy effects are not part of "indirect effects", then it should be indicated where and how they are taken into account, at least for forest. [European Union (EU)]
4202	6	11	6	11	Removal from atmosphere? Please specify. [United States of America]
7166	6	11	6	12	Could we have a comparison between the 2008-2017 number and any previous estimates, so we can see if it's going up or down? Presenting trends would be even more informative [United Kingdom (of Great Britain and Northern Ireland)]
202	6	13	6	13	We suggest saying "Anthropogenic net CO2 emissions" at the beginning of A4.2 (adding "net" before "CO2 emissions"). A4.2 explains whether the large sinks in forest is treated as anthropogenic or non-anthropogenic affect the amount of estimated anthropogenic component of GHG from AFOLU. In this context, just referring to "CO2 emissions" is confusing because this can be read both as gross emissions and net emissions. So, it is better to make it clear that CO2 emissions referred here means "net" CO2 emissions. [Japan]
5096	6	13	6	13	0. 1 → 0.1 (no space between '.' and '1') [Republic of Korea]
8148	6	13	6	14	Rephrase: e.g. "anthropogenic CO2 emissions from AFOLU based on countries' GHG inventories". Rationale: it is not clear why the number should have "medium confidence" (if it is merely reporting what the inventories say, one would expect total confidence). SPM is not the place for explaining why a confidence interval is necessary for inventory data. Therefore suggest language such as the above as a compromise. [European Union (EU)]
5466	6	13	6	14	Please check the AFLU emissions value "...0.1 ± 1.0 Gt CO2 yr-1..." [Brazil]
1650	6	13	6	14	The "medium confidence" in this sentence is inconsistent with the conclusion in the underlying report, in which lines 23-25 of Chapter 2 on page 32 indicate that the conclusion is of "low confidence". It is suggested to give it a check and revision. [China]

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7168	6	13	6	15	Are these book-keeping models the same as the "modelled direct anthropogenic fluxes" discussed in A4.1? If yes, why not use the same terminology and does the difference between the two (5.5 vs 5.1) just derive from the choice of reference period (2008-2017 vs 2005-2014)? If they are not the same thing, then you need to make it clear why you are not being consistent. Overall, this discussion (A4.1 and A4.2) is very confusing to the average reader and would benefit from being written for clarity and precision in language. [United Kingdom (of Great Britain and Northern Ireland)]
8150	6	13	6	19	A4.2 should be revised to make the key points clearer to readers with no background knowledge of the issue. For example: * The paragraph should explain not only why the difference between inventories and models exists, but also why it matters. i.e. emissions and removals captured in GHG inventories are only a fraction of the land sector emissions & removals that affect global warming. Therefore any global assessment of the land sector's influence on global climate change has to consider emissions and removals from all sources. * Citing the 5.1 GtCO2 bookkeeping figure raises a number of issues that are too technical for the SPM. What is a bookkeeping model, and how is it different from the vegetation models mentioned in A4.1? What is the difference between A4.1's AFOLU figure of 5.5 GtCO2 and the 5.1 GtCO2 figure of A4.2? * Rather than absolute numbers, it would be more useful therefore to cite the apparent 4-5 GtCO2 difference between inventories and models which is given in Ch2.4.1.2.2. * when explaining the reason for the discrepancy in lines 16-18, it is better to refer to "the indirect effects of environmental change described in A4.1". That way, the reader knows that this refers to CO2 fertilisation etc. that have already been mentioned. [European Union (EU)]
1182	6	13	6	19	This paragraph is not likely to be understood by the average reader who is not familiar with "global bookkeeping models", what they are intended to capture, how they are used in IPCC modelling, nor how these compare to estimates reported in national GHG inventory reports. Suggest therefore, for the sake of clarity, elaborating further on the difference between these two, and what the implications are, beyond the text that is provided. For example, the para should explain why GHG inventories consider a different area of land to be "managed", and why bookkeeping approaches consider a different sink. As written, this is not clear. Would suggest also avoiding jargon such as "bookkeeping" models that is not defined in the SPM nor in the glossary. [Canada]
8754	6	13	6	19	This is a very important finding. This large discrepancy has implication for Paris Agreement goals, NDS and Global Stocktake. This gap needs to be addressed. [Chile]
714	6	13	6	19	This paragraph is very policy-relevant for climate action and should be kept. However, to increase clarity, please explain what is a bookkeeping model, and add a definition of bookkeeping in the glossary [France]
718	6	13	6	19	In order to enable readers to understand the implications of bookkeeping models, we suggest adding "used in the carbon budget for AR5" (lines 22-23 on page 2-32). [France]
7170	6	13	6	19	It is unclear to a non-specialist what a bookkeeping model is, and why this is relevant. A policymaker will not be concerned with the various methodologies to calculate these emissions levels - they will simply trust that the most appropriate one has been used. Therefore, I would suggest removing this section entirely. [United Kingdom (of Great Britain and Northern Ireland)]

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7172	6	13	6	19	A4.2: The discrepancy between modelled and reported fluxes seems like a big problem in terms of setting and monitoring progress against future targets: should this be a more important point? (again this is better described in the Exec Sum for Ch2). Please consider adding [United Kingdom (of Great Britain and Northern Ireland)]
716	6	14	6	14	Chapter 2 mentions LOW confidence (line 25 p 2-32 or line 33 p 2-4). [France]
204	6	14	6	14	The uncertainty language (medium confidence) in the SPM is incompatible with that (low confidence) in the underlying chapter, Section 2.4.1.2.2. We would suggest cross-checking the uncertainty language. [Japan]
4902	6	14	6	14	What does medium confidence refer to here? Is it not known what the countries have reported as anthropogenic emissions from AFOLU? Or does the confidence level refer to the uncertainty estimate of the quality of what has been reported? [Sweden]
7174	6	14	6	15	A4.2: Here "bookkeeping models" are referred to but they are the same models that produced the "modelled direct flux" referred to in A4.1 so it seems odd to make a distinction here. Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
380	6	15	6	15	Explain "bookkeeping models" in text or foot note. This would not be normal wording for policymakers [Ireland]
206	6	15	6	15	The phrase "bookkeeping models" may be quite unfamiliar to most of the policymakers and many of the scientists. We would suggest replacing "bookkeeping" with "numerical" for clarification, or adding an explicit reference to the Box 2.2 of the underlying chapter. [Japan]
208	6	15	6	19	Suggest to replace this part, "This discrepancy...land sink.{2.4.1}", with the sentences below referring to the lines 11-28 on page 12 of the Technical Summary. Compared with the lines 11-28 on page 12 of the TS, the original text only summarizes the first paragraph of the TS and omits the equally important second paragraph. As such, the suggested sentences below summarize the both. "This discrepancy is consistent with the different approaches used to defining anthropogenic fluxes. The gross emissions from AFOLU, which include compensating deforestation and afforestation fluxes, are more indicative of mitigation potential of reduced deforestation than the global net emissions." [Japan]
1576	6	16	6	19	The text aims to explain the differences between the CO2 AFOLU emissions reported in the GHGI (0.1+/- 1.0 Gt CO2 yr-1) and a larger estimate from models (i.e. 5.1+/-2.6 Gt CO2 yr-1). Nevertheless, the current text explains that a larger area of forested area is included in the GHGI, and therefore a larger sink is reported. There is, de facto, no explanation on the higher estimates resulting from the bookkeeping models. Additional explanation of the reported discrepancy or rewording of the current text is suggested to clarify the substantial difference between the abovementioned GHGI data and models' estimates. [Italy]
4204	6	16	6	19	The discrepancies in estimates are also affected by incomplete and out-of-date inventory reporting, especially for a number of developing countries for which AFOLU emissions may be significant. This should be noted as one factor behind different estimates. Inventories do not necessarily include "a large net sink on managed land"; this varies greatly by country. Indirect environmental effects are not the only driver of sequestration; in some countries there have been significant reforestation/revegetation/enhancement efforts. This paragraph should be revised. [United States of America]

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2500	6	17	6	17	Suggest to rephrase sentence to: "Inventories consider larger areas of forested lands to be managed and include A LARGE ANTHROPOGENIC net sink on managed land due to indirect effects of environmental change." as the current form was difficult to understand. [Germany]
8152	6	18	6	18	Replace "indirect effects of environmental change" with "indirect human-induced environmental change and the dynamic effects resulting from past changes in activities and practices". [European Union (EU)]
8154	6	18	6	18	Suggest to replace "some" with "most" , because bookkeeping models deliberately aim to capture direct effects only, and therefore exclude most of recent indirect human-induced effects. [European Union (EU)]
8156	6	19	6	19	It would be important to add "Therefore, AFOLU CO2 estimates reported here are not necessarily comparable with countries' GHG inventories". This sentence comes from SPM of SR1.5. [European Union (EU)]
8158	6	19	6	19	It would be important to add a sentence on the need to reconcile it in assessing the the global progress towards global temperature goals. [European Union (EU)]
720	6	20	6	20	Please specify "anthropogenic CH4 emissions" [France]
726	6	20	6	20	Please precise if it is "Managed land" or just "Land". As ruminants are also mentioned in the explanations of this sentence (p5 chap 2), the land referred to may be AFOLU. If it's the case, please write AFOLU to make it easier for the reader. [France]
456	6	20	6	20	Replace "land is a net source" with "agriculture is a net source", the break down of these elements is important for policy. [Ireland]
8600	6	20	6	20	To minimise potential for misinterpretation, should insert the word 'CH4' so that the sentence reads "...accounting for 61% of anthropogenic CH4 emission...". [New Zealand]
88	6	20	6	20	Consider changing the word "Land" to "Agriculture" (or "Land-based agricultural activity") for greater accuracy. [Spain]
4904	6	20	6	20	Please write, for clarity: "... 61% of anthropogenic CH4 emissions..." [Sweden]
7176	6	20	6	20	I think this is saying that land emissions of CH4 comprise 61% of total anthropogenic methane emissions, but this isn't 100% clear. Please state this. [United Kingdom (of Great Britain and Northern Ireland)]
7186	6	20	6	20	Please clarify what the 61% refers to. Is it 61% of total global anthropogenic CH4 emissions? Currently, it is not clear and could be interpreted as all GHG emissions. [United Kingdom (of Great Britain and Northern Ireland)]
8160	6	20	6	21	It may be unclear what "61% of anthropogenic emissions" refers to. It should read "anthropogenic methane emissions". However, the precision suggested by "61%" does not seem justified by the high uncertainty of the estimates of methane emissions (and the anthropogenic fraction thereof). A confidence interval could be used, or it could say "for around 60%". The uncertainty language could be revised accordingly (higher than "medium confidence"). [European Union (EU)]
8768	6	20	6	21	"CH4" Indicate the name of nomenclature [Chile]
1834	6	20	6	21	"Land" is a vague term here, so please consider specifying the sources or using the term "AFOLU", if that is what is meant. "61%" seems a high share in anthropogenic emissions. The value cannot be found or derived from the chapters in the full report and available scientific literature seems to indicate rather a range of 40 to 50%. Please check. [Finland]
722	6	20	6	21	Please consider using the same time horizon 2008-2017 than the one used before, in order to improve comparability, consistency and understanding. [France]

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7182	6	20	6	21	Firstly, it is unclear why the term 'land' is used in A4.3 as opposed to AFOLU, which is used elsewhere. Secondly, the first sentence should be rephrased as 'AFOLU/land accounted for 61% of anthropogenic methane emissions from 2005-2015' to avoid the impression that land methane emissions account for 61% of total global GHG emissions. [United Kingdom (of Great Britain and Northern Ireland)]
1766	6	20	6	25	Balance should also be given as CO ₂ -equivalents to make it comparable [Denmark]
724	6	20	6	25	While quantitative values are given for CO ₂ and N ₂ O for land emissions, this is not the case for CH ₄ . To balance the three GHG discussion, estimates of land based emissions from anthropogenic emissions should be provided. Values could be extracted from Figure 2.9 of Chapter 2. While this may not much change the reported range, three inventories are reported in Chapter 2: EDGAR, FAO and GHGI. The Global Carbon Project is leading a synthesis initiative on the methane budget that is not mentioned in Chapter 2. The last budget (Saunio et al., 2016, published in ESSD), covers only 2000-2012, this may be why this global review has been discarded, though other inventories and estimates of anthropogenic emissions were included (namely GAINS model and USEPA). [France]
2502	6	20	6	25	Please provide information on the increase in CH ₄ emissions and the contribution to radiative forcing during the industrial era to provide context to this information. Also, please add a short sentence explaining why wetlands and peatlands make up a larger proportion of emissions than they did before 2000. (Is it directly due to human activity?, is it a feedback loop in the climate system?) [Germany]
570	6	20	6	25	It is suggested to add the direct anthropogenic cropland (Paddy, rice, etc) and N ₂ O emissions. [India]
1574	6	20	6	25	The paragraph is related to CH ₄ emissions, referring to the land as a net source of CH ₄ . In the last sentence there is a reference to ruminants, as a key contributor to CH ₄ emissions. The first sentence should be modified as following: "AFOLU sector is a net source of CH ₄ , accounting for 61% of anthropogenic emissions during 2005 to 2015 (medium confidence)." [Italy]
7722	6	20	6	25	Land is a general term. Please consider specifying the land related human activities that contribute to methane emissions, for instance agriculture, rice cultivation and ruminant livestock are responsible for about half of global anthropogenic methane emissions (ref A1.3). Please consider revising A4.3 and A1.3, where the same information is described in both paragraphs. [Norway]
7178	6	20	6	25	There are a series of high confidence statements in this paragraph that when seen in full context are arguably misleading in their degree of certainty. The wider context is that methane emissions are rising and we do not fully understand why - this is an area of active research with numerous papers published in the past couple of years. It may be true that in isolation each of your statements are high confidence, but the overall picture remains of an incomplete understanding. Would suggest providing some text by way of context (e.g. along the lines of "we are confident that methane is rising, that biogenic sources make up a larger proportion and ruminants are also increasing, but overall there is a poor understanding of the exact sources and drivers of this methane rise and fossil sources may also play a role") [United Kingdom (of Great Britain and Northern Ireland)]
7180	6	20	6	25	Please quantify methane emissions - CO ₂ and N ₂ O have quantified values, but not methane. This is inconsistent. [United Kingdom (of Great Britain and Northern Ireland)]

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7184	6	20	6	25	A4.3: This para is unclear, what does "land" refer to here in terms of its contribution to anthropogenic emissions, AFOLU? Biogenic sources and ruminants are mentioned later in the paragraph - are these part of the 61%? (it's hard to work this out even from the underlying chapter, 61% is only mentioned in the Exec Summ). Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
1570	6	20	6	31	It is not clear the source for data and shares reported in the paras A4.3 and A4.4; GHGI or bookkeeping models? Please add a clear reference to the paras A4.3 and A4.4. [Italy]
398	6	20	6	35	Some additional quantification of the material here would be welcome perhaps a table on this could be used. [Ireland]
1186	6	21	6	22	Specify the period over which this increase in CH4 concentration has occurred. [Canada]
7188	6	21	6	22	The statement that 'there is a significant increase of methane concentration in the atmosphere' does not add any value unless an indication is given of how much concentrations have increased in what time period. [United Kingdom (of Great Britain and Northern Ireland)]
1188	6	22	6	24	clarify whether "biogenic sources such as tropical wetlands and peatlands" is a reference to natural sources or anthropogenic sources. We think this whole paragraph is about anthropogenic methane emissions but it is not entirely clear as written. [Canada]
728	6	22	6	24	Compared to the Summary Section 2.1 on land CH4 emissions, the sentence is a bit modified. Inserting "such as tropical wetlands and peatlands", may induce the reader to think that 1) biogenic is natural - which is not the case, 2) forget the contribution of agricultural CH4 emissions. To keep "high confidence" (signal in C13H4 in the atmosphere) for the sentence, discard "such as tropical wetlands and peatlands". In addition, biogenic could be defined in the glossary (and followed by * in the SPM in order to highlight that it is defined there). [France]
730	6	22	6	24	We invite the authors to introduce numbers to inform about the actual increase in the proportion of emissions [France]
8666	6	22	6	24	Clarify whether emissions from tropical wetlands and peatlands is anthropogenic - this may have implications for management, as these systems can be high value biodiversity areas [A4.3] [New Zealand]
4906	6	22	6	24	Why do these sources now make up a larger proportion? Have they increased more than other sources, or have other sources decreased more? [Sweden]

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8162	6	22	6	25	A4.3 - please explain/clarify the significance of biogenic sources such as wetland & peatland accounting for a greater share of CH4 emissions. - If the statement refers only to wetlands and peatlands, then it would be sufficient to mention those, deleting "biogenic sources such as". If it refers to all biogenic sources, then there is no reason to give only wetlands and peatlands as examples, as there are many more - Does this refer to a greater share of anthropogenic CH4 emissions or of all emissions? - Is this due to expanded AFOLU activity? - the suggestion "tropical wetlands and peatlands make up a larger proportion of emissions than they did before year 2000 (high confidence)" does not seem to be supported by the underlying chapter {2.4.2}. That chapter is rather ambiguous about the role of tropical wetlands. It quotes Poulter et al. (2017) suggesting the opposite ("wetland CH4 emissions increases in the boreal zone have been offset by decreases in the tropics and concluded that wetlands have not contributed significantly to renewed atmospheric CH4 growth."). After referring to some other results which point in the opposite direction with high uncertainties, the section concludes that wetlands (in general, not tropical) are "important drivers of current growth rates", but not that they would make up a larger proportion of methane emissions. [European Union (EU)]
7190	6	22	6	25	Would it be possible to add the scale of how these contributions have increased? [United Kingdom (of Great Britain and Northern Ireland)]
8634	6	23	6	23	Wetlands evidence points to less wetland as humans have drained wetland for agriculture and the same for peatlands [New Zealand]
4206	6	23	6	23	This is not supported by the literature. Even if wetland emissions have increased, the rate of increase is surpassed by agricultural emissions and so the relative role has been diminished. [United States of America]
8164	6	24	6	24	Split the numbers for ruminants and rice - they require different intervention policies. [European Union (EU)]
732	6	24	6	25	"increasingly important" would mean that the contribution of these sources are more important in the changes in methane emissions than before. This would need to specify the time period. Anyway, this discussion does not seem to be part of Section 2.4.2 on methane emissions. Considering the high uncertainty in the knowledge of the community regarding methane changes and its contributing sources over the past decades, it may be more fair to discard "increasingly" and keep only "important contributors". [France]
734	6	24	6	25	Please check the level of confidence as, in section 2.1, it is indicated "medium evidence, high agreement" (line 7, page 2-5). [France]
2504	6	24	6	25	From the trend of increasing meat consumption over the last decades, we would expect that there is not only an expansion of rice cultivation but also on ruminant meat that are increasingly important contributors to rising methane emissions. Please clarify accordingly, so the sentence might read: "The expansion of ruminant livestock and rice cultivation are also increasingly important contributors to rising methane emissions." It would be also very helpful, if the authors could provide the fraction of each contributor and the time scale in which a significant increase in emissions occurred. [Germany]
4908	6	24	6	25	Have these sources increased more than others, or other contributors reduced? [Sweden]

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7192	6	24	6	34	Sections A5.5 and A5.6 are closely linked - suggest these could be merged. [United Kingdom (of Great Britain and Northern Ireland)]
8166	6	25	6	25	SPM reference chap 2.4.2, there is an issue with the category "Enteric Fermentation" of the figure 2.9 in this chapter (the color of this category does not appear in some columns of the chart) [European Union (EU)]
8168	6	25	6	25	There is considerable disagreement on what is causing the recent uptick in CH4 concentrations, which is not accurately expressed by singling out rice and ruminants. [European Union (EU)]
8770	6	26	6	26	"N2O" Indicate the name of nomenclature [Chile]
1572	6	26	6	26	The first sentence should be modified as following: "AFOLU sector is a net source of CH4, accounting for 61% of anthropogenic emissions during 2005 to 2015 (medium confidence)." [Italy]
8636	6	26	6	26	Nitrogen presumably includes fertiliser nitrogen and dung and urine nitrogen deposited onto paddocks by animals? [New Zealand]
8170	6	26	6	27	It would be helpful to provide an estimate of the share of AFOLU and N application in total N2O, instead of just stating it was "the main anthropogenic source". [European Union (EU)]
1768	6	26	6	31	Balance should also be given as CO2-equivalents to make it comparable [Denmark]
458	6	26	6	31	The figures in A4.4 could be clearer if broken down in a table [Ireland]
7724	6	26	6	31	Please specify the contribution of each land use category; agriculture, forestry and other land use to N2O emissions. For instance, as indicated in SRCCL- 2.4.3.2, Agriculture is responsible for approximately two-thirds of N2O emissions (robust evidence, high agreement). This could be relevant information for policy makers. [Norway]
7194	6	26	6	31	You only provide a quantified emissions estimate for cropland soils, please provide total N2O emissions from AFOLU. This will then enable the reader to understand the actual contribution of pasture and rangelands, for example. [United Kingdom (of Great Britain and Northern Ireland)]
7196	6	26	6	31	A4.4: The point from the Exec Summ (Ch2, p2-5, lines 11-19) about the benefits of reducing fertiliser application rates in regions where it exceeds crop demand seems like an important point that hasn't made it into the SPM. Please consider including [United Kingdom (of Great Britain and Northern Ireland)]
4208	6	26	6	31	Given that N2O linked with fertilizers, recommend mentioning more judicious use of N fertilizer, the use of intercropping N fixing species, and so forth. [United States of America]
736	6	27	6	28	Please consider to express this figure in CO2eq, and to use the same time horizon 2008-2017 than the one used previously, in order to improve comparability, consistency and understanding. [France]
738	6	27	6	28	Please check the value of 2.5 Mt N2O yr-1 as, line 14 page 2-5, it is indicated 3 Mt N2O yr-1. [France]
8172	6	28	6	28	The reasons for the "disproportionate growth" should be noted. [European Union (EU)]
46	6	28	6	28	"Disproportionate" is use to decribe the growth in emissions from managed pastures - this is a loaded word and we would suggest using "major" or "extensive". [Denmark]
210	6	28	6	29	"pasture" is usually managed. Therefore, "managed grassland" may be more appropriate as was written in page 12 line 7. [Japan]
740	6	28	6	30	Please clarify this sentence. We suggest to use " ... more than three-quarter of N2O emissions from grazing land (pasture and rangeland) between 1961 and 2014 (medium confidence). Grazing land are responsible ..." [France]

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4910	6	28	6	30	It is unclear over what period the different findings apply for: growth in emissions (over 2010-2016?), which were a large contributor 1961-2014? Please clarify. [Sweden]
8174	6	28	6	31	A4.4 useful to clarify that the disproportionate increase in emissions from managed pastures is due to increased N inputs (as 2-5 lines 22-27 state), and that this accounts for 3/4 of emissions from grazing land from only 1/4 of the area. Please indicate how N2O emissions from pasture compare to total AFOLU N2O. [European Union (EU)]
8720	6	28	6	31	language is uncertain. three-quarters of N2O emissions from grazing land... and next sentence pastures responsible for more than 1/3 of total N2O emissions. [Ireland]
4912	6	28	6	31	Not all pastures are fertilized and therefore the reason behind the mentioned increase in N2O should be explained in more detail in order to clarify that many pastures thus do not contribute to this trend. Also, an increased use of fertilizers will generate an increase in soil C which may partly offset any increase in N2O emissions of N2O. [Sweden]
742	6	30	6	31	It should be made clear that dry and extensive areas are less concerned because of dry condition and lower fertilizer use (see 5.4.2. "N2O soil emissions linked to livestock through manure applications could be 20%-40% lower than previously estimated in some regions, for instance in Sub-Saharan Africa"). Additionally, the proportion of anthropogenic GHG emissions they represent could be add, to allow the reader to have an idea of their impact [France]
2506	6	30	6	31	It would be very interesting for policy makers to be provided with specific information about what agricultural activities on pastures and rangelands lead to the N2O emissions and how they developed over the last decades. Are they mainly due to livestock? If so, it would be interesting to understand, how these emissions would be affected by dietary choices or reduced animal-sourced food. We kindly request the authors to be more specific and provide information accordingly. [Germany]
1192	6	32	6	33	The effect of the climate change on the land carbon sink over the 21st century is projected to be a weakening, but the land is still projected to take up carbon. Recommend replacing 'counteract' with 'partly counteract'. [Canada]
548	6	32	6	33	Kindly mention the level of confidence for the sentence. Increase in CO2 fertilization leading to higher biomass and thus leading to high respiratory CO2 emissions.....are we not overplaying the CO2 emissions from biological systems -- respiration and photorespiration have significant role in plant physiological activities and have been in balance with the natural processes. Moreover, the CO2 net sink change is important for change in atmospheric CO2. The CO2 emissions from other sectors and deforestation may be highlighted. [India]
1412	6	32	6	35	We would prefer to see this important finding related to potential emissions of permafrost thawing to be reflected in the headline message [Luxembourg]
8176	6	32	6	37	Thawing of high of permafrost in high altitudes will lead to instability of mountain slopes and landslides [European Union (EU)]

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5468	6	32	6	37	the paragraph highlights the vulnerability of land to climate change. However, it should be further stressed that CC is not dependent of Land use change alone. Moreover, 80% of the emissions lie outside land use. And if there is no effective actions in those sectors, all the efforts to promote sustainable land use will not refrain the negative impacts that will take place, including further emissions from land use due to increase of temperatures. This should be made clear, even if the report does not address other sources of emissions directly. But they have a strong impact on Land use, hence, should be reported. [Brazil]
744	6	32	6	37	Please consider to better reflect these very important elements in the paragraph A.3.3 (SPM page 5) in order to improve the self consistency of the SPM. [France]
2508	6	32	6	37	We strongly urge the authors to provide quantitative information on these feedbacks of vegetation and soils to climate changes. It is essential that the SRCL delivers on the future emissions from land. [Germany]
8890	6	32	6	37	In paragraph A4.5, it is not clear if futures increases in CO2 emissions from vegetation and soils due to climate change, and CO2 fertilisation are anthropogenic or not. [Liechtenstein]
8814	6	32	6	37	In paragraph A4.5, it is not clear if futures increases in CO2 emissions from vegetation and soils due to climate change, and CO2 fertilisation are anthropogenic or not. [Switzerland]
7198	6	32	6	37	A4.5: this is a key, unresolved uncertainty in terms of future climate and perhaps could be highlighted sooner? [United Kingdom (of Great Britain and Northern Ireland)]
7200	6	33	6	33	Will this completely counteract increased sinks or is there expected to be a residual? Could you clarify? [United Kingdom (of Great Britain and Northern Ireland)]
2884	6	33	6	35	Suggest rephrasing assertions of anything that *WILL* happen. Suggest amending to say "is/are likely to" or "is/are projected to": "Thawing of high-latitude/altitude permafrost is likely to accelerate the loss of soil organic carbon and increase methane emissions relative to CO2 ..." [Australia]
1194	6	33	6	35	It would be useful to say something about the time-frame for the projected acceleration in loss of soil C and CH4 emissions due to permafrost thawing. My understanding is that much of this won't happen until the 22nd century, subject to what warming trajectory occurs before then. This is discussed a bit in 2.6.3.2 [Canada]
4210	6	34	6	35	KEY ISSUE [FLUXES]: Isn't it at least plausible that the methane-to-CO2 ratio will decline as permafrost drains and more aerobic conditions become more common? What justifies medium confidence that the ratio will increase rather than decrease? [United States of America]
8178	6	35	6	35	Is it not known with higher confidence? [European Union (EU)]
8180	6	35	6	35	"Thawing of high-latitude/altitude permafrost will accelerate the loss of soil organic carbon and increase methane emissions relative to CO2 emissions" There is no observational evidence that this is already significantly happening. This statement should mention when this is likely going to be important. [European Union (EU)]
1196	6	35	6	35	The word "respiration" here is unclear. Presumably it refers to heterotrophs and the main group is decomposers rather than herbivores (including arthropods). It could also include respiration from plants (autotrophs). I think it should summarize which groups are included. [Canada]
7202	6	35	6	37	The final sentence of A4.5 is unclear and could be rephrased as "The balance between respiration and photosynthesis in plants as global temperatures increase is a key uncertainty for the size of the future land carbon sink". [United Kingdom (of Great Britain and Northern Ireland)]
1198	6	36	6	36	Please clarify phrase "carbon input from enhanced plant growth". Do you mean "carbon uptake from enhanced plant growth" or "carbon storage from enhanced plant growth?" [Canada]

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400	6	36	6	37	is an estimate of the total carbon taken up in soils and biomass provided or possible in this report and an estimate of distance from carbon/GHG neutrality/balance [Ireland]
4914	6	36	6	37	It is not clear what the confidence level refers to. It would seem that it refers to this being a key uncertainty. Would this be more of a simple fact? [Sweden]
8182	6	37	6	37	Medium confidence in a key uncertainty is somewhat an oxymoron. [European Union (EU)]
2510	6	38	6	38	It should please read: "... historical and future anthropogenic changes in land cover result ...", reasoning: the changes are anthropogenic, not the land cover itself. [Germany]
7214	6	38	6	38	It would be good to be clearer about what is driving albedo change given the likelihood of increase due to vegetation clearance and decrease due to reduction in ice caps. This won't be immediately obvious to policymakers. [United Kingdom (of Great Britain and Northern Ireland)]
1200	6	38	6	39	While the terms biogeochemical warming and biophysical cooling are explained in Ch. 2, using these terms (which are not in the glossary either) makes reading the SPM unnecessarily complicated. Strongly recommend straight forward plain language such as "warming from greenhouse gas emissions" and "cooling due to increased surface reflectivity (albedo)". [Canada]
2926	6	38	6	40	Suggest rephrasing to read: "... changes in anthropogenic land cover have probably resulted in, and are likely to continue to result in biogeochemical warming that is partially offset by biophysical cooling due to an increased surface albedo (low confidence)." [Australia]
1798	6	38	6	40	A5. Chapter 2 in background report includes description of BVOC-aerosol-cloud formation phenomena. Does this statement properly account for the consideration of VOCs-aerosols-clouds feedback loop in the net balance of land use change? Please consider the possibility for acknowledging the uncertainty of the net balance due to other biophysical non-GHG effects than albedo. [Finland]
746	6	38	6	40	In order to avoid a low confidence statement at the very beginning of the head of chapter, we suggest, before the first current sentence, to repeat the corresponding sentences from the executive summary of chapter 2: "Changes in land conditions from human use or climate change in turn affect regional and global climate (high confidence). On the global scale, this is driven by changes in emissions or removals of CO ₂ , CH ₄ , and N ₂ O by land (biogeochemical effects)" (lines 43-48 page 2-5) and by changes in exchanges of energy, including those related to albedo, water and momentum fluxes. [France]
460	6	38	6	40	Remove the point with 'low confidence' and refer to regional rather than global with this point [Ireland]
1594	6	38	6	40	The inclusion of a low confidence statement doesn't seem appropriate for a key message. [Italy]
7930	6	38	6	40	In A.5 the net effect is (biogeochemical warming, partially offset by biophysical cooling) is labeled low confidence, different from A.5.1 where very similar statements are labeled as high and medium confidence [Netherlands]
90	6	38	6	40	Consider deleting the first sentence of the paragraph, qualified as 'low confidence'. The message is weak and could be confusing, eventually. [Spain]

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4916	6	38	6	40	"Low confidence" findings should be less central in the SPM (unless it is an extremely central issue and the fact that very little firm knowledge is needed, is important for policy). This would also seem to be in conflict with A5.1, albeit the headline statement combines a number of issues with different confidence levels. In any case, that there are compensating effects is perhaps not so much in doubt, even though the net impact for the future may well be. [Sweden]
7208	6	38	6	40	The first sentence of A5 implies both that that the warming effect is larger than the cooling effect, and that the albedo changes lead to cooling, whereas this seems to be uncertain looking at the underlying evidence (where both the sign and magnitude of both historical and future temperature changes are uncertain, and a range of biophysical effects is given that could imply either cooling or warming i.e. $-0.10 \pm 0.14^\circ\text{C}$). It may be better to state "In addition to the effects of greenhouse gas emissions on global temperatures, changes in anthropogenic land cover can affects temperatures in other ways, such as changes in surface albedo." [United Kingdom (of Great Britain and Northern Ireland)]
7216	6	38	6	40	This opening sentence seems to be simultaneously too definite "is*...offset" and too vague "is *partially* offset". It also lacks detail on the cause of net albedo increases. Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
4212	6	38	6	40	Suggest modifying so that there can be a higher confidence in the headline statement. Depending on the underlying literature, suggest clarifying to something like: "ON AVERAGE GLOBALLY, historical changes in anthropogenic land cover result in biogeochemical warming that is partially offset by biophysical cooling due to an increased surface albedo AND FUTURE CHANGES ARE PROJECTED TO DO SO AS WELL (XXX confidence)." [United States of America]
8792	6	38	6	40	It is not good a key finding that start with a low confidece statement. The confidence statemant is bout what. The phenomenon of warming or the phenomenon of the offset due to cooling effect of changing albedo? If the confidence is low about the biogeochemical warming please delete this idea. If it is about the offset please just delete the offset idea and keep the global biogeochemical warming with the correspondent confidence. Inthe chapter 2 you adjudicated very high confidenc, high confidence and medium confidece to any of this ideas, in fact adjudicate very high confidece to the current biogeochemecal warming. [Venezuela]
7206	6	38	6	44	The language in the A5 headline statement is impenetrable to a non-specialist - it is unclear what biogeochemical effects are and what biophysical effects are. In addition, the use of the word 'dampen' when talking about water vapour may be confusing to a non-english speaker. It might be better to state "At the regional scale, land can modulate climate change via..." Or if modulate is excessively complex a term, then perhaps simply "land can influence" [United Kingdom (of Great Britain and Northern Ireland)]
8184	6	38	6	45	Proposal to start key message A5 wiht the 'high confidence' statements [European Union (EU)]
7992	6	38	6	45	Please add last sentence A5.1 to the bold text [Netherlands]
8006	6	38	6	45	A5 is very general and of limited value for policy making as it is. Should focus on impact of land use change on climate change. First sentence of A5 has low confidence; is this correct? Is it common to include low confidence statements in bold tekst? [Netherlands]

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7218	6	38	6	45	This headline statement contains technical jargon and is hard to understand. Suggest instead "Changes in land cover due to human activity can influence climate change, including the likelihood, intensity and duration of many extreme events, including heat waves and heavy precipitation events." [United Kingdom (of Great Britain and Northern Ireland)]
1508	6	39	6	39	Biogeochemical and biophysical are confusing terminology. Definition ? [Belgium]
2514	6	39	6	39	Please avoid the introduction of the new expressions "biogeochemical warming" and "biophysical cooling" that remain enigmatic for non-experts and explain instead what is actually meant . The current text is only understandable when checking these expressions in the glossary. Suggest to rephrase "biogeochemical warming" with "global warming through biogeochemical effects" because a similar expression is used in the following section A5.1. [Germany]
212	6	39	6	39	The term, "biogeochemical warming", seems to be an uncommon expression. We would suggest, for instance, adding an explanatory phrase, such as "due to increased emissions of GHGs by land", after "biogeochemical warming" as is done for "biophysical cooling" that appears immediately after. [Japan]
1846	6	39	6	39	Change: replace 'partially ' with "partly" [Russian Federation]
7220	6	39	6	39	The terms 'biogeochemical warming' and 'biophysical cooling' will not likely mean anything to a policymaker [United Kingdom (of Great Britain and Northern Ireland)]
4214	6	39	6	40	"... that is partially offset by biophysical cooling due to an increased surface albedo ..." is only accurate for the boreal regions. In temperate and tropical regions, biophysical warming due to reduced soil moisture accessibility dominate over the albedo cooling effects. [United States of America]
748	6	40	6	42	Please consider deleting "vapour" [France]
7222	6	40	6	45	In these sentences the references to land would be better understood as terrestrial ecosystems - since the biophysical processes are undertaken within ecosystems [United Kingdom (of Great Britain and Northern Ireland)]
750	6	42	6	44	Could the increasing heavy precipitation partially offset warming? The direct impact of precipitation on surface energy budget is not simulated now (rain temperature is either ignored or assumed equal to air temperature). See for example Zhang et al. https://doi.org/10.5194/acp-19-5005-2019 . [France]
7224	6	43	6	44	Recommend defining "modulated by" for the SPM. If you mean "reduced because of", say that instead. [United Kingdom (of Great Britain and Northern Ireland)]
2924	6	38	7	3	Suggest clarification: in the bold statement (A5) there is LOW confidence in albedo & biophysical changes, but this is MEDIUM and HIGH in A5.1 - why the difference in confidence? [Australia]
8186	6	38	7	34	The section A5 could include a more explicit mention to the fact that biophysical effects associated with land cover change have a clear latitudinal trend. For example, in section A5.5 it could be noted that, "because of the combined climate impacts of GHGs and biophysical effects, reducing deforestation in the tropics has a major climate mitigation effect, with benefits at local levels too" (text taken from Ch 6). [European Union (EU)]
8188	6	38	7	34	The terms 'biogeochemical effect' and 'biophysical effect' should be explained in terms that are more commonly understood. It seems that the former essentially refers to the temperature impact of gases and particles in the atmosphere (including greenhouse gases), while the latter encompasses any other effect of land cover change on temperature. [European Union (EU)]

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5470	6	38	7	34	the section A 5 refers to anthropogenic changes, aiming at land recovery and other managerial changes that are adaptation strategies. Should be consider under B either or as well. [Brazil]
7204	6	38	7	34	This section, A5, generally lacks any context to really make it useful to a policymaker. It's largely just a list of basic scientific facts (e.g. soils can impact heat waves). It's not particularly providing policymakers with things that are actually useful for them to know - e.g. what are the trends, where are these things happening and so on. One place where this is done is A5.5 (we expected changes to regional winter warming). Currently overall this section reads like a textbook, so please provide additional context that will move it from a list of facts into a summary of key issues in this area of relevance to policy. [United Kingdom (of Great Britain and Northern Ireland)]
7210	6	38	7	34	In A5 there is no discussion about the balance between biogeochemical and biogeophysical impacts in different parts of the world i.e., boreal v. tropical. It's true that at the global scales, models don't agree with the overall sign of the temperature impact due to historical land-use change (2.6.1.1.1), but there is more confidence that at boreal latitudes the biogeophysical effects of forest loss dominate (2.6.2.1.3) and at tropical latitudes the biogeochemical effects of forests loss dominate (2.6.2.1.1). Please clarify this [United Kingdom (of Great Britain and Northern Ireland)]
7212	6	38	7	34	It would be useful to separate / clarify the model responses to historical v future land use change. At the global scale, models don't agree with the overall sign of the temperature impact due to historical land-use change (2.6.1.1.1). For future land-use change, it's difficult to generalise the model responses because the scenarios involve such different underlying land cover change, but models do agree that land cover change according to RCP8.5 (agricultural expansion and forest loss) will result in a warming. [United Kingdom (of Great Britain and Northern Ireland)]
2512	6	38	7	41	It is unclear if section A5 describes observed impacts or risks from future warming, and less so at which level of warming. It seems to aim at providing theoretical background? Please clarify and be more specific. [Germany]
2516	6	42	7	4	The word "sign" here can be misleading, especially for policy makers. Also "strength" is not very clear. Please use alternative language understandable to a broader audience. One option could be "magnitude and direction of change" [Germany]
2922	6	20			Suggest clarificaion: is the '61% of anthropogenic emission' on land only, or including oceans? [Australia]
1190	6	31			Clarify that in this sentence 'land' refers to terrestrial ecosystems, and the methane emissions referred to here do not include for example fugitive methane emissions from land-based oil and gas production [Canada]
1202	6	40			Replace 'land' with 'land cover change'. [Canada]
8190	7	1	7	1	Change "changes in anthropogenic land cover" to " anthropogenic changes in land cover". It may also be preferable to use "land-use changes", if it refers to the same phenomenon. If it is used with a different meaning, then the difference between the two concepts should be explained. [European Union (EU)]
2518	7	1	7	1	It should please read: "... historical and future anthropogenic changes in land cover result ...", reasoning: the changes are anthropogenic, not the land cover itself. [Germany]
1062	7	1	7	2	Please consider better highlighting that some changes in land cover lead to removals of CO2 from the atmosphere, such as afforestation in mid-latitude regions. [France]

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Comment No	From Page	From Line	To Page	To Line	Comment
2928	7	1	7	3	Suggest rephrasing to read "The net release of CO2 into the atmosphere from changes in anthropogenic land cover contributes to global warming through biogeochemical effects (high confidence), partly offset by global biophysical cooling, dominated by albedo increases". [Australia]
402	7	1	7	3	Is it anthropogenic changes? Also human is used earlier and consistency would be best. [Ireland]
7228	7	1	7	3	This sentence is confusing. The net release of CO2 into the atmosphere from changes in land cover does not just contribute to warming through biogeochemical effects. It mostly contributes because CO2 is a greenhouse gas. Do you mean that say that the radiative impacts of CO2 from land cover changes are then further mediated by biogeochemical and biophysical effects? Please be clear as the very technical science being discussed here will be confusing to the reader. [United Kingdom (of Great Britain and Northern Ireland)]
4918	7	1	7	4	It could be worth mentioning the difference between short- and long lived gases in relation to their respective effects on the climate in the long- and short term. Also, in order to reach the 1.5 or 2 degree targets CO2 emissions need to reach zero very quickly whereas there is still room for some emissions of for example methane. [Sweden]
4216	7	1	7	4	Define biogeochemical effects and global biophysical cooling in terms policymakers can understand. [United States of America]
1204	7	1	7	9	again, this paragraph is unnecessarily technical and difficult to read. Strongly recommend more plain language writing. Where possible, for example, replace "biogeochemical effects" with something like "GHG-induced warming" or "warming from GHGs". [Canada]
7932	7	1	7	9	uncertainty labels differ from A.5; see previous comment. Either align or explain how and why these can differ [Netherlands]
4920	7	1	7	9	The albedo effect from afforestation can in northern latitudes outweigh the positive effect from increased carbon storage. These regional differences should be highlighted. [Sweden]
7226	7	1	7	9	It won't be clear to the average policy reader what you mean here when you are talking about biophysical and biogeochemical effects. Please make this clear, otherwise the paragraph won't really be comprehensible to most readers. [United Kingdom (of Great Britain and Northern Ireland)]
7230	7	1	7	9	This paragraph is overall somewhat confusing for the average reader. It needs better context on the point you are trying to make - this is (I think) that while land use change has GHG impacts that impact warming, there are other impacts on climate change resulting from biogeochemical and biophysical effects (and the projections for these are somewhat uncertain). Making an opening statement along these lines would make it much clearer to the reader. [United Kingdom (of Great Britain and Northern Ireland)]
7232	7	1	7	9	Again, the term 'partly offset' in the first sentence of A5.1 implies that the warming effect is larger than the cooling effect, which appears to be contradicted later in the paragraph, and the rest of this paragraph does not appear to properly reflect the large amount of uncertainty found in the underlying chapter. Conflating historical and future changes also confuses things. Alternative wording could be "Historically, anthropogenic land use change has led to a global temperature change of 0.078±0.093°C, comprised of warming from greenhouse gas emissions counteracted by cooling from other effects such as changes in surface albedo. Future temperature changes strongly depend on the emissions pathway followed, though are expected to increase global temperatures under medium and high emission scenarios." [United Kingdom (of Great Britain and Northern Ireland)]

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Comment No	From Page	From Line	To Page	To Line	Comment
4218	7	1	7	9	KEY ISSUE [ALIGNMENT/ACTION]: Recommend adding a line of text in this section that clarifies something to the effect of "the relatively small historic net climate forcing due to anthropogenic changes in land cover change should not be confused with the climate mitigation potential of reduced GHG emissions and enhanced sinks." In other words, this statement of the net AFOLU problem is not to be confused with the net land-based mitigation solution. Suggest wrapping up with something like: "Our ability to assess ... findings on climate forcings of global terrestrial ecosystems is not to be confused with the potential role of improved land stewardship to mitigate climate change. That is, the ability to track fluxes in the system is not the same as understanding the potential to move the needle by changing land use, because you can focus on the things you know will have a positive change. As it stands, the impression is given that the land sector is not helpful for reducing GHG emissions and increasing C storage. [United States of America]
4220	7	2	7	2	Contribute should be have an 's' on the end. [United States of America]
1510	7	2	7	3	Biogeochemical and biophysical are confusing terminology. Definition ? [Belgium]
752	7	2	7	3	Even if biogeochemical and biophysical are defined in the glossary, they are not easy terms to understand for a policy maker. The authors could be more pedagogic, expliciting the terms or giving examples. [France]
754	7	2	7	3	Please check this level of confidence (medium confidence) as it does not seem consistent with the level indicated previously, line 40, SPM page 6 (low confidence) or lines 44-45 page 2-5 (very high level of confidence). Elements given throughout Chapter 2.6.1 tend to correspond to "very low" or "low" rather than to "medium". [France]
4222	7	2	7	3	Should the concept of 'radiative forcing' be introduced here. It does not appear anywhere in the SPM. [United States of America]
4224	7	2	7	9	KEY ISSUE [ALIGNMENT/ACTION]: "... partly offset by global biophysical cooling, dominated by albedo changes ..." is only accurate for the boreal regions. In temperate and tropical regions, biophysical warming due to reduced soil moisture accessibility dominates over the albedo cooling effects. The next two sentences support a tempering of the quoted phrase from line 3, as well as a similar sentiment in line 8. "... offset it via biophysical effects ..." is still overly reliant on the idea that albedo cooling effects are globally dominant when this is really only appropriate for the boreal regions. [United States of America]
1206	7	3	7	3	Rather than "albedo changes" which is un-necessarily vague, say "increases in albedo". [Canada]
7234	7	3	7	4	This sentence needs to be more carefully worded as it's too easy to take it out of context. [United Kingdom (of Great Britain and Northern Ireland)]
8192	7	3	7	7	A5.1 The inclusion of biogeochemical effects in this statement (explained as being largely CO2 emissions) is confusing because: i) it is not clear how these relate to the GHG fluxes described in A4. ii) the idea that combined biogeochemical and biophysical effects are small in comparison to GHG emissions is confusing - since GHG emissions from land are surely part of the biogeochemical effect. [European Union (EU)]
8194	7	3	7	9	It should be clarified what is meant by 'biogeochemical effects can be offset by biophysical effects' ... Could they be fully offset or just partially? Does it consider feedbacks? The limitations of the models need to be clearly stated. [European Union (EU)]

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Comment No	From Page	From Line	To Page	To Line	Comment
4226	7	4	7	4	Earth is a proper noun and should be capitalized throughout. [United States of America]
1512	7	4	7	5	We suggest modifying 'changes in global temperature' by 'contributions to global temperature changes' [Belgium]
4922	7	4	7	5	It might be possible to simplify (and as such clarify the message) by deleting "Over historical periods, earth system models... and biophysical effects.", as the magnitude is stated to be small. [Sweden]
1770	7	5	7	5	The point made that GHG emissions from AFOLU over-rule other biogeochemical processes associated with AFOLU is important and could be moved to the top of A1.5 [Denmark]
7236	7	5	7	7	"The magnitude of such contributions to global temperature change is small compared to that caused by GHG emissions from all sources." - is it possible to quantify here how the contribution to global temperature change from human land-use changes compares to the contribution from all GHG emissions? [United Kingdom (of Great Britain and Northern Ireland)]
756	7	7	7	7	We suggest to precise which projected changes are here referred to. [France]
404	7	7	7	7	"Increase" is more correct than "enhance" here [Ireland]
1208	7	7	7	9	The effects discussed here do not include the land carbon sink, which could reasonably be characterized as a 'projected change in land' 'via biogeochemical effects'. Suggest revising to clarify that this is for the direct effects of LUC only. [Canada]
1210	7	7	7	9	The scenarios introduced in this report are the SSPs (Box A7), but these projections are for the RCPs. The SSPs exhibit a broader range of land use changes than the RCPs (see Riahi et al., 2016). The authors should assess whether or not these projections are equally valid for the SSPs. If there is insufficient information to assess this, then they should flag that these projections are for the RCPs, otherwise readers will assume that the medium and high emissions scenarios referred to here are the medium and high SSPs introduced two pages later. [Canada]
7238	7	7	7	9	Final sentence of this para needs to conclude by clearly stating the net effect of the projected changes & associated biophysical effects. . [United Kingdom (of Great Britain and Northern Ireland)]
4228	7	7	7	9	State the expected net effect. [United States of America]
4230	7	7	7	9	This is confusing. Are the authors telling the reader that biogeochemistry alone is responsible for global warming (should be 'global change') and that biophysical effects [e.g., albedo, feedbacks through temperature changes (nighttime, seasonal)] offset or negate changes in global temperatures (under medium and high emission scenarios)? [United States of America]
1848	7	8	7	8	Probably, 'partly offset' [Russian Federation]
4232	7	10	7	10	Some quantification of the 'climate change' effect is recommended. [United States of America]
2930	7	10	7	11	Suggest rephrasing to read: "Desertification exacerbates climate change through changes in vegetation cover, sand and dust aerosols and GHG fluxes (high confidence). However, it also tends to increase albedo ..." [Australia]
1772	7	10	7	12	later part of the sentence (about albedo) confuses the overall message. [Denmark]

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Comment No	From Page	From Line	To Page	To Line	Comment
758	7	10	7	12	In order to better reflect the findings in the report (section 3.4.2. lines 11-31 pages 3-29), we suggest to use a more balanced sentence such as: "Desertification also tends to increase albedo. In cases where the shortwave dominates the surface energy balance, this will decrease energy available at the surface and associated surface temperatures, producing a negative feedback on climate change (high confidence)." [France]
2520	7	10	7	12	Is it possible to specify how desertification processes exacerbate climate change - e.g. by giving the direction of the change (increase/decrease in sand/dust aerosols, decrease/increase in vegetation cover, greening/browning etc.) in order to clarify the processes involved? If the result is clear (exacerbate, high confidence), the direction of the change would supposedly also be clear? Also, wouldn't increased albedo counteract climate change, potentially neutralizing the exacerbating effect? And why is the opposite direction (CC exacerbating desertification processes) not mentioned? Please revise and clarify. [Germany]
214	7	10	7	12	The first sentence ("Desertification exacerbates climate change through changes in vegetation cover, sand and dust aerosols and GHG fluxes.") gives an impression that desertification leads to further warming, while the second sentence ("It also tends to increase albedo, decreasing energy available at the surface and associated surface temperatures.") implies that it may lead to cooling. We would suggest that another formulation may be considered that clarifies and reflects the description in the underlying chapter, Section 3.4.1. [Japan]
7240	7	10	7	12	You have presented two high confidence statements here, one around a warming effect and one with a cooling effect ("decreasing....surface temperatures). However, it is difficult for the reader to then infer the magnitude of the overall impact on climate and so the significance of desertification on this context is left obscured. What is the overall contribution of desertification? Can you make such a comparison? Please include wider context here. [United Kingdom (of Great Britain and Northern Ireland)]
1516	7	10	7	18	Information in A.5.2 and A.5.3 is contradictory. The 2 paragraphs should be better integrated. Also a definition for albedo is necessary (glossary + footnote in SPM because glossary not included in SPM)) [Belgium]
4234	7	11	7	12	For simplicity, suggest replacing the phrase "decreasing energy available at the surface and" with "decreasing reflectivity," or remove "decreasing energy available at the surface and" altogether. [United States of America]
8602	7	13	7	13	is 'dampen' the most appropriate term? Mitigate or moderate? [New Zealand]
4236	7	13	7	13	Maybe amplify would be a better characterization instead of strengthen. Soils don't get stronger. [United States of America]
7242	7	13	7	14	The use of the word 'dampen' when talking about wet soils may confuse non-english speakers. This could be rephrased as "wet soil conditions can reduce the severity of extreme warm events" [United Kingdom (of Great Britain and Northern Ireland)]
8196	7	13	7	15	A5.3 reference to irrigation as a means to maintain soil wet under extreme warm events should be qualified to take account of level of water resources / droughts as this would not be an adequate strategy under all circumstances. See comment above entitled consolidate messages: irrigation [European Union (EU)]

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2932	7	13	7	15	Suggest rephrasing: this sentence very long and the example could be confusing. The theory is that drier soil contains less moisture to evaporate and carry heat away from the ground. This results in higher surface temperatures, fewer clouds and less rainfall. Heat waves and dry soil conditions do not need to be caused by one another, but the point being made is that when both occur at the same time, there is an increase in the effect of the heatwave felt at ground level. Suggest that the example that follows would be clearer if written as a separate sentence - "extreme warm events. For example, irrigated crop management practices that maintain a cover crop all year round". Note that non irrigated cover crops could have the opposite effect, so we need to be clear. [Australia]
1652	7	13	7	15	There are no definitions of dry soil and wet soil, which are very important, in the SPM or the glossary. It is suggested to clarify and define them. [China]
1746	7	13	7	18	"Dry soil condition and Urbanization" are discussed in the same subsection A5.3. Is there a strong relationship between the two? if not "they should be separated and put into different subsections. [Saudi Arabia]
48	7	13	7	28	The report describes: "Dry soils can strengthen summer heat wave conditions...". Instead of writing "strengthen" it seems more appropriate to use "worsen", as it is a bad side effect. The sentence would go: "Dry soils can worsen summer heat wave conditions..." [Denmark]
1584	7	14	7	14	The sentence is not clear, for example the right position of the phrase "for example from irrigation" should be checked. [Italy]
406	7	15	7	16	Not clear on value of statement for this report also same comment as above on enhance. [Ireland]
4238	7	15	7	16	It's not JUST a heating during day times. From the U.S. Climate Science Special Report, volume 1, chapter 10, the UHI also impacts nighttime temperatures and varies spatially with humidity and population density. Urban forcings are becoming better understood: In the United States, the urban heat island effect results in daytime temperatures 0.9-7.2°F (0.5-4.0°C) higher and nighttime temperatures 1.8-4.5°F (1.0-2.5°C) higher in urban areas than in rural areas, with larger temperature differences in humid regions (primarily in the eastern United States) and in cities with larger and denser populations. The urban heat island effect will strengthen in the future as the structure and spatial extent as well as population density of urban areas change and grow (high confidence). [United States of America]
760	7	15	7	17	In order to distinguish the issue of dry soils and the issue of cities, we suggest to separate the remaining part of this paragraph in a separated paragraph A.5.3a. This would allow to have a more clear focus on cities, which has become recently one of the major issues of the World Meteorological Organization. In order to improve the consistency with the main report, we also suggest to repeat the key findings from the Cross-Chapter Box 4: Climate Change and Urbanisation: "Climate change is already affecting the health and energy demand of large numbers of people living in urban areas (high confidence). Future changes to both climate and urbanisation will enhance warming in cities and their surroundings, especially during heat waves (high confidence). Urban and periurban agriculture, and more generally the implementation of urban green infrastructure, can contribute to climate change mitigation (medium confidence) as well as to adaptation (high confidence), including co-benefits for food security and reduced soil-water-air pollution." [France]
1520	7	15	7	18	Sentence on urban heat islands should be separated from the rest of the Para. [Belgium]

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4240	7	15	7	18	The point regarding urbanization and the heat island effect seems unique enough that it should have it's own specific point (A5.X) rather than be combined with dry soils. [United States of America]
8198	7	16	7	16	The heat island effect can be mitigated by significantly increasing green spaces in the cities. A qualifier could be added, for example "... The heat island effect, if unabated ..." [European Union (EU)]
8604	7	16	7	16	does the evidence support the definitive language of 'intensifying' (the inference that it 'always' does)? [New Zealand]
4242	7	16	7	17	Not sure this is in your literature citation: Urban temperatures can contribute to urban-induced thunderstorms in the southeast. Ashley, W.S., M.L. Bentley, and J.A. Stallins, 2012: Urban-induced thunderstorm modification in the southeast United States. Climatic Change, 113, 481-498. http://dx.doi.org/10.1007/10584-011-0324-1 [United States of America]
8200	7	19	7	19	Clarify what is meant by "Changes in local land cover or irrigated water availability". It is unclear whether it refers to changes in irrigation (due to water availability or otherwise), or the depletion of water sources. [European Union (EU)]
766	7	19	7	19	suggestion of modification : "water availability for irrigation" [France]
2522	7	19	7	19	"...or irrigated water availability..." The terminology is unclear and should be specified/rewritten. Does it refer to "share of irrigated area" or "extend of irrigated crop land"? [Germany]
550	7	19	7	19	irrigated should be changed to irrigation [India]
1578	7	19	7	19	"Irrigated water availability" is unclear. Maybe it should be changed to "availability of water for irrigation" ? [Italy]
4244	7	19	7	19	The word "local" appears to be missing between "affect" and "climate"; this would help clarify the scale relevant to A5.4. [United States of America]
762	7	19	7	20	It should be said that this is only the result of modelling studies (Chapter 2 line 29 and 39-42 on p2-67). [France]
7244	7	19	7	21	But land use changes, such as deforestation of the Amazon could also have global scale effects. Important to also highlight this please. [United Kingdom (of Great Britain and Northern Ireland)]
764	7	19	7	23	The purpose of this paragraph remains unclear. Please consider adding a first sentence to bring this clarification. [France]
4246	7	19	7	34	KEY ISSUE [ALIGNMENT/ACTION]: A key point for these sections should be: Where can you use CO2 flux as proxy for climate forcing? In Boreal regions you cannot, because the biophysical effects of forests are strong and run in the opposite direction to their influence on carbon budgets. However, in the tropics (largely brushed over in what is seen as dominantly boreal issue), it is the reverse: Local biophysical effects complement and further strengthen forcings (more forest = more clouds = more reflectance). This is just one example. A5.4-A5.6 leave the reader befuddled ("it is so complicated, how to interpret?"). Actually a clear statement could be made: Don't worry about biophysical local effects in the tropics unless you want to claim additional benefits. Just claiming GHG benefits is conservative. Try to extract statements like this: "where to worry about it, where not to worry about it." That kind of guidance would help – that is, the direction to which these are either synergistic or complementary by major climate domain. Often in tropical countries one finds the highest concentration of degraded ecosystems, and in the tropics the land sector dominates countries' climate mitigation story. So it would be very helpful if in one sentence this SPM can obviate the need to worry about all these issues. [United States of America]

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8202	7	20	7	20	Replace "Changes to the land" with "Changes in land use [practices]". [European Union (EU)]
8892	7	20	7	20	Is the word "downwind" correct in this context? Would it not be more appropriate to write "surroundings"? [Liechtenstein]
8816	7	20	7	20	Is the word "downwind" correct in this context? Would it not be more appropriate to write "surroundings"? [Switzerland]
1212	7	24	7	24	I think it is an open question whether "northward [boreal] tree line migration" will enhance winter warming (due to decreased albedo presumably?). Seed dispersal from northern conifers is typically not very far and the rate at which climate zones shift will far exceed the rate at which tree seedlings can generally colonize into new areas north of tree line (soils are not always available either). Also effects of fires and insects could cripple northward conifer migration. Deciduous tree species may colonize more rapidly but won't have as big an impact on winter albedo. Suggest change "will" to "may". [Canada]
1214	7	24	7	25	Ensure consistency with Ch. 2 executive summary which only attributes increases in winter warming in boreal regions to decreased surface (albedo from northward migration of tree line and associated decreases in snow cover). [Canada]
1216	7	24	7	25	As written the text implies that regional winter warming in boreal regions will be enhanced by permafrost thawing in particular i.e. that permafrost thawing acts as a local feedback on climate change. This is only true to the extent that the response to any greenhouse gas increase is enhanced in winter and boreal regions. The CO2 and CH4 released by thawing permafrost are well-mixed greenhouse gases which have global climate effects. [Canada]
768	7	24	7	26	Please consider bringing a clarification on the expected changes about permafrost thawing, ensuring consistency with the other elements of SPM about permafrost, including paragraph A.6.1. [France]
2524	7	24	7	28	Please provide more specific information on the temperature increase ranges for which these statements are valid. [Germany]
4924	7	24	7	34	Section A5.6 discusses that during the dormant season, forests are warmer than any other land cover. This would more logically precede regional winter warming due to northward treeline migration, longer growing season and permafrost thawing now mentioned in A5.5. [Sweden]
4248	7	24	7	34	What about the impacts of extreme events and storm events on forest movement and their warming/cooling impacts? Forest damage from blowdowns, etc., could have strong feedbacks on the albedo and cooling effects. [United States of America]
8204	7	25	7	25	Is it only the winter temperatures that contribute to permafrost thawing? It does not seem logical that summer temperatures would also not contribute. [European Union (EU)]
4250	7	26	7	26	"... warming during the growing season will be dampened as a result of greater evapotranspiration (high confidence)." seems potentially overly optimistic, because temperature in boreal regions is also strongly modulated by temperature advection and weather effects (i.e., ridging and high pressure systems), which have often resulted in these being some of the FASTEST warming land areas. [United States of America]
216	7	26	7	28	Kanae et al. (2001; J. Hydrometeor.) have shown another example of deforestation in North East Thailand affecting the long-term decrease of September rainfall over Thailand, and we would suggest including this paper also in the reference in the underlying chapter. [Japan]

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4252	7	26	7	28	This seems overly optimistic: "In the tropics, in areas where increased rainfall is projected, increased vegetation growth will dampen regional warming (medium confidence)." Taken alone, this could imply that in the tropics more green vegetation will offset global warming. Perhaps 'slightly dampen'. In the observations and models, these regions are warming the fastest, compared to the their interannual standard deviation (which of course is very low). [United States of America]
7246	7	27	7	32	Section A6.6 - suggest this could be merged with A6.1 as it would be helpful to have context for regional heterogeneity of projected impacts at start of this section. [United Kingdom (of Great Britain and Northern Ireland)]
8206	7	29	7	29	The statement in the first sentence is probably specific to certain regions/biomes. Please elaborate. [European Union (EU)]
7248	7	29	7	29	The first sentence of A5.6 can be deleted as it is repeated later in the paragraph. [United Kingdom (of Great Britain and Northern Ireland)]
770	7	29	7	30	Please delete this sentence as it is a repetition of a following sentence (lines 31-32 of the same SPM page 7). [France]
5098	7	29	7	30	Flooding in paddy fields could also dampen the amplitude of extreme heat during the growing season. Insert paragraph. There are many evidence in Korea and Japan even though there are Korean or Japanese in reference. [Republic of Korea]
8756	7	29	7	31	Is it correct that the second sentence only includes "afforestation" not reforestation? The effects of cooling due to evapotranspiration is only valid for afforestation, not reforestation? [Chile]
8208	7	29	7	32	The first two sentences are rather redundant and can easily be combined. [European Union (EU)]
218	7	29	7	32	The first and third sentences overlap considerably in the substance. It seems desirable that the two sentences are integrated. [Japan]
1582	7	29	7	33	The paragraph contains repetitions i.e.: phrases in para 29 and that in paragraph 31-32 are repeating the same concept. The second phrase is more complete and could be kept, while the first (line 29) can be deleted. [Italy]
772	7	29	7	34	Please consider improving this paragraph by giving some elements about the consequences of the expected changes, in particular with regard to albedo. [France]
2526	7	29	7	34	Does this statement really only relate to forestation-processes, or has a standing forest the same/similar effect? Please clarify. Also, the first and third sentence are almost identical and should be merged. [Germany]
5100	7	29	7	34	Same content with 2 sentences, why repeating? [Republic of Korea]
5102	7	31	7	31	afforestation → afforestation/reforestation [Republic of Korea]
4254	7	31	7	31	KEY ISSUE [TERMS]: Not sure that the word "afforestation" is used correctly here. The accepted definition for afforestation is planting trees where they did not previously exist. It's not the same as re-forestation, or re-claiming previously forested areas. [United States of America]
4256	7	31	7	32	Clarify how this sentence is consistent with the first sentence in A5.5. Does the growing season have an overall warming effect, or does the effect vary in boreal regions versus others? [United States of America]
1580	7	32	7	34	Please specify the cause of the phenomenon described in the phrase (i.e. due to albedo effects) [Italy]

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774	7	33	7	33	"warmer than any other land cover" : Please consider adding some elements explaining that this finding is true in a given geographical context. We suggest to insert "nearby" before "land cover". [France]
776	7	35	7	36	Several key policy-relevant dimensions of the impacts of climate change are missing from the statement, such as the impacts on species diversity or economics stresses including the impacts on infrastructure or food supply. We suggest to improve the statement by providing elements reflecting the following key findings : - the impacts on species diversity : climate change is projected to accelerate losses of species diversity which has implications for land based challenges. Climate change impacts on species diversity are mentioned in Chapter 1 and need to be reintroduced in this statement. ("In future, climate warming has been projected to accelerate losses of species diversity rapidly (Settele et al. 2014; Urban et al. 2016; Scholes et al. 2018; Fischer et al. 2018; Hoegh-Guldberg et al. 2018)" 1.2.2 (2-4)); - economic stresses should also be mentioned given that in A6.2 findings about GDP and losses of infrastructure are provided, as well as findings about food supply in A6.4. We suggest to rephrase it with : "Climate change is projected to create additional stresses on land systems exacerbating existing risks related to species diversity, desertification, land degradation, food security and key components of economics such as infrastructure." [France]
778	7	35	7	36	References to the relevant chapters (7.3) should be added at the end of key message A6 (only key message without references in the SPM) [France]
8606	7	35	7	36	Insert word 'some' (i.e., 'exacerbating some existing risks') [New Zealand]
7726	7	35	7	36	Please consider to mention the effect of climate change on pollination and pollinators, and the implication on food security and other ecosystem functionings. [Norway]
7252	7	35	7	36	A6 currently talks about projected impacts, but doesn't make a statement about how ambitious climate action can help mitigate these. The following text from the executive summary of chapter 1 could be inserted into the headline statement to help address this: "Rapid reductions in anthropogenic greenhouse gas emissions that restrict warming to "well-below" 2°C would greatly reduce the negative impacts of climate change on land ecosystems (high confidence)." [United Kingdom (of Great Britain and Northern Ireland)]
4258	7	35	7	36	Section A6 requires references to the underlying report. [United States of America]
4260	7	35	7	36	In the underlying chapters, impacts on vulnerable groups and community (e.g., poverty, migration) are discussed. Can consider to bring some discussions in the key message and/or in the subparagraphs below. [United States of America]
4262	7	35	7	36	This is a very general conclusion. In practice, impacts might be expected to differ greatly by region. Consider adding: "... , with the degree of risk varying by region." [United States of America]
8212	7	37	7	38	include 'biodiversity loss' after vegetation loss [European Union (EU)]
4264	7	37	7	39	Does the high confidence statement apply to all impacts listed, for all regions? [United States of America]

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2534	7	37	7	40	The way the list of risks and/or adverse impacts is framed here is not consistent (and grammatically incorrect); "As global temperatures increase, the potential for adverse impacts on crop yield, food supply stability, vegetation loss, fire damage, permafrost and coastal degradation, soil erosion and water availability become more severe." Potentials can't become severe, while some of the items in the list "loss", "damage" can - this is not only an editorial issue, as it is very important to clearly portray how risks from different processes rise with GMT. A clear verbal expression of the key risks represented in Figure SPM.2 would be very helpful to communicate this important result. Please also consider to lift this to the headline statement of section A6. [Germany]
1708	7	37	7	40	This points about the potential for adverse impacts on food supply stability is critically important. Chapter 5 (section 5.2.5.2) outlines how increases in extreme weather events will cause food stability to decline, which is a crucial point for SIDS that rely on food imports. Can anything be added to this section to cover migration (e.g. from section 5.8.21 and Box 5.6). For example, in some SIDS rising temperatures and declining groundwater availability, combined with increases in the frequency and intensity of extreme events, threaten food security and cause human displacement. [Saint Kitts and Nevis]
7934	7	37	7	41	In A.6.1. the list of 'adverse impacts' is an inconsistent mix of effects ON desirable outcomes (like food security) and negative outcomes themselves (like fire damage). The sentence should be split, after all, what is the meaning of an 'adverse impact on fire damage'? [Netherlands]
4266	7	37	7	41	Add a statement along the lines of: "If the current emissions trajectory continues, and brings 3°C of warming or more, very extreme impacts on crop yield, food supply stability, vegetation loss, fire damage, permafrost and coastal degradation, soil erosion and water availability will be common and dangerous." [United States of America]
4268	7	37	7	41	It's not really just about increasing temperatures. It's about changing the magnitude and frequency of the diurnal, seasonal cycles and dynamics of temperature and precipitation, as well as environmental changes (erosion, etc.). [United States of America]
4270	7	37	7	41	This is a very general conclusion. It would seem (and the burning embers diagrams suggest) that the amount of the increase in temperature would matter, that impacts might not become severe until certain temperature thresholds were reached, and that the severity of the impacts would differ across impacts. [United States of America]
780	7	38	7	39	"water availability become more severe" : Please consider adding some elements highlighting that this finding depends of the regional context, and could be not true for high latitudes. [France]
5104	7	40	7	40	SPM Fig. 2 → Figure SPM 2 [Republic of Korea]
4926	7	42	7	42	"Values" would seem to be unclear. What is meant? Replace with a clearer wording. [Sweden]
7254	7	42	7	42	It is not at all clear what is meant by a negative impact on GDP through impacts on "land-based values" - please clarify [United Kingdom (of Great Britain and Northern Ireland)]
4272	7	42	7	42	What are "land-based values"? [United States of America]
782	7	42	7	43	Please indicate a level of confidence for this statement. [France]
8668	7	42	7	43	What are 'land-based values' in this context, and how do they relate to GDP? [A6.2] [New Zealand]
4274	7	43	7	43	Add "s" to end of ecosystem service. It should read "ecosystem services." [United States of America]

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8210	7	35	8	32	the risks highlighted here are, except for the price impacts, only highlighting the physical effects. Socio-economic effects like conflicts on land resources, land rush, access issues are also important and some of these are mentioned in Chapter 7 but are not highlighted in this point in the SPM. Recommendation: also mention the socio-economic risks associated in more detail here. [European Union (EU)]
5472	7	35	8	32	It seems like it would be productive to inform policy makers here that at least 9 out of 13 tipping elements of the Earth System are predicted to occur on land, all of them primarily driven by climatic changes (see Lenton et al. 2008 PNAS). And considering that the term tipping point is used widely in several chapters of the report, it would be reasonable to minimally address it in the SPM. Notice that not all tipping elements are related to desertification (which has a strong focus in this report), but they can surely be socio-environmentally disruptive just as desertification. [Brazil]
5346	7	35	8	32	The paragraph 3.5.2 and Figure 3.9 contain very policy-relevant messages stating that the pressures from desertification and climate change would jeopardize the achievement of several Sustainable Development Goals. It would be useful to have this message relayed by the SPM when discussing how climate change will exacerbate risks related to desertification [Gambia]
2528	7	35	8	32	Economic effects are an overarching result of all risks/impacts mentioned in the subparagraphs to A6, not only of those mentioned in A6.2. We therefore request to mention economic effects (negative effects on GDP) in the headline statement A6. [Germany]
2530	7	35	8	32	Paragraph A6.1 does not have a clear focus. Is it on economic effects, on infrastructure damages or on limits to adaptation? We suggest moving the sentence on GDP to the headline (please see our related comment on this suggestion). The statements referring to limits to adaptation should be joined with the text in B3.5 and be contextualized in a more comprehensive manner, please see our comment on B3.5 (P17 L15-17). Paragraph A6.1 would then focus damages to infrastructure which could possibly be expanded, see e.g. TS P23 L23. [Germany]
7250	7	35	8	32	This section, A6, is overall rather generalised and would benefit from more specific, preferably quantified, examples to make it more hard hitting. For example, A6.3 gives the number of people that are likely to be impacted in drylands. While there is a big range (and clearly you shouldn't use values that are too uncertain), it is much more impactful to provide this kind of information. Otherwise it is very high level and lacks real impact. Please consider how you can add more specific examples to boost this important section [United Kingdom (of Great Britain and Northern Ireland)]
2536	7	42	8	7	This para points to CrossChapter Box 10 (as do D3.2, C1 and B1.4). When reviewing CC Box 10 in Chapter 7 we found it to be partly ill-referenced (e.g. none of the studies underpinning the bold statement "The cost of reducing emissions is estimated to be considerably less than the costs of the damages at all levels (Kainuma et al. 2013; Moran 2011; Sánchez and Masera 2016)" performs any form of analysis that compares damage costs to costs of reducing emissions. The statement "SLM practices reverse or minimise economic losses of land degradation, estimated at between USD 6.3 and 10.6 trillion annually, (ELD Initiative 2015)" is only supported by one publication, which is a technical paper by a non-governmental entity. There are further similar examples. As statements about costs and damages are vital for policymakers, we would kindly ask the authors to revisit Box CC-10, thoroughly go through all text and references and replace/revise the Box in a way that is robust enough to be referenced in the SPM and serve as the "go-to-place" for economic considerations during the approval plenary. [Germany]

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1710	7	42	8	7	This is a very important point with a number of valuable pieces of information. It is essential that the IPCC provide comprehensive information on limits to adaptation, and St. Kitts and Nevis is very grateful that the authors have included this. [Saint Kitts and Nevis]
92	7	42	8	7	No indication of the confidence level of this statement is provided. [Spain]
94	7	42	8	7	Paragraph A6.2 does not have a confidence qualifier. [Spain]
4928	7	42	8	7	Please provide confidence level statements for findings in A6.2. [Sweden]
7256	7	42	8	7	This paragraph feels quite unbalanced - an initial high level statement about impacts and then a lot of detail about a specific impact (permafrost). This feels unbalanced. Could wider examples be given for 1.5-2C? There are presumably a lot more examples of land impacts to draw on. [United Kingdom (of Great Britain and Northern Ireland)]
220	7	43	8	3	Impacts of temperature rise between 1.5oC - 2oC are presented. It is desirable to provide the impacts of other temperature rise ranges also, for example, 2.0oC - 2.5oC and 2.5oC - 3.0oC for better understanding of global warming impacts. Otherwise, the reader could not understand why in one paragraph SPM refers only to 1.5 degrees and in another paragraph only to 2 degrees, which makes comparisons difficult. [Japan]
5106	7	43	8	6	What is the confidence level for this statement? [Republic of Korea]
2532	7	35	10	36	The level of risk that are addressed in the Section A6 and A7 does not only depend on temperature increase and on socioeconomic development but also on the speed of these changes. In addition, impacts will most probably lead to economic damages. Therefore, please consider to include the following quote "The consequences of inaction and delay bring significant risks including irreversible change and loss in land ecosystem services, including food security, with potentially substantial economic damage to many countries in many regions of the world (high confidence)." from CH7 CC-Box 10 to headline statement A6 or possibly A7. We recognize that "Action in the near term" is addressed in Section D, but omitting the important aspect of timing and economic effects to the framing would not be appropriate. [Germany]
1218	7	25			Based on the assessment in Chapter 2, regional winter warming will not be enhanced by an increased growing season, but by reduced snow ('regional winter warming will be enhanced by decreased surface albedo and snow'). According to Chapter 2, an increased growing season will actually lead to reduced warming 'warming will be dampened during the growing season due to larger evapotranspiration (high confidence)'. [Canada]
5474	7	36			Include word (concept). "...and food and WATER security" [Brazil]
8214	7	38			Remove 'and' between permafrost and coastal degradation: ... permafrost, coastal degradation, soil erosion ... [European Union (EU)]
5108	8	1	8	1	four million → 4 million [Republic of Korea]
8216	8	1	8	2	Could you clarify how much surface this "Northern Hemisphere Permafrost Area" does represent. [European Union (EU)]
1220	8	1	8	7	This para starts by saying infrastructure, including settlements, may be affected by thawing of permafrost at between 1.5-2C global warming. The second sentence then reports "collapsing infrastructure and livelihoods due to permafrost thaw (and other factors)" as examples of limits to adaptation. Please clarify if such severe impacts are projected to occur at temperature changes above 1.5-2C of global warming or not. [Canada]

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4276	8	1	8	7	It would be very useful to add projections related to a +3°C warming scenario. [United States of America]
8218	8	3	8	3	replace may be with 'will be'; these impacts will happen. Infrastructure has not been built for unstable conditions, they will break this is a physical consequence and will happen if thawing continues [European Union (EU)]
4830	8	3	8	3	Add before "Collapsing...", this sentence: "The Middle East and southwest Asia are a highly water-stressed region with reduced societal resilience resulting from economic and political challenges (Mathew Barlow et al, 2016) Reference: MATHEW BARLOW, BENJAMIN ZAITCHIK, SHLOMIT PAZ, EMILY BLACK, JASON EVANS AND ANDREW HOELL, 2016: "A Review of Drought in the Middle East and Southwest Asia", JOURNAL OF CLIMATE, Volume 29, 1 December 2016. [Iran]
5052	8	3	8	3	Add" Technology transfer and sufficient and predictable financing" [Iran]
1222	8	3	8	4	"Collapsing Infrastructure" is a poor choice of words and not the terminology used in 7.3.2.7 (although collapsing livelihoods is used in 4.9.5). In permafrost areas, infrastructure doesn't necessarily collapse but it may gradually settle over time and its integrity will eventually be compromised. The statement also ignores the fact that infrastructure performance is normally monitored and mitigation or other measures are usually implemented before it completely collapses or is destroyed. The statement also ignores the fact that the response of the infrastructure depends on its design and in several cases thawing of permafrost (particularly ice-rich permafrost) may have little or no effect on infrastructure integrity. It should also be clearer which parts of the paragraph are specific to permafrost rather than non-permafrost areas (i.e. the last sentence in the paragraph). [Canada]
8220	8	3	8	6	the sentence seems to imply that climate change is the reason behind coastal erosion or extreme soil erosion for which land management practices have more impact than climate change; it would be useful to rephrase in a way that does not seem to imply that cc is the sole or main reason for such effects. [European Union (EU)]
4278	8	3	8	6	Collapsing infrastructure and livelihoods due to permafrost thaw, etc., are all examples of the consequences of not adapting? Or, are the authors saying that these are unavoidable consequences even if humans do adapt? This sentence is confusing. [United States of America]
4280	8	5	8	5	Perhaps 'challenges' is a better term here than 'limits'? [United States of America]
2538	8	8	8	12	Please clarify the cause and effect of this statement. From box A7 we understood, that SSP1 are characterized by a lower population, but also less resource intensive consumption. We kindly request the authors to clarify whether these assumptions cause the lower water demand and amend the text accordingly (suggestion: "...low population and less resource intensive consumption resulting in lower water demand, as in SSP1,...") [Germany]
572	8	8	8	12	Given the effect on 4-5 billion people in the world, "Land degradation - climate change" relationship should be given in detail with related data/ numbers [India]
464	8	8	8	12	Perhaps including impacts at 1.5 degrees would help elaborate this point - would also improve consistency with SR1.5 [Ireland]

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7258	8	8	8	12	A very wide potential projected range of drylands populaitons affected by climate change. Such a wide range cited is not very helpful. Can this be refined any further? [United Kingdom (of Great Britain and Northern Ireland)]
784	8	9	8	9	"composition" : As it might be confusing with the nutritious composition, we would suggest to refer to "the plant species mix (alien species)". [France]
8670	8	9	8	10	Useful, please retain [New Zealand]
5110	8	10	8	10	There must be a comma next to 'At global warming 2°C'. [Republic of Korea]
7260	8	10	8	10	Is there intended to be a difference between biodiversity and biological diversity. Please clarify or use consistent terminology throughout the SPM [United Kingdom (of Great Britain and Northern Ireland)]
8608	8	10	8	11	Is 'population' the correct term? Needs clarifying/expanding. [New Zealand]
1654	8	10	8	12	"At global warming of 2°C the population of drylands exposed and vulnerable to water stress, increased drought intensity and habitat degradation is projected to range from 35-522 million" in this sentence and "While at global warming of 2°C, under SSP1 (sustainability), the exposed (vulnerable) dryland population is 974 (35) million, and under SSP3 (Fragmented World) it is 1,267 (522) million." in lines 42-44 on page 3 of Chapter 3 are not entirely consistent as a conclusion. Since the underlying report highlights the exposed (vulnerable) dryland population in SSP1 and SSP3, it is suggested to give the conclusion a check and revision. [China]
222	8	10	8	12	Impacts of 2oC temperature rise are presented. It is desirable to provide the impacts of other temperature rise also for better understanding of global warming impacts. Otherwise, the reader could not understand why in one paragraph SPM refers only to 1.5 degrees and in another paragraph to 2 degrees, making comparisons difficult. [Japan]
7262	8	11	8	11	2.8C seems like an oddly precise level of warming. For a range, would 1.5 to 3C not be more appropriate here? This comment applies to all usage of 2.8C in section A7. [United Kingdom (of Great Britain and Northern Ireland)]
4282	8	11	8	11	Acknowledgement of CO2 feedbacks on water use efficiency is necessary for a complete picture. [United States of America]
5478	8	12	8	12	not clear what the range of 35-522 million refers to, and further, it is a very large range... [Brazil]
786	8	12	8	12	"35-522 million" : Please specify unit and timeline [France]
2540	8	12	8	12	Please add the word "people" so that the text reads "35 -522 million people". [Germany]
2542	8	12	8	12	Please explain the large range of 35-522 million which appears quite broad and add "depending on the socio-economic scenario" at the end of the sentence, see CH3 P3 L 42-44. [Germany]
462	8	12	8	12	The range of 35-522 million people is huge and weakens the point [Ireland]
224	8	12	8	12	Please add 3.6.1 to the reference. The information on "increased drought intensity and habitat degradation is projected to range from 35 -522 million." at the end of A6.3 is derived from section 3.6.1. [Japan]
1414	8	12	8	12	The figures provided here are difficult to put into perspective. Maybe they could be given in percentage of population? [Luxembourg]
5112	8	12	8	12	Range from 35 to 522 million [Republic of Korea]

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4284	8	12	8	12	Add a sentence describing likely impacts on desertification impacts on drylands and dryland populations for a +3°C scenario. [United States of America]
4286	8	12	8	12	Add "people" after 35-522 million. [United States of America]
7264	8	12	8	13	35-522 million people & 1-29% increases - these are unhelpfully huge ranges and the report should make a specific comment about this as the ranges span challenges that are relatively easily managed and close to insurmountable challenges. This deserves more explicit reflection by the authors. (eg price increases for cereal between 1 and 29%, or populations in drylands with water stress between 35 million (just about manageable) and 522 million (not manageable). [United Kingdom (of Great Britain and Northern Ireland)]
552	8	13	8	13	1-29% increase in cereal prices by 2050.....is the inflation rate is taken in to account? Economic modelling for so far has only uncertainties. why to highlight this number? From 2000 to 2018 prices of cereals increased over 100% in some regions. [India]
538	8	13	8	13	Not clear on the value of this: RCP 6 is high emissions scenario and perhaps called this: what are values for other RCPs? A table on this might be useful which refers to temperature ranges rather than RCPs [Ireland]
614	8	13	8	13	"Increase in cereal price" not clear [United Republic of Tanzania]
1224	8	13	8	14	Recommend including here what the increase in global temperature is by 2050 under RCP6.0. [Canada]
7266	8	13	8	14	It won't be clear to many policy makers what RCP 6.0 actually means (or why this has been chosen). Could you present a temperature instead (RCP 6.0 and 4.5 have similar temps at 2050, hence it makes much more sense to do temperature here and not just because it will be more comprehensible to do so) and give an indication of why this value is chosen (e.g because it's an approx 3C pathway and this is where the NDCs are projected to take us) [United Kingdom (of Great Britain and Northern Ireland)]
1064	8	13	8	15	We suggest to provide some brief explanations of the RCP 6.0 and/or to add a reference to the box A7 about SSPs in which additional elements about RCPs could be considered. [France]
5348	8	13	8	15	This point discusses the impacts on cereal prices under RCP6.0, but it would be helpful to explain what this RCP means for warming levels. [Gambia]
2544	8	13	8	15	Are these prices indexed / corrected for inflation? Please add clarification accordingly. [Germany]
2546	8	13	8	15	Why is a RCP 6.0 scenario chosen here? Also it is not easy for policy makers (and especially CBD and UNCCD communities) to follow which RCP is which. Please refer to the associated likely warming range instead and give a context e.g. "the likely warming based on current policy" or whatever is correct. [Germany]
226	8	13	8	15	Impacts of RCP6.0 are presented. It is desirable to provide the impacts of other RCPs also for better understanding of global warming impacts. Otherwise, the reader could not understand why in one paragraph SPM refers only to 1.5 degrees and in another paragraph to 2 degrees, making comparisons difficult. Also for better understanding for Policy Makers, it is useful to indicate what temperature rise RCP6.0 coincidences. [Japan]
1416	8	13	8	15	This sentence seems to be an important finding and should be highlighted in the headline messages [Luxembourg]
4288	8	13	8	15	It is unclear if the high confidence rating applies to all three clauses in this sentence. [United States of America]

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4290	8	13	8	15	What is the meaning of high confidence in a result of 1-29%? The range seems too large to draw a meaningful conclusion. Perhaps a more generalized statement would be appropriate, like "Global crop and economic models project that cereal prices in 2050 WILL BE LEVEL OR INCREASE due to climate change under Representative Concentration Pathway (RCP) 6.0 (CONFIDENCE RATING). AN INCREASE would impact consumers globally through higher food prices, although regional effects will vary (high confidence)." [United States of America]
4292	8	13	8	15	KEY ISSUE [TERMS]: Provide some context for policymakers around RCP 6.0. Why is only this pathway discussed here? Clearly define RCP so that policymakers better understand. [United States of America]
8758	8	13	8	16	Couldn't find the reference of the study using RCP6 for increased cereal prices in chapter 4 or 5 [Chile]
788	8	13	8	18	This paragraph seems to reflect an isolated example. We suggest to consider a statement with a larger basis of findings, including by providing quantitative projections for other RCP. [France]
8224	8	13	8	20	Please specify the baseline or the year of reference when stating that food prices increase 1-29% by 2050. This increase cannot be of "High Confidence", split the sentence in two parts if the "high confidence" apply only to part of the sentence. The 1-29% range appears to come from the AgMIP exercise, with 5.3.2.1 suggesting that the wide range is partly due to the diversity of model types involved (i.e. crop models and economic models separately conducting the same exercise). It would be good if the paragraph could make this clearer, as well as distinguishing between crop prices and food prices (if applicable). The current formulation 'global crop & economic models project' is rather unclear. [European Union (EU)]
8764	8	13	8	20	The report says "Global crop and economic models project a 1-29% increase in cereal prices in 2050 due to climate change under Representative Concentration Pathway (RCP) 6.0", and later it makes reference to chapter 4 and 5, however, I was not able to find these values in the versions of the mentioned chapter that I currently have. Please revise the consistency of this statement with the appropriate reference. [Chile]
1656	8	13	8	20	A mistaken reference. Since Section 4.3.2 of Chapter 4 of the underlying report does not refer to A6.4, it is suggested to give the reference a check and revision. [China]
2548	8	13	8	20	We request the authors to clarify whether the CO2 fertilization effect was included in the estimation or not. It is also intransparent in the underlying chapter, which studies considered CO2 fertilization, and which did not; it would be useful to amend the information provided. [Germany]
4294	8	13	8	20	This sentence could be improved to state reasons why the range in cereal prices could be greater than the stated 1-29%: the effect of increasing CO2 concentrations on crop yields, variation in simulated yield across crop models, and economic development as represented by the Shared Socioeconomic Pathways (SSPs). [United States of America]
96	8	14	8	14	The concept behind "Representative concentration Pathway 6.0" is not presented in the text. A footnote would be appreciated. [Spain]
790	8	14	8	15	Please provide more detailed information on the regional effect here referred to. We suggest: "leading for even more drastic impacts on poorer countries" [France]
8228	8	15	8	15	High confidence in price increases due to climate change seems to suggest an large confidence in economic models as well as yield/production forecast. Both modelling systems have still large limitations, contradicting this level of confidence. Suggest using medium confidence. [European Union (EU)]

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2550	8	15	8	15	To us, the confidence statement seems too high, given that it is a modelling study for 2050. It does not match well with confidence values for present state. Also, these models are not yet very advanced, and prices are usually very sensitive model outputs with little validation and quality control. We request to review the confidence statement. [Germany]
2938	8	16	8	16	Suggest rephrasing to read: "Food quality is also likely to be affected by higher CO2 concentrations ..." [Australia]
2552	8	16	8	16	Please do not use jargon: "metabolic processes" is not understandable for non-experts. Please rephrase so that policy makers can understand. [Germany]
554	8	16	8	17	The metabolic processes are not changed due to CO2 fertilization but the carbohydrates are accumulated more and in management conditions, the dilution of protein/ nutrients lead to poor quality. But the results from field experiments also have huge uncertainty. [India]
228	8	16	8	17	It is desirable to insert "in plants" at the end of "(...)metabolic processes" for easier understanding. [Japan]
792	8	16	8	18	Please check the level of confidence, not consistent with findings in lines 42-44 page 5-41. We suggest to repeat the statement "While increased CO2 is projected to be beneficial for crop productivity at lower temperature increases, it is projected to lower nutritional quality (e.g., less protein, zinc, and iron) (high confidence)." [France]
4930	8	16	8	18	It is unclear whether the food quality is improved or impaired, please clarify. [Sweden]
7268	8	16	8	18	This sentence states that higher CO2 concentrations will affect the nutritional quality of foods – can this be reconciled with the statement on page 5 lines 36-38, stating that agricultural yields of some crops will increase at higher latitudes i.e. will their nutritional value decrease too? It would be good to ensure that there is consistent read across the whole SPM on this topic. [United Kingdom (of Great Britain and Northern Ireland)]
408	8	17	8	17	Important message that should be liked with statement of fertilisation by CO2 [Ireland]
4296	8	18	8	20	Maybe a nod to cultural? As climate change exacerbates food security, so also does the likelihood for political security become even more unstable. [United States of America]
4298	8	18	8	20	The references to the stability of the food supply merit further elucidation. How is that stability measured? By how much would it decrease? In what time period? Would that be the same for all populations, or would it be felt only in certain regions? [United States of America]
4300	8	18	8	20	Minor revision suggested: "The stability of the food supply is expected to decrease as the magnitude and frequency of extreme events increase, disrupting food chains [in food-insecure areas] of the world" (i.e., rather than all areas of the world). [United States of America]
2940	8	19	8	19	Suggest rephrasing to read: "The stability of the food supply is likely to decrease ... " or "The stability of the food supply is projected to decrease ... " [Australia]
1774	8	19	8	20	Sentence needs qualifier [Denmark]
230	8	20	8	20	Please delete 5.2.2 and add 5.2.3 to the reference. The contents of A6.4, such as price or food quality, are covered in section 5.2.3. Section 5.2.2. has little relevance to A6.4. [Japan]
4302	8	21	8	22	Are anticipated due to what? Global warming? [United States of America]
4304	8	21	8	22	The first sentence in A6.5 mentions new compound risks, but the remainder of the paragraph appears to be limited to those related to wildfire. [United States of America]

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4932	8	21	8	25	It is unclear whether the increasing human exposure is due to population increase, or the long-term vegetation changes, etc., or all of the above. Suggest exploring some alternative wording, for clarity. [Sweden]
1226	8	21	8	26	The first sentence notes that there are risks to food systems, human and ecosystem health, livelihoods, and infrastructure. Suggest that the example of wildfire should therefore also touch on the risk to livelihoods in addition to the other risks already noted. In areas such as British Columbia, Canada, and Indonesia (noting that the cause of the major peat fire is still contested), as well as many other areas, wildfires have caused millions in lost income. This should be further reflected in the graphic which connects wildfire to human systems at risk, i.e. by adding that wildfire also has impacts on livelihoods. [Canada]
7270	8	21	8	26	As with paragraph A6.2 this feels unbalanced, with a high level statement and then a very specific example (wildfires, which are discussed in great depth - including references to mental health). Compound risks are highly important and need to be strongly emphasised, but giving just one very detailed example does not allow the reader to fully appreciate the full range of risks. Could you please provide more examples of potential compound risks (and reduce the length of the wildfires example). [United Kingdom (of Great Britain and Northern Ireland)]
4306	8	21	8	26	KEY ISSUE [TERMS]: The term "compound risks" is undefined and unclear, leaving too much latitude for (mis)interpretation in this context. Define the term. The relationship to wildfire, while extant, is hardly all-encompassing. Joining the two exclusively together in this paragraph is misleading. [United States of America]
2554	8	22	8	22	Please replace "anticipated" with "projected". "anticipated" sounds like it is not based on scientific evidence. [Germany]
1586	8	22	8	22	The use of the term "Anticipated" is unclear (with respect to?). Furthermore the phrase seems delinked to the rest of the paragraph that focuses on fire risks. [Italy]
2556	8	22	8	23	It is unclear from this sentence if increasing human exposure to wildfire is a result of increasing population in exposed areas or a result of increasing fire-prone areas, which contain a high population. Please revise the sentence accordingly. [Germany]
7936	8	22	8	23	In A.6.5. it is unclear how climate change contributes to exposure to fire, as only an increasing population in fire prone areas are mentioned, without making explicit to what extent climate change could aggravate this further. [Netherlands]
794	8	22	8	25	Please consider the following proposal: "as the population and the fuel biomass in fire-prone regions grow". [France]
4934	8	22	8	25	Not a full sentence, unclear meaning. [Sweden]
4308	8	22	8	25	The statement about increasing human exposure to wildfire is very general. Surely this is more relevant in some regions than in others. It would also be helpful to have a sense of the time frame to which this conclusion would apply. How does this vary in different scenarios? [United States of America]
1228	8	22	8	26	The text here states 'Increasing human exposure to wildfire is projected as the population in fire-prone regions grows, creating... risks to ecosystems, through long-term vegetation changes, accelerated erosion and altered hydrology'. Why does increased human exposure to wildfire create risks to ecosystems? Is it really the increasing human exposure to wildfire that creates these risks, or the direct effects of human disturbances? I could not find the supporting statement for this in the chapters. [Canada]

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7272	8	23	8	23	Could you please clarify if this means growth in population, or extension of fire-prone areas, or both? [United Kingdom (of Great Britain and Northern Ireland)]
4310	8	24	8	26	Aren't most long-term vegetation changes really the result of human interference (agriculture, forestry, settlement patterns)? Climate is really just an add-on stressor. [United States of America]
2558	8	27	8	27	Please specify the kind of "projected future changes" - are you talking about climate change? In addition, the statement is a tautology because projections always refer to the future - please delete the word "future". [Germany]
1418	8	27	8	28	This first sentence seems to be quite general and could be deleted [Luxembourg]
7274	8	27	8	29	Could you please clarify whether crop yields and suitability are expected to decline everywhere (and especially in tropical and semi-tropical regions). [United Kingdom (of Great Britain and Northern Ireland)]
5610	8	27	8	32	and North Africa? [Algeria]
2560	8	27	8	32	Please clarify if this statement considers adaptation effects and whether CO2 fertilising effects are included. [Germany]
618	8	27	8	32	It is somehow confusing, In the second sentence the Author noted that " There is also high Confidence" that aridity will increase in some locations....., However in the next sentence the Author indicate that " Projection s, however provide no evidence for an increasing global trend in dryland aridity. This may be confusing to Policy maker. [United Republic of Tanzania]
8230	8	28	8	28	Delete "and suitability" or specify how it changes. There are different concepts of "suitability" and not all quantitative (i.e., not all can "decline"). [European Union (EU)]
1230	8	28	8	28	Not clear here why "Crop yields" is linked to "crop suitability". I suggest changing this sentence to something like: "Crop yields are projected to decline in many regions as temperatures increase, particularly in the tropics and subtropics. Suitability of some crops for these agricultural regions may also be compromised, but could be enhanced at higher latitudes or elevations." [Canada]
2562	8	28	8	28	What does "crop suitability" mean? Suggest replacing with "viability" if this is what is meant. Otherwise please modify so that it is understandable to policy makers. [Germany]
7276	8	28	8	28	It is unclear what is meant by 'suitability' here - the suitability of what for what? [United Kingdom (of Great Britain and Northern Ireland)]
8232	8	28	8	29	Please indicate if boreal regions could have increased yield. [European Union (EU)]
1776	8	28	8	29	Sentence needs qualifier [Denmark]
796	8	28	8	29	Should it be also mentioned crop yield increase in temperate-boreal region that are currently temperature limited with respect to photosynthesis. [France]
232	8	28	8	29	We would bring up two points regarding SPM A6.6 which seems quotation from Chapter 5 (p. 5-27, line 33-35); 1, Chapter 5 is not limited to tropical and semi-tropical regions. It's better to delete them. 2, The sentence after p. 5-27, line 33-35, "However, the study found the projected total land area in 2050, including regions not currently used for crops, climatically suitable for a high attainable yield similar to today", seems more important than that pointed out here. We suggest to replace with or add this sentence. [Japan]

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Comment No	From Page	From Line	To Page	To Line	Comment
4312	8	28	8	29	This line states that crop yields are projected to decline as temperatures increase, especially in tropical and semi-tropical regions. Figure SPM.1 shows that crop yields have risen 350% since 1960. All discussions of declines in crop yields need to be clear if the decline is in absolute terms, or relative to an increasing trend in a reference case without climate change. These obviously have drastically different implications. [United States of America]
7278	8	29	8	30	"around half of the vulnerable population" - add actual number if possible, for context [United Kingdom (of Great Britain and Northern Ireland)]
5482	8	29	8	31	Sentence modified. "Aridity will increase, especially in tropical and semi-tropical regions. There is also high confidence that aridity will increase in some locations with around half of the vulnerable population in South Asia, followed by Central Asia, West Africa and East Asia (high confidence)." [Brazil]
234	8	29	8	31	In SPM A6.6, "vulnerable" indicates vulnerability to aridity, while "vulnerable" in Chapter 3 (p. 3-41, line 37-38) , refers vulnerability to impacts caused by desertification, such as water stress or habitat degradation. We suggest the modification of the sentence; "There is also high confidence that aridity will increase in some locations. Around half of vulnerable population to impact of increasing global mean temperature, including aridity, is in South Asia, followed by Central Asia, West Africa. [Japan]
1748	8	29	8	32	Please revise the statement on increase of aridity in some locations and population in South asia, Central Asia, West Africa and East Asia to include Arabian Peninsula, Middle East and West Asia particularly in the light of new data/information included in chapter 3. [Saudi Arabia]
4314	8	29	8	32	This bullet seems to contradict itself. Aridity will increase yet no evidence for an increasing global trend in dryland aridity. [United States of America]
4936	8	30	8	30	What does the "half of the vulnerable population" refer to? Half of the population that will be vulnerable (exposed and without means of adaptation?) in the regions suffering increases in aridity? [Sweden]
2564	8	30	8	31	The information that "aridity will increase in some locations with around half of the vulnerable population in South Asia, followed by Central Asia, West Africa and East Asia." is very unspecific ("some locations") but is associated with "high confidence". Please provide more specific information and/or decrease the level of confidence. [Germany]
236	8	31	8	31	SPM A6.6 applies "no evidence" instead of "insufficient evidence" in Chapter 3 (p. 3-39, line 43). The meanings that "no" and "insufficient" convey are totally different. We suggest that SPM quote the same words with those of each Chapter. [Japan]
7280	8	31	8	31	Re 'Projections, however, provide no evidence..' - does this mean none of the models provide evidence or some of the models suggest it but there's little cross-model agreement? Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
1232	8	31	8	32	The last statement here that "projections provide no evidence for an increasing global trend in dryland aridity" is inconsistent with the Ch. 3 executive summary (Pg. 5 lines 14-15) which state that "drought and/or aridity are projected to increase as a results of 1.5C to 2C global warming (high confidence). [Canada]
2566	8	31	8	32	"no evidence for an increasing trend in dryland aridity" seems to contradict the column "dryland aridity" in Fig SPM.2 that shows high risk potential. Please add clarification or modify accordingly. [Germany]
4938	8	31	8	32	As it already is mentioned that aridity will increase in some regions (implying that it will not do so in all regions), what is the reason for this statement? [Sweden]

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Comment No	From Page	From Line	To Page	To Line	Comment
7282	8	31	8	32	This text is a slightly inaccurate reflection of the underlying chapter. Page 39, lines 43-44 of Chapter 3 state that "aridity will increase in some places (high confidence), there is insufficient evidence to suggest a global change in dryland aridity (medium confidence).. " - suggest amending the text to better align with the underlying chapter. This is also reflected in AR5, and relates to Figure SPM2 and Chapter 7 of this report which finds that there is medium confidence that the transition from moderate to high risk related to water scarcity in drylands is between 1.5°C and 2.5°C (p.15 lines 33-34). [United Kingdom (of Great Britain and Northern Ireland)]
7284	8	31	8	32	Suggest also adding in detail around the most affected regions to strengthen here and highlight that impacts to water are strongly regional even in drylands e.g. from Chapter 7 (p.15 lines 40-42). "the Mediterranean, North Africa and the Levant will be particularly vulnerable to water shortages (medium confidence)". [United Kingdom (of Great Britain and Northern Ireland)]
616	8	31	8	32	"Projections, however, provide no evience for an increasing global trend in dryland aridity" Just curious to know whether should be written " Projections did not look at golbal evidence...." [United Republic of Tanzania]
4316	8	31	8	32	Rephrase to state: "No current evidence for an increasing ... " [United States of America]
4940	8	32	8	32	If the finding is "NO evidence", how does it lead to "medium confidence"? [Sweden]
798	8	33	8	35	To improve the consistency with § A.2.3, please consider adding "technology development" in crucial socio-economic drivers. [France]
2570	8	33	8	35	Consider deleting the word "future" and put the phrase in present tense. [Germany]
2568	8	33	8	39	In this para, as throughout the SPM, please make sure that reporting overall risk from all societal factors combined doesn't cloud the contribution from climate hazards, which should be the focus here. Climate change acts as a risk amplifier and creates new risks, even if the extent of risk and impact depends on exposure and vulnerability. The role of climate change must be clearly outlined. [Germany]
2942	8	33	8	44	Suggest clarification: In the bold statement (A7), higher income is linked to lower risk of food insecurity where as A7.1 states that higher income is linked to "implications for food insecurity" - be more explicit on the direction of change in food security and use only 'food security', as opposed to both 'security' and 'insecurity'. What about the 'food supply chain' - what are risks and implications? [Australia]
2574	8	35	8	37	Is it pathways with the combination of these characteristics that result in lower risks, or with any one of these characteristics? Please revise language accordingly, e.g. "pathways with the combination of..." (if this is the case). In addition, what is a "pathway with higher income"? Does this refer to a higher global GDP? [Germany]
7286	8	35	8	37	This sentence is confusing. It seems to be saying that "higher incomes...result in lower risks of...food insecurity" but para A7.1 says "Increases in...income...result in increased demand for food...with implications for food insecurity." The next sentence (rows 43-44) "Development pathways in which income increases and pressure on land reduces can lead to reductions in food insecurity." is clear, perhaps this should be the headline statement? But it would be even clearer if it said "improvements in food security" instead of "reductions in food insecurity". [United Kingdom (of Great Britain and Northern Ireland)]

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238	8	35	8	38	Add "land-based" before technological change in SPM A7. Section 4.6 features technologies for CDR, and some words with "land-based", such as land-based technologies or land-based CDR, can be found. It is apparent that "land-based" is essential to consider the technologies. Therefore, we suggest this revision. [Japan]
4322	8	35	8	38	Consider reversing the sense of this sentence to focus on the risks, that is: "Pathways with LOWER incomes, MORE resource-intensive consumption, and LOWER rates of technological change result in GREATER risks of water scarcity in drylands, land degradation, and food insecurity." Risk aversion will be a major motivation for reducing emissions and adapting to climate change. [United States of America]
1522	8	35	8	39	Please verify: we think there is a risk of wrong interpretation of suggesting a causality between 'higher incomes' and 'lower risk of water scarcity ...' [Belgium]
7994	8	36	8	36	The term "less resource-intensive" is unclear. Please specify e.g. low proteine, low waste, etc. or define in Glossary. [Netherlands]
5612	8	37	8	37	Desertification is missing. [Algeria]
800	8	40	8	40	We suggest to provide precisions on the socio-economic changes here referred to, in a consistent way with § A.2.3 and § A.7. [France]
8894	8	40	8	43	Rewrite the 2 sentences: "Socio-economic changes can strengthen stresses on land systems (high confidence). Increases in population and income, combined with changes in consumption and land management, result in increased demand for food and the type of food demanded, and water, with implications for land use change, food insecurity, water scarcity and terrestrial GHG emissions." [Liechtenstein]
8818	8	40	8	43	Rewrite the 2 sentences: "Socio-economic changes can strengthen stresses on land systems (high confidence). Increases in population and income, combined with changes in consumption and land management, result in increased demand for food and the type of food demanded, and water, with implications for land use change, food insecurity, water scarcity and terrestrial GHG emissions." [Switzerland]
7728	8	40	8	44	It can be somewhat confusing that increase in income can be linked to reduced pressure on land which lead to reductions in food security. Especially when the previous sentence states that increases in income result in increased demand for food and implications for food insecurity. Please consider to clarify. [Norway]
4326	8	41	8	42	The medium confidence designation seems at odds with statement that "All assessed future socio-economic pathways, however, result in increases in water demand and water scarcity." [United States of America]
8236	8	43	8	43	add after terrestrial GHG: " and biodiversity" [European Union (EU)]
8238	8	43	8	44	Are these the only ways in which food insecurity can be reduced? This needs to be rephrased. [European Union (EU)]
802	8	43	8	44	We suggest to detail the kind of pressure on land here referred to [France]
2578	8	43	8	44	Please clarify the main drivers reducing the pressure on land. We are wondering if lower meat consumption and/or less CDR might be the main reason that lead to the reductions in food insecurity. [Germany]
410	8	43	8	44	The statement on inclome is not clear without greater context and development [Ireland]

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8234	8	33	9	2	A7 & A7.1 give mixed messages about the relationship between income and water scarcity. These paragraphs associate higher incomes and lower consumption with reduced water stress. Yet they associate higher income and increased consumption with greater water stress. This is confusing given that higher incomes would typically be associated with higher consumption. It would be better if the paragraph spoke more directly about the main drivers of this difference in outcomes (which appear to be population growth, income equality and material-intensity of consumption as described in Box A7?) [European Union (EU)]
4318	8	33	9	2	The topline statement in A7 that certain pathways result in lower risks of water scarcity appears to contradict the statement in A7.1 that all assessed pathways result in increases in water scarcity. [United States of America]
1234	8	40	9	2	When speaking about the compounding issues, it might be good to highlight a few examples of impacts on human health from the technical chapter. Farmers who rely on healthy crops for their livelihoods whose crops are impacted by drought often have compounding impacts on their health and well-being which can lead to depression, substance abuse and even suicide. Additionally, rapid urbanization paired with climate impacts can increase exposure to certain infectious diseases especially for the most poor/at-risk populations. [Canada]
2576	8	40	9	2	The paragraph is unclear. What kind of "changes in consumption and land management" would result in "increased demand for food"? Is population the key parameter or income? Do consumption pattern or land management types also matter? Please provide more specific information, e.g. to which SSP you are referring to. We are wondering, if the increase in water demand and water scarcity is similar for all socio-economic pathways and would like to understand, whether the lower resource consumption assumed in some SSP1 would make a difference concerning the water sector, as mentioned e.g. for SSP1 in A7.2. Please clarify. [Germany]
4324	8	40	9	2	Land management decisions also affect both emissions and sequestration potential; this should be made clear in A7.1. [United States of America]
7288	8	44	9	2	Suggest amending to "All assessed future socio-economic pathways, however, result in increases in water demand and water scarcity, but some more than others (medium confidence)" for greater clarity. [United Kingdom (of Great Britain and Northern Ireland)]
5350	8	33	10	6	It is good to see that information on limits to adaptation is included in the report (i.e. in B2.5, B3.5) - this is important information which should be retained. However, this need to be extended by the resulting implications for Loss and Damage. Furthermore, it is apparent from Figure SPM2 that 6 out of 7 identified elements reach 'very high risk' levels, some of them already around 2°C. 'Very high risk' levels are characterised by limits to adaptation being reached. This is highly policy relevant information and should be reflected in the text for all 6 elements. [Gambia]
8672	8	33	10	6	The risks in this section seem to ignore those created for the overall sustainability, viability and resilience of biological systems due to the loss of biodiversity. If biodiversity considerations are explicitly excluded from this section, should it be made clearer that these risks are out of scope - ie, that the risks described in this section relate only to the land-climate-food interface? However, even if this is the case, the loss of biodiversity long-term is also likely to put agricultural production at risk as well. [New Zealand]

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4320	8	33	10	8	This section lacks a serious discussion on population growth/reduction dependencies (aside from just inclusion in the SSP scenarios). This is region-specific but needs to be part of the narrative, because some areas with more land/resources may see a population decline, which would have equity feedbacks. [United States of America]
2572	8	33	14	25	In SPM.2, 4 out of 7 RFCs show a transition to high risk at around 1.5C. This underpins the risk assessment of SR1.5 for land systems, and should be put into written text in order to highlight the importance of limiting global warming to 1.5C for land systems. Please include text that summarizes the main findings of SPM.2 panel 1 in A7. [Germany]
5476	8	4			Include word. "infrastructure and DETERIORATING livelihoods due to" [Brazil]
8222	8	12			Potentially add the median or another central measure to avoid communicating an uncertainty range of nearly 500 million. [European Union (EU)]
8226	8	13			If possible, add a central measure in addition to the range. [European Union (EU)]
2934	8	13			Suggest providing more context: '1 to 29%' is a large range and can be interpreted as an insignificant increase in cereal prices - suggest noting why this percentage range matters. [Australia]
2936	8	14			Suggest clarification as to why is RCP6.0 the focus concentration pathway here? And is the percentage range in the previous line smaller or larger for other RCPs? [Australia]
5480	8	20			Sentence modified "chains in all regions." [Brazil]
7290	9	1	9	1	"increases in water demand and water scarcity" - increases by how much? [United Kingdom (of Great Britain and Northern Ireland)]
1694	9	3	9	3	'free trade' could be used instead of 'open trade' because that's the common term. [Hungary]
8638	9	3	9	3	While the human population differences are accepted the other elements in the scenario may not be associated with each population change and might be mutually exclusive of one or more of the other factors in each scenario. How is this addressed throughout the text. This fact should be clearly explained in the text. [New Zealand]
4942	9	3	9	3	In the Box A7, under SSP1, what does "lower" compare to in "lower meat consumption" and "lower food waste"? [Sweden]
8240	9	3	9	4	Box A7: the SSP concept in SRCL is more complicated than the P1-4 system of the SR1.5 SPM, so needs to be explained very clearly starting with the basics: * that this is a 2*2 matrix system. i.e. several temperature outcomes are possible with a single SSP. A diagram may help with this, along the lines of Supplementary Table 1 in Rogelj et al. 2018 (https://doi.org/10.1038/s41558-018-0091-3) but highlighting the SSP-temperature combinations considered in this SPM. * that each SSP represents a coherent set of socioeconomic and technological assumptions but is not a central prediction or projection: different futures are possible. Also, the box should include a central population projection alongside the SSP-based estimates. * where applicable, overlaps with the SSP scenarios used in the 1.5°C report and the IPBES General Assessment report should be identified. [European Union (EU)]
8242	9	3	9	4	In the second bullet of the box, replace "improvement" with "reduction" (if that is how it is meant). [European Union (EU)]

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5484	9	3	9	4	Along the SPM, the text shouldn't say "lower meat consumption" but healthier diets. The meat consumption necessarily linked to deforestation is far from questionable and there are other dietary problem that should also be addressed. [Brazil]
1066	9	3	9	4	This box (Box A7) is useful and policy-relevant. We suggest moving this box forward in the SPM, in the introduction section for example. To improve its contents, we suggest to complete the description of RCPs and SSPs by providing references to the relevant sections in the main report (including ones to the cross-chapter box 1 pages 1-23 to 1-27 and to the cross-chapter box 9 pages 6-142 to 6-147) and, particularly in link with section 1.3.2.2, lines 30-38 page 1-20, to provide detailed expanations about the differences of assumptions in regards to climate adaptation, variation of inequalities with time and policies assumptions (business-as-usual, continuation of current policies, implementation of additional policies...). For SSP 1, please also consider highlighting the fact that when the SSP 1 had been produced the 7 billion assumption could correspond to a low growth of human population, but now this level has been outpassed, it should be considered as a decline of human popoulation. [France]

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2580	9	3	9	4	<p>This is the first report to introduce the SSP-framework at SPM-level. We therefore appreciate the provision of a box, but have some suggestions for improvement which we find essential for a good understanding of the related messages:</p> <p>1) For non-experts it will be very challenging to grasp the difference between scenarios, pathways, and projections as well as between RCPs and SPPs. Unfortunately across the report the expressions "pathways" and "scenarios" are used synonymously and in a confusing manner (e.g., the glossary definition of RCPs refers to scenarios while the definition of SSPs refers to scenarios). It has been very challenging in the past to communicate which one of the two is input and which one is output of model simulations and to explain the different model families. Now with the SSP being more in the focus than ever in the SRCCL it becomes even more important to communicate in a clear and unambiguous manner. We therefore request the authors to clarify the issue in Box A7 and to reconsider language at least in the SPM to avoid further confusion.</p> <p>2) Please explain which characteristics of the SSPs are input and which are outputs resulting from the IAMs, because without such information it is difficult to distinguish cause and effect. For example, population growth seems to be a very important parameter, but is population growth the main driver for differences in socio-economic pathways (i.e. less people is more sustainable) or is population growth a result of the socio-economic input conditions for a given pathway (i.e. more sustainability leads to lower population growth).</p> <p>3) Please mention in the first lines of the box that the type of socioeconomic development matters for GHG emissions resulting in global warming. However, climate change impacts and potential feedbacks on the socioeconomic development including impacts on land resulting from this warming are not taken into account in the SSP framework.</p> <p>4) Please explain why those three SSPs are chosen, and not SSP4 and 5. Also, please consider to include already here the information that SSP 3 is not compatible with pathways to 1.5C/well below 2C by 2100.</p> <p>5) SSP2: "only gradual improvement in inequality ..." unclear formulation: is inequality increasing or decreasing?</p> <p>6) Please provide information on the same characteristics for all SSPs, e.g. regarding trade or inequalities.</p> <p>7) The text under the bullets refers to Figs. SPM.2 and SPM.4. Non-experts will find it very difficult to understand how Figs. SPM.2 and SPM.4 compare to each other given that they both present information from scenarios/pathways. Both figures provide information on risks under different SSP-scenarios. However, these figures and the subpanels of Fig.2. seem to be not fully consistent in their treatment of climate change impacts resulting from different levels of warming. Please explain how these two figures treat climate change impacts and how compare to each other. Please see also our individual comments on these two figures.</p> <p>8) Please provide references in Box A7 indicating where more information on the SSP framework can be found in the underlying report, in particular Cross Chapter Box 1 in CH1 and Box 9 in CH7. (Side note: CC Box 9 is referenced incorrectly to be found in CH6 in TS P45 L21). [Germany]</p>
7730	9	3	9	4	Please consider to add some more quantification and explanation. [Norway]
7732	9	3	9	4	The SSPs are challenging to understand. For clarification, a box explaining the differences between the SSPs in this report and the scenarios in the 1,5C report (P1, P2, P3, P4 etc.) could be helpful. Please consider to include this. [Norway]
5114	9	3	9	4	It would be better to express SSPs in Figures including simple explanation. [Republic of Korea]

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4946	9	3	9	4	It would be useful to also include something about energy demand/use for the different SSPs. [Sweden]
4328	9	3	9	4	KEY ISSUE [TERMS]: Box A7 – Shared Socioeconomic Pathways (SSPs) – needs to do a better job explaining what the SSPs are and how they are used in this report and how they can be used by policymakers. Crucially, the SSPs were designed to be used in conjunction with the RCPs, with a set of baseline SSP scenarios and a set of mitigation SSP scenarios that meet the forcing levels covered by the RCPs. This box should describe both the SSPs and the RCPs and how they are used together in baseline and mitigation scenarios. It may also be worth mentioning the different degrees of challenges to mitigation and challenges to adaptation that were used in framing the SSPs. [United States of America]
242	9	5	9	6	Impacts of temperature rise between 1.5oC - 2oC on water scarcity are presented. It is desirable to provide the impacts of other temperature rise ranges also, for example, 2.0oC - 2.5oC and 2.5oC - 3.0oC for better understanding of global warming impacts. Otherwise, the reader could not understand why in one paragraph SPM refers only to 1.5 degrees and in another paragraph to 2 degrees, making comparisons difficult. [Japan]
7292	9	5	9	6	Does 'under current socio-economic conditions' mean this assumes no population projection or GDP change and they are therefore using current numbers for these? Please clarify and caveat as appropriate [United Kingdom (of Great Britain and Northern Ireland)]
4330	9	5	9	6	How do current socioeconomic conditions relate to the SSPs? How does this statement relate to the burning embers diagrams in Figure SPM.2? [United States of America]
2946	9	7	9	7	Suggest rephrasing to read: "... pathways with high population growth and higher water demand ..." [Australia]
4332	9	7	9	7	"Low population growth", not "low population" [United States of America]
2948	9	8	9	8	Suggest rephrasing to read: " ... in SSP1, there is only a moderate projected risk related to desertification ..." [Australia]
5116	9	8	9	9	Only a moderate risk related to desertification even at global warming of 3C? What is the evidence for this statement? [Republic of Korea]
8244	9	9	9	9	The following statement appears unduly optimistic: "For Shared Socioeconomic Pathways (SSPs – See SPM BOX A7) with low population and less increase in water demand, as in SSP1, there is only a moderate risk related to desertification even at global warming of 3°C." This seems to be inconsistent with the current desertification risk (which is considerable in many regions, at current warming of around 1°C) and the previous sentence. Perhaps it applies to a different region? [European Union (EU)]
244	9	9	9	11	Suggest that the word "(medium confidence)" is added at the end of this sentence to keep a consistency with Section 7.3.2.8 (Page 7-18, Line 24-26). [Japan]
804	9	11	9	12	The fact that the thresholds stem from an expert elicitation protocol, a method that is based on but differs from direct literature review, should be stated somewhere in the text of section A7, given the importance of the thresholds for that section. For the moment, this information appears only at the end of the caption of Figure SPM2. [France]

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4334	9	11	9	12	There are several entries that discuss 'RISK TRANSITION' zones. Risk is defined as the product of probability (or likelihood) and consequence. Some add vulnerability to this notion. It is hard to understand the notion of risk transition, since moving from a lower level of warming to a higher level of warming would imply that one is more likely than the other. The argument could be made that the negative consequences of a higher warming zone are so much worse that it is higher risk albeit the likelihood of the warmer temperature (which is innately uncertain). Recommend rephrasing either as CONSEQUENCE or IMPACT TRANSITION. [United States of America]
1236	9	13	9	20	Consistent with comments provided on the previous draft, it is problematic to assume that the SSPs which are based on population growth, resource consumption intensity, and level of technological adoption are directly correlated with risks to land degradation and increased land use change, as is stated in line 13 below. Use of this approach may reinforce social perceptions that low income countries are solely responsible for land degradation, while it simultaneously obscures the link with high consumption rates and high GHG emissions from more economically advanced countries. Suggest that further explanation is needed as to how the SSPs related directly to cause of land degradation - and include any caveats required to ensure that this is not reinforcing unfounded beliefs. [Canada]
2582	9	13	9	21	We kindly request the authors to clarify the causes of the increased land use change in the SSP3 and whether it is also due to the assumed consumption patterns (material-intensive, more meat, more food waste), as one would expect considering potential impacts on land mentioned in chapter 4: "Social changes, such as widespread changes in dietary preferences will have a huge impact on agriculture and hence land degradation (medium evidence, high agreement)." (Ch. 4 p. 45 ll. 41-42) [Germany]
7296	9	13	9	21	Could you refer to the relevant characteristics of SSP1 and 3 etc. instead? It feels like the reader needs to do quite a lot of detective work to work out the key message of this paragraph. Why are the transitions to high risk occurring when they are? Please explain what the data means not just state numbers. Readers can always look at spm2 for data, but the key messages are what really count. This is also relevant for a7.3. [United Kingdom (of Great Britain and Northern Ireland)]
4336	9	13	9	21	KEY ISSUE [TERMS]: This applies to a number of sections. SSP2 is only mentioned at the end. If SSP2 is a realistic option, why is it ignored for the most part in the SPM? [United States of America]
4338	9	13	9	21	Policy makers reading this section in isolation would have no idea what it means to say "the transition from high to very high risk occurs between X and Y°C." No policymaker thinks in terms of degrees of warming as thresholds or in terms of SSPs. The SPM should be revised to make sentences that are understandable to the intended audience. Revise the statements to be in values that policymakers can understand, such as: "Risks related to land degradation due to climate change are higher in scenarios with larger population, and scenarios with increased land use change result in more people exposed to habitat degradation, fire, and coastal flooding (medium confidence)." Or "Demographic and economic factors, lower populations, less land use change within scenarios can lead to increased risks at lower levels of warming and possibly eliminate some risks altogether." Authors should also be as specific as possible in this reformatting, specifying that the damage implied by permafrost melt is to arctic infrastructure and not from biogeochemical climate feedbacks. [United States of America]

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4340	9	13	9	21	KEY ISSUE [ALIGNMENT/ACTION]: The discussion of permafrost thaw should be more precisely stated to track the assessment in Chapter 7.3, which refers specifically to damage to infrastructure. Also, the SPM does not really address the interaction between permafrost thaw and the potential release of methane; if there is a medium or high confidence conclusion that could be brought forward from the underlying report, this may be an appropriate place to do it. [United States of America]
2584	9	14	9	15	Habitat degradation: the term habitat is used also for housing, better use "ecosystem degradation". [Germany]
2952	9	15	9	15	Suggest rephrasing to read: "The projected risk transition ..." [Australia]
4342	9	15	9	16	KEY ISSUE [CONFIDENCE]: Low confidence conclusions should be accompanied by an explanation (e.g., lack of evidence, conflicting evidence, small signal amplitude, etc.). [United States of America]
2954	9	17	9	17	Suggest rephrasing to read: "The projected transition ..." [Australia]
4344	9	18	9	19	KEY ISSUE [CONFIDENCE]: This statement refers to a low-confidence conclusion depicted in Figure SPM.2b. Instead the statement should say that there is low confidence in the risk assessment for land degradation in SSP1. [United States of America]
2956	9	19	9	20	Suggest reconsidering the sentence on permafrost - it is out of place in this paragraph. [Australia]
1420	9	19	9	20	This sentence on projected changed in permafrost thawing should be highlighted in the key messages [Luxembourg]
1238	9	19	9	21	Unclear what is meant by "damage". Infrastructure damage? As mentioned above, whether the infrastructure is damaged due to permafrost thaw will depend on its design as well as whether the permafrost is ice-rich. [Canada]
2958	9	22	9	22	Suggest rephrasing to read: "Risks related to food security are projected to be higher in the SSP3 than in the SSP1 ..." [Australia]
8246	9	22	9	23	In the first sentence, it would seem reasonable to recognise increased food demand due to a much higher population (almost double by 2100). That may also allow increasing the confidence level of the statement. [European Union (EU)]
2586	9	22	9	23	Please review the confidence level of the statement that the risks are higher in a SSP3 worlds. To us it seems like a high confidence statement. [Germany]
4346	9	22	9	23	A7.4 states that "Risks related to food security are higher in SSP3 than in SSP1, due to increased food prices resulting from land competition, lower income, and more limited trade." Lower income in SSP3 has a direct impact on food security, but it is not clear that lower income is a cause of increased food prices. Suggest rephrasing. [United States of America]
4348	9	22	9	23	KEY ISSUE [LAND-COMPETITION]: Land competition between which sectors? So far, this SPM has only highlighted urban systems, and not so much the energy system's competition for energy vs. food production, or peri-urban expansion, increasing settlement in rural areas, etc. Should probably provide some clarification on what sectors are discussed. [United States of America]
1240	9	23	9	23	Change "land competition" to "competition for land", or "competing land uses" [Canada]

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240	9	5	10	3	High levels of risk' etc. are ambiguous (please see the following list). If these phrases correspond to "very high", "high", "moderate", and "undetectable" in Figure SPM2 , the quotation marks would need to be added to them. <page 9> Line 5: high; Line 8: moderate; Line 10: moderate, high; Line 11: high, very high; Line 15: moderate; Line 16: high; Line 17: high, very high; Line 19: high; Line 24: moderate, high <page 10> Line 1: high; Line 2: very high; [Japan]
98	9	5	10	3	Consider adding a brief statement about the existence of regional differences in the results presented in these paragraphs. [Spain]
7938	9	13	10	3	Differences in exposure and vulnerability between SSP1 (lower) and SSP3(higher) are described here as if they are essentially a (semi-coincidental) result of the projections, while in reality SSP3 was specifically designed to represent a future state of the world facing very high challenges w.r.t. climate change impacts. It would be good to revise the sections A.7.1-7.3 accordingly to reflect this purpose of the SSP architecture and not treat this as a pure uncertainty. [Netherlands]
5352	9	22	10	3	There are some important regional differences when it comes to climate risks for food security. The Executive Summary of Chapter 7 mentions for example that "tropical regions, including Sub-Saharan Africa, Southeast Asia and Central and South America are particularly vulnerable to decreases in crop yield (high confidence, while 5.22 states that "climate change is affecting food security in drylands, particularly those in Africa, and high mountain regions of Asia and South America." This regional perspective should be provided in the text or in the Figure as a "disclaimer" so that policymakers can understand the nuances hidden in the global perspective visualised in Fig. SPM2. [Gambia]
1712	9	22	10	3	Can anything be said about where this risk transition lies for small islands? Reliance on fisheries, food trade, food aid and small areas of arable land, all of which are vulnerable to climate change, means that food security risks are particularly high for small islands. [Saint Kitts and Nevis]
7294	9	5	14	27	The concept of "high risk" is brought in the first sentence of A7.2 (p. 9 line 5-6) without any context - high risk for whom? Relative to what? This whole section of the report (paras A7.2 to A7.4, SPM Figure 1 and 2) would benefit from a clearer explanation of how risk is quantified within this report, to whom/what system it applies, and what the implications are of the different categories. The key at the bottom of Figure SPM 2 is not sufficient. It explains the "severity", but gives no details of the breakdown in terms of hazard/exposure/vulnerability assumptions for each category. It also comes too late. I would suggest a box on risk directly after Box A7, before para A7.2. [United Kingdom (of Great Britain and Northern Ireland)]
2944	9	3			Suggest correction: SPM Fig. 4 is introduced in the text before SPM Fig. 3. [Australia]
2950	9	14			Suggest deleting 'change' after 'land use'. [Australia]
246	10	1	10	3	According to Section 7.3.2.8 (Page 7-19, Line 26-27), the transition range in SSP3 is "2 - 2.7 degree". Therefore, please revise "2.2" to "2". [Japan]
7298	10	1	10	3	It would be useful to have SSP2 presented here as well. [United Kingdom (of Great Britain and Northern Ireland)]
4350	10	2	10	3	The last statement in this paragraph should be marked as medium confidence. [United States of America]

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5118	10	3	10	3	SPM Fig. 2b → Figure SPM 2b [Republic of Korea]
7300	10	4	10	4	Should clarify here that these responses can "affect the risk" both positively and negatively, depending on the particular intervention [United Kingdom (of Great Britain and Northern Ireland)]
8248	10	4	10	6	A7.5 is very weak and its messages are dealt with in greater detail in sections C & D. Delete, unless there are unique, high confidence messages from underlying sections that can be brought in at this point. [European Union (EU)]
1778	10	4	10	6	This is an important message and it begs the question; how? And how can it be avoided? Figure on page 13 illustrates some of the conflicts/risk, but section A7.5 should also be elaborated. [Denmark]
806	10	4	10	6	This paragraph should be better balanced as for the moment, it only highlights trade-offs situations between mitigation and food security, whereas it also exists land-based mitigation options such as agroecology*, including agroforestry* on croplands and grasslands, that have some synergies with food security* and other services. See executive summary chap1 p.1-2 l.11 Besides, in order to avoid any misunderstanding, we also suggest to replace "affects the risk" by "increases or decreases the risk". [France]
2588	10	4	10	6	This statement is too general. Please provide information about how mitigation and adaptation affect risks and how these can be avoided. In addition, this information concerns response strategies and should therefore be moved to section B and put in the context of sustainable development and other societal goals, see e.g. B6.2. [Germany]
574	10	4	10	6	A very surprising statement with not much qualifications. May mention whether the effect is positive or negative. Or this may lead to wrong conclusions as if land based Management and Development are bad practices. [India]
412	10	4	10	6	Key statement could be more prominent [Ireland]
1588	10	4	10	6	The sentence sends out a confusing message, it is not clear which kind of responses to mitigation and adaptation can actually lead to desertification degradation and food security problems, thus missing the opportunity to inform the policy makers. We suggest to either add examples of specific responses or to delete the sentence. [Italy]
7734	10	4	10	6	This statement is very important. [Norway]
4352	10	4	10	6	Point A7.5 seems better placed under A6 (which discusses desertification, land degradation, and food insecurity) than under A7 (which does not, nor does it mention adaptation in the main point). Recommend moving. [United States of America]
4354	10	4	10	6	A7.5 reflects a very important point that should be elevated within the SPM. [United States of America]
7302	10	6	10	6	Suggest adding in "regional consequences of biophysical effects such as albedo changes" for clarity. [United Kingdom (of Great Britain and Northern Ireland)]
22	10	30	10	39	A significant negative impact on food production and prices in all South Asian countries due to climate change-induced agricultural productivity changes (Bandara, J.S. and Cai, Y., 2014. The impact of climate change on food crop productivity, food prices and food security in South Asia. Economic Analysis and Policy, 44(4), pp.451-465.) [Sri Lanka]
2590	10	5			Please add "food production" to the list, e.g. after "emissions". [Germany]

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1698	11	0	11	0	Figure SPM1 - Part "F" : global mean warming of 0.87°C, whereas the text explaining indicates 0.86 °C [Hungary]
592	11	0	11	0	Surface ozone (O3), like other greenhouse gases, also needs to find some mention among others in the diagram. [India]
248	11	0	11	0	The unit mentioned in the item E on the rightmost column of the Figure SPM.1 ("1.5 +- 0.7 Gt CO2 yr-1") seems to be incorrect. Maybe the correct unit for this case is GtC instead of GtCO2. To facilitate understanding, we would suggest mentioning the amount in Gt CO2 yr-1, that corresponds directly to the amount shown in the Table 2.3 in the underlying chapter, Section 2.4.1.2. [Japan]
250	11	0	11	0	There is discrepancy in the estimation of percentage of global anthropogenic GHG emission deriving from land use, over the period 2003-2012, in the Figure SPM.1 (Column E) and the underlying chapter, Section 2.4, para. 2.; the Figure SPM.1 (Column E) mentions an estimation of 24% and the underlying chapter, Section 2.4, para. 2 mentions the estimation of 22%. We would suggest rechecking the estimation. [Japan]
5120	11	0	11	0	A, B, C, D, E, F not (a),(b),(c),(d),(e),(f) [Republic of Korea]
5122	11	0	11	0	It is hard to see how much is unused land in the future. Unused land 28% is included in the figure or not? [Republic of Korea]
5124	11	0	11	0	In accordance with the IPCC guidelines, the land use categorized 6 type, forest land, crop land, grass land, wetland, settlement and other land use. However wetland does not shown in the figure SPM 1 only included in Unused land as a part. The Wetland should display as a one of the land use categorise for having a certain consistence in accordance with published IPCC guidelines. [Republic of Korea]
5126	11	0	11	0	The figure of picture 19+2=22(x) 21 [Republic of Korea]
4944	11	0	11	0	Figure SPM-1 is a very attractive graphical overview with essential information presented in an easy-to-grasp manner. The word "biodiversity" could, however, be inserted somewhere. Possibly, in text A, one could write "...which has caused considerable biodiversity impacts" . Text C could also be adjusted a bit, so that readers do not get the impression that agriculture intensification is caused by a single factor, i.e., the rapid increase in food demand, since it is taking place due to many different reasons. An alternative text C could be: "The agriculture intensification has resulted in higher land productivity, which has counteracted the need for agriculture land, but has brought other challenges. Since 1961, the use of inorganic fertiliser increased nine-fold and the use of irrigation water doubled." [Sweden]
7304	11	0	11	0	SPM Figure 1, sub-figure A would be much easier to read and interpret if replaced by a conventional pie chart. I am worried that people might not spot the top end of curve 1 on sub-figure C. There are a number of other aspects that may not make the figure intuitive or easy to follow for the reader. For example, small and slanted text, the percentages may not be immediately obvious, is A-E in circles meant to refer to anything specifically (i.e. why not just bullets or some other way to distinguish), the semi circle with aerosols etc coming in and out won't be at all intuitive. [United Kingdom (of Great Britain and Northern Ireland)]

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5488	11	1	11	1	<p>at letter B: is the dietary change due to increase of population? What is the evidence that consumption of meat is the main change in diets? Why is there an increase in meat consumption (consider technology, production, as well as price and quality, transportation, global information, affluence...);</p> <p>in no health related publication can we find a correlation between meat consumption and overweight. when presented in a same graph, as it is done here, it conveys the message that the main change on diets are related to meat, and that meat consumption is related to overweight. The SPM report does not mention the increase of the food industry, of processed food vs in natura, the amount of calories, etc. Please consider present this information in different graphs, avoiding misleading and inaccurate conclusions.</p> <p>reiterating a message conveyed before that misleading conclusions will hinder the capacity to actually find concrete and effective solutions. [Brazil]</p>
5490	11	1	11	1	<p>at letter C: what is the actual area under irrigation? Saying that it has doubled does not inform what is the area under irrigation, and what is the actual impact of irrigation. [Brazil]</p>
1250	11	1	11	1	<p>Suggest replacing "used" land descriptions with language that is consistent with definitions used elsewhere in IPCC reports, as well as in other parts of the SPM and underlying chapters, e.g. "managed land" (see lines 17 to 19 on page 6, for example). "Used" is not included in the Glossary, nor is it clear in terms of temporal usage - i.e. is the land being used presently vs. having ever been used; whereas the concept of "managed land" has clear definitions and is defined in the Glossary to this SR. [Canada]</p>
252	11	1	11	1	<p>The value of contribution of land use emissions ("24%") in the caption of Panel E is inconsistent with sections A1.3, A4 and the underlying report ("22%"). It would be better to use a consistent value. [Japan]</p>
254	11	1	11	1	<p>It is a little bit hard to distinguish at a glance each solid lines in the Panel B to F of Figure SPM.1. It would be very helpful for readers to change colors of each solid lines and legends. [Japan]</p>
256	11	1	11	1	<p>Although Figure SPM.1 says "The extent of inland wetlands has declined to 70% of the extent in 1970...", this value does not correspond to that in Chapter 4 (p. 4-16, line 34), "The loss of wetland has been estimated 35% since 1970". We suggest that SPM quote the same values with those of each Chapter. [Japan]</p>
8896	11	1	11	1	<p>In the illustration of section A of figure SPM.1 the depicted uses of land can not be read because the small font. [Liechtenstein]</p>
7736	11	1	11	1	<p>The figure should state how much of the total globe the "global ice-free land surface" constitutes. This is not conveyed and is important. [Norway]</p>
7738	11	1	11	1	<p>The information in the figure is somewhat uneasily accessible. It is hard to differentiate between habitats currently under human use and those still "intact"/"unused land". The rectangles are presented in a somewhat unstructured fashion, where even habitats such as "forests" have different color (and are located far apart). A more intuitive way of presenting the data could be a classic pie chart (probably a more familiar way for most of the audience), perhaps sorted after "use" and "non-use". [Norway]</p>

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7740	11	1	11	1	The terminology of "unused land" (barren land, grasslands & wetlands, primary forests), may suggest that these areas are open for further development by humans (actions recommended in the report), when infact these areas likely represents the remaining intact wilderness areas, which in many cases are under some form of legal protection (National Parks, etc). A more correct representation might therefore be the term "remaining natural habitats" or "intact wilderness" or "intact natural land". The percentage legally protected of the "unused land" category might be relevant to policy makers. [Norway]
7742	11	1	11	1	Please clarify whether the emissions from land use (24 %) mentioned in (E) refers to AFOLU, or just FOLU. Also please clarify how much of the AFOLU emissions stems from FOLU. [Norway]
7744	11	1	11	1	Please consider to add year for the figure. [Norway]
7746	11	1	11	1	In the graph under section E showing the GHG emissions, the CO2 emissions seem to have a downward trend and does not immediately appear to be "a problem", although we recognise that it is described in the text. Please consider to illustrate CO2 emissions differently. [Norway]
7748	11	1	11	1	This figure is very informing and useful, especially the text part. Please keep this (with some modifications) in the final version of the SPM. This figure could also be very useful in a presentation if it is animated to show one part (A,B,C...) at the time. [Norway]
7750	11	1	11	1	Please consider to add information also on land-use changes in the figure. Current global land use and management is interesting information. It would, however, be even more interesting to see how land use and management have changed over time. [Norway]
7752	11	1	11	1	The illustration of land surface use is somewhat difficult to read. Please consider to tilt the text (and perhaps the whole illustration) to horisontal in order to improve readability. Perhaps also the shape could be simplified to make the proportions clearer. [Norway]
4948	11	1	11	1	Under "E", it is stated that "... decreased in the early 1960s..." The graph would seem to show, however, that the decrease continued to around early 1980s or so... [Sweden]
8820	11	1	11	1	In the illustration of section A of figure SPM.1 the depicted uses of land can not be read because the small font. [Switzerland]
7308	11	1	11	1	The line graphs in SPM1 fail to show some of the key messages that could be brought out. Instead of meat calorie consumption and prevalence of overweight in section B (where it is unclear if these things are meant to be linked, or if they are on an absolute or per capita basis), the graph could show the increased proportion of overall GHG emissions coming from methane over time, or the changes over time of GHG emissions from other parts of the food system. Section C could similarly show a direct measure of intensification e.g. yield per area instead of an indirect measure such as fertiliser use (the line for which goes outside the area of the graph in a confusing manner) or cereal yields (is this on an absolute or a per area of land basis? also why specifically cereal?). The main helpful points are found in sections D, E and F. [United Kingdom (of Great Britain and Northern Ireland)]
7310	11	1	11	1	E says 24% of total ghg emissions derive from land use, whilst A1.3 says 22%? Which is correct? [United Kingdom (of Great Britain and Northern Ireland)]

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7312	11	1	11	1	Figure SPM1: It's not clear how the 6 pieces of text A-F relate to other parts of the figure , and in general the flow of information is quite unidirectional i.e. it spends a lot of time talking about how human activity affects land and then gives slightly less detail on how this affects GHG emissions and climate change, but then misses out on the oportunity to link this back to land use and land degradation/desertification. It would be good to maximise communication of the linkages between these issues and the land challenges. [United Kingdom (of Great Britain and Northern Ireland)]
7314	11	1	11	1	Figure SPM1: The y-axis in the "Land Use intensification" graph disappearing behind the textbox and then reappearing further up the page is really confusing and difficult to follow - is ther a way of simplifying the layout or changes the units on the axis so this doesn't need to happen? [United Kingdom (of Great Britain and Northern Ireland)]
4356	11	1	11	1	This figure tries to put too much information into one place. Figures are intended to simplify messaging. [United States of America]
4358	11	1	11	1	Denote what the percentage numbers in each tile stand for. [United States of America]
4360	11	1	11	1	KEY ISSUE [GRAPHICS]: Figure SPM1, Section B. The statistics on the prevalence of overweight should not be included in a box intended to describe growing demand for food and pressure to expand agricultural production. The food consumption choices that drive growth in overweight and obesity (e.g., ultra-processed foods high in sugar and fats) may not be particularly strong drivers of land use expansion. Since the larger report does not include overweight as a major driver of agricultural expansion, it should not be a focus of this box. In addition, linking meat consumption and overweight in this box/graph could lead many to assume that increased meat consumption is driving increases in the prevalence of overweight. This is not true. [United States of America]
4362	11	1	11	1	The baseline is different between the a-e panels as for f. The start year needs to be the same. [United States of America]
4364	11	1	11	1	Panel E is potentially misleading as it gives the impression that N2O and CH4 are more important that CO2. This figure should be redone using GWP for CO2eq. [United States of America]
4366	11	1	11	1	The definitions for the land use and cover types are not consistent with IPCC or IGBP. For example, 'used grassland' is unclear. Is this rangeland? Some attention to definitions of land classes is needed. [United States of America]
4368	11	1	11	1	KEY ISSUE [FLUXES]: Caption E says 24% of global emissions derive from land use. Other parts of the SPM reference 22%, but over a different time period. These numbers should be made consistent throughout the special report if possible, or the differences resulting from different time frames should be clearly explained. [United States of America]
4370	11	1	11	1	Figure SPM.1A should be clearly labeled to indicate what the depicted changes represent, including the parentheses. Is this change between 1961 and 2018? Further, it should indicate the areal extent of each subcategory depicted. [United States of America]

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4372	11	1	11	1	KEY ISSUE [GRAPHICS]: Figures SPM.1B-E are misleadingly labeled. The number 100 appears to reflect a normalized baseline index value. Thus a figure of 200 would reflect a doubling or a change of 100 percent, not 200 percent as the legend would suggest. This error is carried into the description in SPM.1D, which states that the number of people living in desertified areas has increased by nearly 300%. Moreover, the text and the legend appear to treat desertified lands as equivalent to desertifying lands; whereas those terms would suggest a distinction. Finally, it would be clearer to say that the extent of inland wetlands has declined 30% since 1970 (assuming that figure is correct). [United States of America]
4374	11	1	11	1	KEY ISSUE [ALIGNMENT/ACTION]: The population trend line since 1961 in areas undergoing desertification (Panel D) does not appear to be traceable to the underlying report. It should be deleted or revised to more clearly correspond to the underlying report. [United States of America]
4376	11	1	11	1	Figure SPM.1F should use different colors to distinguish the two trend lines. [United States of America]
414	11	1	11	2	Useful figure but some of the information is obscured by text e.g. N levels in panel C [Ireland]
4378	11	1	11	2	Is there some reason that this figure has an angular perspective? It's kind of distracting and makes the information harder to read. [United States of America]
4380	11	1	11	25	KEY ISSUE [GRAPHICS]: For Figure SPM.1E, it would be good to include on the graph the current level of emissions. The figure emphasizes the relative growth in emissions, but the reader needs to be aware that the absolute level of emissions from land use change is still extremely high relative to the others. [United States of America]
7306	11	1	11	44	Box A is currently not hugely informative. Alternatively, it could say something like what the % of the current total agricultural land was converted from natural since 1961 (otherwise 5.3 Mkm ² feels quite abstract, even with its comparison to the size of Australia. [United Kingdom (of Great Britain and Northern Ireland)])

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4382	11	1	11	44	<p>KEY ISSUE [GRAPHICS]: This graphic has the potential to serve as an excellent means to frame and provide context for the report; however, as currently structured, it falls short. Section A of the figure provides a visually compelling way to represent the various categories of global ice-free land surface, dividing the area into major categories (used forest, used grassland, cropland, settlements, and unused land) by color, and further sub-dividing the major categories with dashed lines. This is an excellent start. To provide the proper framing and context needed to set the stage for this report, the figure (along with Chapter 1) needs to show a few key trends, as follows:</p> <p>1) How is the share of land in each of these major categories changing over time due to land use change? Section 1.2.2.3 notes that cropland area has increased 15% since 1960, and permanent pastures have increased 8%. It would be useful to have a line graph in the style of B-F that shows the trends since 1961 for each of the major land categories.</p> <p>2) What are the major drivers of land use change, and how are they evolving over time? The current Panel B notes that land use change has been driven by increases in food, fibre, and timber production arising from increasing population and dietary changes. However, the figure only shows trends for population, meat calories, and prevalence overweight, with population rising faster than meat calories somewhat undercutting the point. Instead it would be more useful if this figure actually showed the trends in the drivers called out in the text. Show the trends in food, fiber, and timber production, along with population and meat calories per capita. This will immediately begin to tell an important story, as from Section 1.2.2.3 one sees that cropland production increased 350% and animal production increased 250% over the period in which cropland area only increased 15% and pasture area only increased 8%.</p> <p>3) How intensification of land use, and increased yields, have enabled land production to increase faster than used land area? The trends shown in 1 and 2 above, the dramatic increase in land production with a much smaller increase in used land area, can then be explained in this sub-figure showing trends in yields and intensification. The 300% increase in cereal yields shown in the current sub-figure C explains how cropland production was able to increase 350% while cropland area only increased 15%, and the trends in N fertilizer use and irrigation water help explain how the yield improvements were achieved. This sub-figure can be further improved by showing equivalent trends in yields for animal products, fibre production, and timber production. In the discussion, the SPM needs to bring out how the need to produce about 50% more food by 2050 (see Section 5.6.4.4, Sustainable Intensification) will require either sustainable intensification or extensification expanding cropland area.</p> <p>4) What do trends in land degradation look like? The current sub-figure D shows trends in population in desertifying areas, drylands in drought, and inland wetlands extent. One small point is that the current text states that, "... the extent of inland wetlands has declined to 70% of the extent in 1970 ...". It would be less confusing to simply state that the extent of inland wetlands has declined 30% since 1970, as written it seems to risk the reader erroneously understanding the decline to be larger than it was. Section 1.3.1.3 defines land degradation to be long-term loss in one or more of: biological productivity, ecological integrity, and value to humans. The authors should consider if there are other trends that could be shown to better demonstrate the breadth of land degradation.</p> <p>5) What are the drivers of land degradation? How are climate change, land-use change, and land-use intensification impacting land degradation? Climate change can directly contribute to all aspects of land degradation, impacting yields as well as impacting ecological integrity and biological productivity; land-use change can contribute to land degradation, e.g., through loss of habitat and reduced</p>

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8250	11		11		<p>Editorial suggestions for improving Figure SPM1.</p> <p>* The upper section is informative but visually challenging. Suggest making it a simple rectangle with differently-sized quadrants representing the different land uses.</p> <p>* A-E text. Reduce dramatically. Suggest having one headline statement only per figure. The rest can be footnotes (or references to the relevant part of the SPM text).</p> <p>* B-E figures: series should have different colours (or dot-dash systems) to improve readability.. [European Union (EU)]</p>
8252	11		11		<p>Suggestions for improving Figure SPM1.</p> <p>A figure - Clarify (perhaps in the caption) that "settlements" include other infrastructure, and to include in one of the charts (C or D) the trend in its expansion, consistent with 1.2.2.3: "Urban and other infrastructure areas expanded by a factor 2 since 1960 (Krausmann et al. 2013), resulting in disproportionately large losses of highly-fertile cropland."</p> <p>B figure - consider different data series with a more direct link to land use change. Ideally, the diagram would show the increase in agricultural area over time broken down into its key driving components in a Kaya-identity-like system (e.g. increased population, increased consumption per capita, increased land intensity of diets, food waste etc). The series on % of overweight is not so informative since the reader cannot tell how strongly it is driving land use change. On meat consumption, the diagram appears to show it has grown more slowly than population (i.e. diets are becoming less meat-intensive over time). Surely this is not the case?</p> <p>D figure - for population in desertifying areas, useful to clarify the relative contributions of increases in the local population and increases in the desertifying area. Is it possible to give a data series also for those affected by degradation more generally?</p> <p>E figure – it mentions deforestation, does the figure include ecosystem degradation including also peatlands, grasslands, boreal forests, marine ecosystems etc ...They are all impacted by land use change. If not the graph may be misleading. [European Union (EU)]</p>
1524	11		11		<p>panel A : please consider redesigning by deleting the 'perspective'. (make it 'flat'); otherwise it is a good synthesis. [Belgium]</p>
1526	11		11		<p>panel F : reference period: is it different from other IPCC reports ? If so, it makes comparison between reports difficult. [Belgium]</p>
1242	11		11		<p>Figure SPM.1. POINT A. The tilde (~) symbols on the land surface tiles don't really help (initially I thought they were minus symbols!). The side notes are confusing because they don't have any ~ symbols attached. Could delete these and simply state "all area fractions rounded to the nearest 1 percent". [Canada]</p>
1244	11		11		<p>Figure APM1 Point B - the causes of being overweight are many and not only a function of food intake. It is suggested deleting the last phrase "the prevalence of the population who are overweight nearly doubled". [Canada]</p>

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1246	11		11		In the text under E about CO2 emissions from land use change, it says CO2 emissions stabilized at high levels (1.5 ± 0.7 Gt CO2 yr ⁻¹ , 2008-2017). This number seems much too low. Is this meant to be GtC rather than GtCO2? Notes for this figure cite the Global Carbon Budget for this value but the GCP gives a value of 5.3 GtCO2/yr for CO2 emissions from land use change. [Canada]
8760	11		11		Panel F of figure: very important to show how much more land has warmed compared to the global mean warming, but why not show the same as Fig 2.2? with same baseline as SR1.5 [Chile]
8674	11		11		Land use intensification graph: formatting is confusing. It would be more helpful to see the entire trend line for Inorganic N fertiliser use, rather than having it behind the explanatory text. [New Zealand]
100	11		11		Graph 1 could be more illustrative if divided in two parts: one part containing section A and the other part containing the remaining sections. [Spain]
4384	11	1	12	1	KEY ISSUE [GRAPHICS]: Panel A is intended to highlight that human use affects 72% of the global, ice-free surface, but what it looks like instead is that humans only occupy 1% of this area (the settlements). Perhaps changing this term to something like "densely populated settlements" would suggest that other categories do indeed still involve human habitation. The shape of the set of connected boxes is hard to understand too. What's the significance of certain boxes sticking out from the whole? Panels B through E are hard to understand because of the y-axis units. It's most strange in Panel C where the 9X increase in inorganic fertiliser use stands out the most, but this is really just a reflection of whatever the usage was in 1961: a reader does not know how important this is relative to the two other quantities graphed on the same plot, yet their presence together forces that question ... without answering it. In Panel E this is also striking: clearly the N2O emissions have increased the most since 1961, but doesn't it make sense to put these three emissions terms in some sort of equivalent units and show how they have changed relative to each other? [United States of America]
5486	11	1	12	12	The text and graph of Figure SPM.1B give the idea that the consumption of meat is the cause of overweight, which does not have scientific literature support. The cited literature (Abarca-Gómez et al. 2017) relates overweight with increased consumption of nutrient-poor and energy-dense foods. As well as the figure capture when it mention that "Agricultural areas have increased to meet the demand arising from population growth, increasing consumption of animal products, growing food waste and over consumption indicated by the proportion of the global population that is overweight". The word "indicated" is misleading giving the wrong idea of the causes of global overweight. The same should be reviewed in chapter 5 items 5.2.1 and 5.6.3 as for example on page 5-12 lines 13-14 where availability of food shifts towards more affluent diets is related to prevalence of overweight and obesity, while it may not have a direct relationship, afterall food waste has also grown. The statement in lines 14-16 is also confusing and misleading. [Brazil]
1658	11	1	12	25	As shown by curve ① in Figure D, it is 100 in 1961 and nearly 300 in 2017, hence an increase by about 200%. It is suggested that "...increased by nearly 300% since 1961" be changed to "...increased by nearly 200% since 1961" in column D. Figure F in SPM.1 indicates that the global average temperature in 1999-2018 is 0.87°C higher than that of in 1881-1900, while lines 23-25 on page 12 indicate that the increment is 0.86°C. The inconsistency of the two data is suggested to be checked and revised. [China]

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2592	11	1	12	25	Fig. SPM.1, D and E: The 9fold increase of N mineral fertilizer since 1961(D) and 2fold increase of N2O emissions "from nitrogen application" ('E) - this large difference requires an explanation. In addition, inorganic nitrogen fertiliser use "increased by nearly nine-fold globally" is inconsistent with the underlying chapter. In the Technical Summary of CH5 it is said it increased by 800%. [Germany]
4386	11	1	12	25	KEY ISSUE [GRAPHICS]: This is a very helpful figure. Several suggestions for improvement: 1) Make the label ""Global ice-free land surface"" more prominent and clearly applicable to the whole graphic A. As presented, the ""global ice-free land surface"" could be interpreted as another category parallel to ""used grassland"", etc. 2) The choice to present plots B and C in percentage terms may be misleading because it limits the reader's ability to interpret the magnitude of each variable. The percentage makes it easier to plot multiple curves on the same axes, but the same could be accomplished with multiple y axes that match in color to plotted curves. 3) In Panel B, the inclusion of prevalence of overweight as an indicator related to food systems implies that increasing overweight populations are a driver of land use change. Overweight populations are related to many factors but are not a primary driver of land use change. 4) In Panel E, suggest representing in CO2e, as CO2 emissions and CH4 emissions are not directly comparable otherwise. Also suggest that the chapeau be consistent with statement A1.3, that 22% of total anthropogenic GHG emissions arise from AFOLU. 5) In the legend for Panel F, suggest explaining what drives the diverging trends. [United States of America]
1826	11	1	12	26	Figure SPM 1 contains 5 graphs (B to F) showing changes on certain parameters. This figure is based on Fig. 1.3 of Chapter 1. However, the figure caption does not explain why these graphs (from those in Fig. 1.3 of CH 1) have been selected to Figure SPM 1 and why not others (e.g. livestock)? Please, add a sentence to explain and justify the selection. [Finland]

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Comment No	From Page	From Line	To Page	To Line	Comment
1074	11	1	12	26	<p>Figure SPM 1 pages 11-12</p> <p>This figure is policy-relevant and has been significantly improved compared to the previous version. To improve its readability and understandability, please consider the following proposals</p> <p>Regarding the panel A and the central illustration:</p> <ul style="list-style-type: none"> • in the illustration, legends in the squares should be bigger; • in the illustration, "albedo" is the only one physical property mentioned in this list of terms which mainly address fluxes of energy, water and chemical species. To increase the consistency of the underlying message, we suggest to replace "Albedo" with "Water, heat, energy, momentum fluxes, including those controlled by albedo" ; • in the illustration, the value of surface indicated below each type should be bigger, or if not possible, deleted; <p>Regarding the panel B and the figure about food systems:</p> <ul style="list-style-type: none"> • in the text, add mentions about "changes in consumption patterns" and "food waste"; • in the text, insert "per capita" after "consumption of meat". Global meat consumption (not represented here) increased significantly both because of increasing population and increasing meat consumption per capita. • In the figure, "feed" should be added to "food system" • in the figure, replace "change in %" by "index 100 on the 1961-1975 average"; <p>Regarding the panel C and the figure about land use intensification:</p> <ul style="list-style-type: none"> • the fact that the curve about inorganic N fertiliser use goes outside the frame is very illustrative and better represented like this than with a logarithmic y-axis, but prevent further reuses. Please consider switching the two panels C and D each other and redesigning the profile of the text, so that the "inorganic N fertiliser use" curve is not hidden while keeping the same legend in all figures; • this figure mixes values per hectare (yields) and total values (inorganic N fertiliser use and irrigation water volume). Is it possible to add a curve representing the evolution of a surface indicator for agricultural land to show to what extent inorganic N fertiliser use and irrigation water volume are the result of intensification and not geographic expansion? • in the figure, replace "change in %" by "index 100 in 1961"; <p>Regarding the panel D and the figure about land degradation and desertification</p> <ul style="list-style-type: none"> • in the figure, replace "change in %" by "index 100 on the 1961-1975 average"; <p>Regarding the panel E and the figure about GHG emissions:</p> <ul style="list-style-type: none"> • in the title, please consider adding "removals" to "emissions". • in the text, please check the value as there is currently an inconsistency between here (24 %) and line 16 page 2-4 in the report, SPM § A.1.3 line 24 page 3 (22%): we think it's a mistake and the value should be 22%; • in the text, improve consistency with SPM text by using the same time period (2008-2017 as in subsection A.4.1) for emissions values; • in the figure, replace "change in %" by "index 100 in 1961"; <p>Regarding the panel F and the figure about climate change over land:</p>

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2594	11	1			Fig. SPM.1, A: Why is such a crooked form used for the central illustration? We suggest using a pie chart or regular rectangles for land use shares. This would enable a better readability of the labels of the land categories. Further more, please add arrows for the significant exchange of water and energy between land and the atmosphere to this figure. - Please add a time series in this graph that focuses on the most important issue, i.e. the transformation of natural/unused land to cropland and grassland. - The interrelationship between land degradation and climate change is not included in this figure, the single graphs are not interlinked. This could be improved, for example by pointing out the common drivers or by highlighting the most intensive changes, i.e. increase in agricultural use of former unused (natural land) or loss of agricultural land and their effect on climate change. [Germany]
2596	11	1			Fig. SPM.1, B-E: Why is 1961 chosen as a reference year in this graph? Is this choice due to data availability or meant to underscore certain developments? Given that temperature change is shown for the period from 1880, the choice of 1961 as a base-year merits an explanation. [Germany]
2598	11	1			Fig. SPM.1, E: A4. gives 22% between 2007 and 2016, the figure 24% between 2003 and 2012, please provide only one number to avoid confusion. [Germany]
2600	11	1			Fig. SPM.1, F: Please provide information on temperature trends in a similar way to the SR1.5, which referred to different time periods in its Section A1.1. In addition, it seems as if the range provided refers to "the spread in the datasets' median estimate" indicated in A3.1. How does it compare to the "likely ranges" that are normally provided by the IPCC? It is very important that the IPCC does not provide confusing information on the global temperature increase to the general public. Please modify. [Germany]
2602	11	1			Fig. SPM.1, D: Please add information on the increased water use and soil erosion processes. [Germany]
8254	11				The following are included in Figure SPM 1, but should (also) be in the main text of the summary: - Since 1961, CH 4 emissions from ruminant livestock have increased by 1.7 times and N2O emissions from nitrogen application have more than doubled. - Since 1961, the consumption of meat more than doubled and since 1975, the prevalence of the population who are overweight nearly doubled - The extent of inland wetlands has declined to 70% of the extent in 1970. In the summary text it reads as though wetlands as emitters of methane are a climate pressure to be addressed, and there is limited acknowledgment of their role in sequestering carbon and importance for the water cycle. [European Union (EU)]
2960	11				Suggest using a log scale y-axis on panel C, the curve moving out of the figure (curve Npo. 1) is distracting. [Australia]
1248	11				Figure SPM.1. Pg. 5, In 45 notes that AFOLU accounts for 22% of anthropogenic GHG emissions between 2007 and 2016, whereas this figure (part E) notes that land use accounts for 24% of anthropogenic GHG emissions over 2003-2012. It would be better to use the same period for both statements, rather than giving two different estimates for two different overlapping periods. [Canada]
1422	11				Figure SPM.1: We appreciate in general the Figure. However we are not sure how the interpretation of the different graphs should be made. The storyline that is outlined here seems a bit too general- Additionally it is not clear if the drivers behind the evolution are due to climate change only. E.g. the increase in population in desertifying areas, is it due to climate change or other processes? [Luxembourg]

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2962	12	1	12	26	Suggest reducing the length of the SPM considerably. The entire page 12 should be deleted, as this text is congruent with the content of Figure SPM.1. (Applies in the same way to page 14.) [Australia]
7316	12	2	12	25	This doesn't seem like a caption, more like a list of key messages that might be better placed as bullet points in the text. It's also far too long for a figure caption. [United Kingdom (of Great Britain and Northern Ireland)]
5128	12	4	12	18	Panel A, B, C, D, E, F (see page 14) [Republic of Korea]
4388	12	6	12	8	The distinction between "used" and "unused forest land" does not make a lot of sense; unless they mean nature reserves and parks vs all else. For example, a forest that is growing until harvest maturation may be "unused" for 100 years, but it will be "used" upon harvest. [United States of America]
1252	12	6	12	9	Suggest replacing "used" land descriptions with language that is consistent with definitions used elsewhere in IPCC reports, as well as in other parts of the SPM and underlying chapters, e.g. "managed land" (see lines 17 to 19 on page 6, for example). "Used" is not included in the Glossary, nor is it clear in terms of temporal usage - i.e. is the land being used presently vs. having ever been used; whereas the concept of "managed land" has clear definitions and is defined in the Glossary to this SR. Suggest indicating in a footnote that there may be some differences in the application of "managed" land definitions between this report and National GHG Inventory Reports, which currently appears in line 8-9. [Canada]
1660	12	7	12	8	The forest land involved in unused land and used land means inconsistently. It is not appropriate to use the word "forest land" directly in unused land and used land, which should also include wetland. It is suggested that "...managed grassland, forestland and cropland" in line 7 be replaced by "...managed grassland, managed forestland, cropland and wetland" and "unmanaged grassland and forest land" in line 8 be replaced by "unmanaged grassland, unmanaged forest land and wetland". [China]
1828	12	7	12	8	"Unused land". The definition is not clear. The category "unused forest land" may be "unused" in terms of logging, but could be "used" in terms of NTFP collection, recreation etc. [Finland]
4950	12	7	12	8	Perhaps, for clarity, write "used forest" to align with the figure, and the following sentence. In the latter, "forest land" could also be termed more precisely, what forest land is meant. [Sweden]
7318	12	7	12	8	Query definition of 'unused land' as this may not differentiate that land under common property rights and under extensive systems such as pastoralism. Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
7320	12	8	12	9	Why aren't the categories directly relatable to the land cover types used for GHG inventory purposes? It seems that they probably should be, otherwise why are we accounting for them in different ways to a logical breakdown into types based on emissions? Please consider amending, in order to avoid inconsistencies in future interpretation [United Kingdom (of Great Britain and Northern Ireland)]

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5492	12	9	12	16	the statement induces a conclusion that the increase of agriculture has only negative impacts, while the development of agriculture, the advancement of knowledge, has allowed for important advances, not only on food production and availability, but also to more sustainable practices - showing that there are ways to produce food sustainably, and efforts towards promoting these strategies are worthwhile, for food security, income , livelihoods, etc. Further, it mentions the increase of animal products as negative, what is highly debatable, considering the various studies and publications available. there are several other issues that have a direct impact on emissions and food access, such as food origin and transportation, industrialization, packaging, among others. The language should be more balanced, less tendencious, and based on technical elements. As in other items, if there is not enough evidence and publications with divergent positions, the confidence is very low , and the studies are still incomplete and not universal. [Brazil]
4952	12	11	12	11	Probably too much and unnecessary detail in SPM to quote the rather clear definition for overweight. [Sweden]
4390	12	11	12	12	"... growing food waste and overconsumption indicated by the proportion of the global population that is overweight...": This statement is problematic. Proportion of global population that is overweight does not necessarily indicate growing food waste. In addition, obesity is a complex health issue; diet is only one of many contributing factors and overweight does not necessarily suggest overconsumption of nutritious food. [United States of America]
8726	12	12	12	12	consistency of terminology with charts on page 11 eg food production versus food demand; is there also an increasing demand for animal feed especially for pigs and poultry [Ireland]
5130	12	12	12	12	25 kg/m2 → 25 kg m-2 [Republic of Korea]
5132	12	19	12	20	Need to use a same font. (ex, CO2 and CH4) [Republic of Korea]
258	12	20	12	20	Suggest modifying the citation source "{2.3}" to "{2.4}".Section 2.4 covers more information on flux of GHG. [Japan]
102	12	20	12	22	These lines are part of figure SPM.1's caption, panel E. They indicate that exchanges between land surface and atmosphere are indicated by arrows but they are are not present in panel E of figure SPM 1. [Spain]
4392	12	23	12	23	Add "over land" to the sentence, "The warming from the late 19th century ..." It should read, "The warming over land from the late 19th century ..." [United States of America]
1528	12	25	12	25	The legend mentions 0.86°C; the panel F shows 0.87°C. Please look for coherence. [Belgium]
4954	12	26	12	26	The last four lines in footnote 10 would seem to be unnecessary (and as such, confusing), as these details are, or can be stated, in conjunction with Figure 2.2. [Sweden]
1662	12		12		The words in Note 8 concerning desertification are inconsistent with those in lines 38-39 on page 15 of Chapter 3 of the underlying report, which state that "there is high confidence that anthropogenic and climatic drivers interact in complex ways in causing desertification". So desertification results from the interaction of natural and human factors. In Note 8, however, only the latter is listed, which is suggested to be supplemented and modified. [China]

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8676	12	1	14	25	These diagrams (and the SPM overall) would benefit from also including the role of biological diversity, genetic adaptability and the ability to evolve over time, which is a key part of the long-term viability and resilience of the land uses mentioned, and prevention of degradation, in the face of climate change. [New Zealand]
2604	12	1			Fig. SPM.1, caption: Please shorten the caption, do not repeat the figures that are shown in the figure itself. The figure title and the first sentence are almost identical. A: Why are the categories "not intended to be directly relatable to the land cover types used for GHG inventory purposes"? This might lead to confusion and we suggest either reconsidering this approach or explaining the reasons. [Germany]
1424	12				FOOTNOTE 7: We are not sure if the use of one single value for livestock density to define intensive pasture is appropriate here. Whereas we understand that this figure might be applicable in climates with semi-arid climates, they seem too low for Western Europe. Here the values are an order of magnitude higher. Thus we suggest to use different values for different regions of the world and climates or make a general comment as regards the regional specificity of these values. [Luxembourg]
5134	13	0	13	0	No panel indication such as A, B, C [Republic of Korea]
5136	13	0	13	0	Would you please show a diagram for SPP2 pathway also to make clear understanding? It would be nice SPP2 bar is also included. [Republic of Korea]
104	13	0	13	0	In the figure, consider changing the heading "Mitigation through bioenergy deployment causes risks to (...)" to "Mitigation through bioenergy crops deployment causes risks to (...)" [Spain]
5496	13	0	13		Delete Panel C of Figure SPM 2. The panel refers to bioenergy in a rather unconditional negative wording, with inconsistent argumentation that does not reflect the co-benefits, scale dependency and context specific nature of sustainable bioenergy deployment, as expressly recognized in the full report. For instance, in the full report draft Chapter 6, page 4, lines 35-38: "Some options, such as bioenergy and BECCS, are scale dependent. The climate change mitigation potential for bioenergy and BECCS is large (up to 11 GtCO ₂ yr ⁻¹); however, the effects of bioenergy production on land degradation, food insecurity, water scarcity, GHG emissions, and other environmental goals are scale and context specific (high confidence)." The issue is also addressed in Chapter 6, Cross-Chapter Box 7, pages 6-48, lines 6-42: "Synergistic outcomes with bioenergy are possible, for example, strategic integration of perennial bioenergy crops with conventional crops can provide multiple production and environmental benefits including management of dryland salinity, enhanced biocontrol and biodiversity, and reduced eutrophication [...] Additionally, planting perennial bioenergy crops on low carbon soil could enhance soil carbon sequestration [...] Experience in countries at quite different levels of economic development (Brazil, Malawi and Sweden) has shown that persistent efforts over several decades to combine improved technical standards and management approaches with strong governance and coherent policies, can facilitate long-term investment in more sustainable production and sourcing of liquid biofuels [...] The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specificity (high confidence)." Therefore, since the unconditional negative language of the SPM does not reflect the carefully phrased references in the draft full report, Panel C of figure SPM 2 should be deleted from the SPM. [Brazil]
5494	13	1	13	1	idem above on the focus on meat consumption as a tendency that might have some impact, rather than other food aspects, such as industrialization, packaging, transportation, etc... [Brazil]

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1254	13	1	13	1	Consistent with the comment on page 8 (lines 21-26) that the example of wildfire should therefore also touch on the risk to livelihoods in addition to the other risks already noted. [Canada]
8898	13	1	13	1	Introduce A, B and C for the pannels. In the illustration of section A of figure SPM.2 the curved lines linking the burning bars with the sectors (Food, etc.) are difficult ot follow. Please find another way of linkind the burning bars wit the sectors [Liechtenstein]
7754	13	1	13	1	In the bottommost figure "Mitigation through bioenergy deployment...": The text boxes on the rightmost part of the page (particularly the "Co-benefits"-box which is not quantified) seems to be only related to SSP3. Do they also apply to SSP1? if so, please consider to make this more clear. [Norway]
7756	13	1	13	1	In the middle part "Different socioeconomic pathways...". Please be aware that this figure can be interpreted in such a way that a temperature increase of 3 degrees is less of a problem if SSP1 is followed. The figure text should also communicate that there is a relationship between the choice of SSP and temperature increase and the timing. [Norway]
7758	13	1	13	1	Please consider to put the legend that explains how to read the figure should come on the top and not at the bottom. Atleast for the new readers this is very confusing and wastes time. [Norway]
7760	13	1	13	1	The uppermost part of this figure is very focused on human risks. Ecosystems is only mentioned together with human health under "human systems at risk". Please consider to give ecosystems more attention. Suggestion: separate "human health" and "ecosystem condition". [Norway]
4956	13	1	13	1	In the bars for "Mitigation through bioenergy deployment..." it is not evident how the two text boxes related to the risk levels. (The figure caption does not seem to explain these either.) [Sweden]
4958	13	1	13	1	(i) The bold text in panel C in fig SPM-2 is one-sided and does not reflect a comprehensive balanced overview of possible positive and negative effects of bioenergy deployment. It is also not aligned with the main report, e.g., the bioenergy box, in which its is better recognized that bioenergy deployment can in many ways contribute positively to SDG implementation. There is much literature about bioenergy investments to support rural development plans and about bioenergy in livelihood strategies in rural areas. How has this literature been considered? One feasible way to deal with this would be to delete this panel. [Sweden]

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4960	13	1	13	1	If panel C is kept in the SPM: (i) As the panel specifically concerns energy crops, the bold text should be changed to: "Consequences of bioenergy crops depend on cropping system, location, scale and pace of deployment". Proposed text under this bold heading: "The figure illustrates how land use for monoculture bioenergy crops (correct?) in 2050 under a 2°C warming target can represent a combined risk related to food systems, terrestrial ecosystems and water scarcity, which vary with scale and pace of deployment, and with context (e.g., land demand for food, societal norms and governance), here represented by the two contrasting SSP1 and SSP3 futures. The colours focus on risks for negative impacts, but do not weigh possible positive and negative impacts across geographies, and should be considered indicative only, given the low degree of confidence concerning impacts of bioenergy crops. (ii) One could also consider replacing in C the text "Ecosystem losses: more than 100 million additional people at risk of hunger", and write something like "Risks: biodiversity losses; water scarcity and water pollution; soil degradation; land use competition.", if appropriate. (iii) The figure seems to propose that bioenergy crop production can only bring co-benefits when little total land is used for bioenergy crops. This is too simplified and falls short from reflecting the whole picture: such situations can occur also in a future where the total area used for bioenergy crops is very large. But this same future may at the same time be associated with negative impacts in other locations, e.g., biodiversity losses due to conversion of tropical forests to croplands or pastures. It should be made very clear that the figure concerns only risks for negative effects and does not consider the ways bioenergy deployment can contribute positively to various SDGs. At least, the line connecting co-benefits with small deployment area should be removed, and indicated graphically that these benefits can be obtained also in the SSP1 world. [Sweden]
4962	13	1	13	1	Overall, the impression is that panel C in figure SPM-2 provides a one-sided view focusing on risks and ignores opportunities associated with bioenergy deployment. An alternative could be to change panel C to consider land based mitigation more broadly. This would make this panel better aligned with the other panels that have broader scope. [Sweden]
8822	13	1	13	1	Introduce A, B and C for the pannels. In the illustration of section A of figure SPM.2 the curved lines linking the burning bars with the sectors (Food, etc.) are difficult ot follow. Please find another way of linkind the burning bars wit the sectors [Switzerland]
4394	13	1	13	1	KEY ISSUE [GRAPHICS]: This figure tries to put too much information into one place. Figures are intended to simplify messaging. [United States of America]
4396	13	1	13	1	KEY ISSUE [GRAPHICS]: Given the salience of the burning embers diagram in the SPM, it is a major concern that the expert elicitation process that produced them is so poorly explained. The very general characterization on page 1 of the Chapter 7 supplementary material is inadequate to provide confidence in the figures that it has produced. It would be important to know: Which experts were consulted? What intermediate results were developed that led to the conclusions in the diagram? The text in the Chapter 7 supplementary material states that "the protocol pre-specified ... the research question, eligibility criteria, and strategy to recruit experts, research materials, data collection procedure, and analysis plan." However, none of these elements are described in the underlying report (including the SPM). These elements should be explained. A discussion should be included in the underlying report, providing transparency and insight into the factors that led the selected experts to reach the depicted conclusions about the level of risk to the selected endpoints. [United States of America]

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4398	13	1	13	1	<p>KEY ISSUE [GRAPHICS]: Several suggestions for improvement of this figure:</p> <ol style="list-style-type: none"> 1) Label panels in the graphic, not only the caption. 2) Clarify upon which SSP(s) the burning embers in Panel A are based. 3) The gray lines demonstrating links between burning embers and human systems at risk are difficult to follow from start to finish. Could they be colored for improved visibility? 4) Clarify on the far left margin that Panel B depicts risk as a function of both GMST and SSP. 5) Be consistent in use of terminology related to food. Both ""food security"" and ""food system stability"" are used but it is unclear if they are synonymous and, if not, what the distinction is. 6) For better comparability, the y axis for both Panels A and C should go from 0-5°C. 7) Figure SPM.2C is not clearly explained. It is unclear how disparate types of risks could be aggregated in the way that is suggested in the caption. Moreover, it would be helpful to examine the issues raised in this figure in multiple temperature scenarios. 8) The caption on bioenergy is misleading, and the title and text should be reframed. The potential impact of bioenergy production depends on the scale, feedstock, production system, and location of production. Not all mitigation through bioenergy causes risks to food systems, terrestrial ecosystems, or water security, and the adverse impacts of less mitigation must also be considered. The key message seems to be that ""where bioenergy is produced, the feedstock used, and the production systems employed may affect food systems, terrestrial ecosystems, or water security."" 9) Why are only SSP1 and 3 used? Include SSP2 and potentially even SSP4 and 5. Readers will only be able to accurately interpret this figure if very clear explanations of the SSPs are given earlier in the SPM (Box A7). [United States of America]
4400	13	1	13	1	<p>KEY ISSUE [GRAPHICS]: The bioenergy portion of Figure SPM.2 has a vertical axis that goes up to 10 Mkm² of land used for bioenergy crops in 2050 under a 2°C scenario, with the high-risk area in the SSP1 bar and the very high-risk area in the SSP3 bar both beginning above 7 Mkm². None of the scenarios modeled in this report or in the 1.5°C report include more than 7 Mkm² of land used for bioenergy crops in 2050. In Figure SPM.4, the high end of the interquartile ranges for change in bioenergy cropland from 2010 to 2050 across the SSPs in the 1.5°C scenarios is 7 Mkm². Similarly, in Figure SPM.3b of the 1.5°C Special Report, the highest reported amount of land area used for bioenergy crops in 2050 is ~7 Mkm² in scenario P4, and the interquartile range across all of the 1.5°C scenarios in the 1.5°C Report is 1.5 to 3.2 Mkm². Consider changing the scale to only go up to 7 Mkm², or give some indication within the figure what the interquartile range is for bioenergy land usage in 2050 in the scenarios analyzed in this report. [United States of America]</p>
4402	13	1	13	1	<p>Process should be plural in the first sentence. [United States of America]</p>
4404	13	1	13	1	<p>The panel "Mitigation through bioenergy deployment" should reference the role productivity improvements in food and biomass feedstock production can play in reducing competition for land. [United States of America]</p>
260	13	1	13	10	<p>For the top diagram of Panel A, it would be appreciated if you could specify which of the socio-economic scenarios this graph is based on. Generally speaking, it seems to be common to write based on SSP2. [Japan]</p>
4406	13	1	13	25	<p>Shouldn't there be a line from "costs from soil erosion" to "food"? [United States of America]</p>

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4408	13	1	13	44	While the report never makes this conclusion, it seems to imply that in many cases it makes more of a difference whether you are in SSP1 or 3, or the amount of land used for bioenergy than whether temperatures increase 1 or 3°C. Is that intended? For the burning ember figures, consider including SSP2 since it is closest to the BAU option. Readers will more likely be considering the benefits or risks of moving from SSP2 to SSP1 or SSP3 than wanting to compare SSP1 and SSP3. If these SSPs have that big of an impact, it would be good to see all three. [United States of America]
8728	13	1	13	70	consistency of terminology food system stability versus food system insecurity [Ireland]
8256	13		13		In the lower section, it is unclear why "co-benefits" are indicated without assigning any uncertainty language. Consistent with the colouring of the chart in Panel C, overall risks and impacts are likely to increase monotonously with increasing deployment of bioenergy crops, with impacts being "undetectable" at zero deployment. Why would co-benefits be more notable than undesirable side-effects at a low rate of deployment? [European Union (EU)]
8258	13		13		Figure SPM2 (top and middle sections) *Overall a very useful diagram. *However, the top and middle quadrants send mixed messages. The middle section makes clear that socioeconomic factors affect impacts for any given temperature. Yet the upper section, by not showing different SSPs, appears to imply the opposite (that impacts per °C are inevitable). *This is particularly confusing for food security/ food system stability. In the upper diagram this appears to be severely threatened, while the middle diagram shows that different development pathways make an enormous difference. *Proposed solution, include SSP1-3 comparison also for the top section, or at least clarify which SSP the top section refers to. [European Union (EU)]

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8260	13		13		<p>Figure SPM2 (lower section)</p> <ul style="list-style-type: none"> * In the "Legend", the level of impact/risk should be explained without attributing it to climate change. This is because the legend applies to all panels, including Panel C, which shows the risk attributable to land use under identical mitigation scenarios. *This section needs to approach the issue of bioenergy deployment in a more balanced manner. In particular the headline is not balanced. *While the other burning ember diagrams cover a specific impact, these seem to aggregate very different issues related to bioenergy into a single RFC in a manner that is not transparent. Suggest disaggregating into more tangible impact categories. *Why is bioenergy singled out as the 'cause' of these impacts? Surely they are dependent on the amount of land devoted to AFOLU overall, including agriculture and expansion of the natural sink for mitigation purposes. For example, B4.3 states that one third of global food production is lost or wasted. Also, non-bioenergy AFOLU area is presumably a lot lower in SSP1 than SSP3. *The diagram needs to acknowledge the contribution of bioenergy in halting global warming, as highlighted in the 1.5°C special report. Also, the figure implies that mitigation involves dedicating 10 Mkm² to bioenergy, which is much greater than the area quoted in most of the literature. Suggest placing the estimated bioenergy requirements (e.g. those of figure SPM4) as markers on the diagram. * The "current area of land used for bioenergy" should be clarified. It is indicated as "0-0,14 Mkm²", but zero is clearly unrealistic, and the higher bound seems lower than the current area of crops used for biofuels. The current area effectively used for all bioenergy globally must be significantly higher. * The size of the region indicating "undetectable impact/risk" (white section of the bars) relative to the "current area of land used for bioenergy" should be clarified. There is a significant amount of evidence indicating that current land use for food based bioenergy production has a detectable impact on terrestrial ecosystems (also marine), food systems and water use on different scales (locally to globally). It would be interesting to point out that the type of biomass changes in these mitigation scenarios, moving away from food based to other type of non food based crops. And how does one actually frame in these graphs traditional biomass use and the land implication of that? [European Union (EU)]
2974	13		13		<p>The statement "Mitigation through bioenergy deployment causes risks to food systems, ...water scarcity" is disproportionate to the current area of <0.14Mkm² currently planted for bioenergy, or a realistic expectation of the increase in area likely to be planted to bioenergy in the foreseeable future (to 2050). And there does not seem to be any recognition of the ability for coproduct utilisation. Therefore the risks arising from area utilised for bioenergy is largely overemphasised. The risk element needs to recognise the actual impact and is negligible. [Australia]</p>
2976	13		13		<p>Suggest adjusting the graphic: in the bioenergy panel, the area for which bioenergy can produce co-benefits should be marked with a different colour, for example green, to signify a positive impact, not an undetectable (negative) impact. This should be applied to the SSP1 bar also. The area shown should be consistent with the global area of degraded land, discussed in Chapter 4. [Australia]</p>
1530	13		13		<p>processes instead of process [Belgium]</p>

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1532	13		13		Presentation 'mitigation through bioenergy deployment': this fig is different from others (V axis is Mkm2 and not °C). Where can information be found in the text? If no link in the text, please consider simplifying the figure. [Belgium]
1534	13		13		Burning ember on food insecurity: With different socio-economic pathways, please make sure that this is supported by robust literature. [Belgium]
1664	13		13		<p>Figure SPM.2 consists of four panels. To enhance their readability, it is suggested that the panels be numbered in the figure. In addition, several inconsistencies with the underlying report are found in Figure SPM.2 as follows.</p> <ol style="list-style-type: none"> 1. "Different socioeconomic pathways affect levels of climate related risks" in Figure SPM.2 is inconsistent with Figure 7.2 in Chapter 7, in which the maximum value of the bar chart is marked as 3, while the corresponding maximum value of the bar chart in Figure SPM.2 is less than 3. 2. "Different socioeconomic pathways affect levels of climate related risks" in Figure SPM.2 is inconsistent with Figure 7.3 in Chapter 7 as seen from the inconsistency in the vertical ordinate data of the two bar charts. 3. The bottom panel in Figure SPM.2 is also inconsistent with Figures 7.2 and 3.3 respectively. For example, the absence of the expression: VH = Very high. <p>The above three deficiencies are suggested to be checked and improved.</p> <p>In addition, in "Risks from potential impacts of global mean temperature rise on elements of the land system" in Figure SPM.2, "desertification (water scarcity)" is mentioned. Whether or not desertification and water scarcity are treated as equals in this case, however, are suggested to be reformulated or explained. [China]</p>
5354	13		13		<p>Figure SPM 2: this is a really valuable figure from a scientific perspective, and we thank the authors for making the role of different socio-economic conditions vs. climate change clearer compared to the FOD of the SPM. However, in its current state this differentiation could send a puzzling message to decisionmakers. For example, the Figure indicates that under SSP1 the risks induced by desertification remain moderate even for 3°C of global warming. But would severe and widespread impacts not appear for some regions, justifying a risk transition to high? The underlying material in chapter 7 does not include regional specification and brings justification for the lack of transition to "high risk" for desertification in SSP1, yet is this compatible with the fact that "steady increases in the exposed and vulnerable populations [to various impacts related to water, energy and land sectors] are seen for increasing global mean temperatures." (3.6.1.1)? More strikingly, there is some inconsistency with the statement from 7.3.2.4 saying that "At 2.5°C–3.5°C risks [for dryland water scarcity] are expected to become very high with migration from some drylands resulting as the only adaptation option (medium confidence)." We ask the authors to check the compatibility between these various statements and give a more region-specific view of the problem by indicating clearly on the Figure as well as in the text which regions are most vulnerable to risks related to desertification, land degradation and food security, that currently seem to remain low from a global perspective. [Gambia]</p>

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5356	13		13		The previous version of B1.4 contained the useful following statement: "Land has an essential role to play in mitigating and adapting to climate change but improved land management is not sufficient by itself. Without rapid reductions in anthropogenic GHG emissions across all sectors, altered management practices in cropland, pastures and managed forests are insufficient to achieve the long-term temperature goal in the Paris Agreement (high confidence)." This has however disappeared in the current version. As currently written, the new B1.4 suggests that scaling up action in the land sector is sufficient. It is essential to re-insert a mention of the need for rapid decarbonisation in non-land sectors in order to achieve the temperature goal of the Paris Agreement while limiting negative impacts of some land-based mitigation measures in the SPM, as this is an important scientifically robust message to convey to policymakers which was moreover already highlighted by the SR1.5. It is supported by many elements from the Executive Summaries of Chapters 1 (p.4, lines 1-5), 2 (p.8, l.19-27), 6 (p5, l37-39) and 7 (p5, l19-20). 2.7.3 also contains a useful description of how the role of CDR should be considered within the portfolio of mitigation options: "CDR [is] not a substitute for climate action in the energy sector". [Gambia]
1714	13		13		Figure SPM2 is a very useful figure. However, it would be useful if the findings in relation to risks at different levels of warming be reflected in the paragraphs of the text as well. [Saint Kitts and Nevis]
7322	13		13		We welcome the way authors have addressed our request for some quantification of risk. The Panels need labelling A, B, C. [United Kingdom (of Great Britain and Northern Ireland)]
7324	13		13		Figure SPM2: The caption on p. 14 makes clear that the middle panel "Difference socioeconomic pathways..." shows how climate change compounds risks from desertification etc, rather than risks from desertification itself, but it would be good to make that clear in the labelling of the figure itself, too. [United Kingdom (of Great Britain and Northern Ireland)]
7326	13		13		Figure SPM2: Again relating to the middle panel, why does the grey bar show the temperature increase between 2006-2015 (i.e. from SR1.5) when everywhere else in the report, current temperature increases are reported from 1998-2018? Could you make this figure consistent with the rest of the text? [United Kingdom (of Great Britain and Northern Ireland)]
4410	13	1	14	8	KEY ISSUE [GRAPHICS]: At least some of the burning embers diagrams in Figure SPM.2 are poorly connected to the underlying report. For example, the ember on food system stability shows a transition to high risk at 1.4°C with medium confidence; this is traceable to a statement in 7.3.2.2. However, examination of the three sources to which that statement is attributed fails to reveal a relationship between the statement and the sources. And no source is cited for the transition to moderate risk at 1°C shown in the diagram. In short, there appears to be no traceability to the burning ember on food system stability, other than the recitation of these figures in Table SM7.4. [United States of America]
4412	13	1	14	8	KEY ISSUE [GRAPHICS]: Table SM7.1 in the supplementary material underlying Figure SPM.2 was not completed properly. Many of the entries fail to line up with the column headers. This raises serious questions about the content and use of that table in developing the burning embers in Figure 7.1, which in turn are part of the underlying basis for Figure SPM.2. For example, the last column in Table SM7.1 is labeled Region. However, the entries in the table under that column with respect to food system stability do not relate to geographic differences. Similar issues pertain to other columns in this table. In short, the table does not provide an adequate and traceable basis for the embers for which it is used as a reference. [United States of America]

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4414	13	1	14	18	KEY ISSUE [GRAPHICS]: The relationship between the ember on food system stability and the embers on food insecurity in SPM.2A and B is unclear. [United States of America]
7940	13	1	14	25	Fig SPM2 presents risks for a variety of indicators as function of the level of temperature change in the top panel. In the lower panel risks of using bio-energy are presented as function of the land area used. While all this is valuable information, it is unclear how to understand the interlinkages and what the compounded effect of using land for bio-energy (prominent in deep mitigation strategies as laid out in Section B of the SPM) could be, as it would contribute to keeping temperatures lower and hence reduce the temperature-driven impacts and risks in the upper panel. As this may put the reader on the wrong foot (e.g. simply add up temperature and bio-energy area impacts on food security), it is suggested to split the two panels and/or add text to explain better how the two types of impacts/risks interact to an overall effect. In the SPM this impacts/adaptation vs. mitigation trade-off is only introduced much later; see for example B.7.2 [Netherlands]
4416	13	1	14	25	KEY ISSUE [GRAPHICS]: Is there some verifiable method as to how these 'risks' are calculated? This seems very subjective. [United States of America]

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1076	13	1	14	27	<p>Figure SPM 2 pages 13-14</p> <p>This figure is policy-relevant with a good readability and understandability. To improve it even further, please consider the following proposals.</p> <p>We suggest to ensure consistency with SR15 regarding the current level of global warming (SR15 affirms 1°C for the current level of global warming) by providing SR15 value of current global warming of 1°C in addition to the 2006-2015 range of values, with a short explanation in the general caption on the differences between the two values.</p> <p>Please check the panel letters in the figure, as there seemed to have been forgotten. For the rest of the commentary, we consider that :</p> <ul style="list-style-type: none"> • Panel A corresponds to the text and figure below the title “Risks from potential impacts of global mean temperature rise on elements of the land system”; • Panel B corresponds to the text and figure below the title “Different socioeconomic pathways affect levels of climate related risks”; • Panel C corresponds to the text below and the figure on the right of the title “Mitigation through bioenergy deployment causes risks to food systems, terrestrial ecosystems and water scarcity”. <p>Regarding Panel A:</p> <ul style="list-style-type: none"> • in the text, the years of reference (2006-2015) should be mentioned, as in the figure; • in the text, the statement “Risks are location specific and differ by region.” is important and we suggest to provide further elements highlighting some of key regional disparities (possibly through an additional figure or a reference to a figure in the report); • in the figure, please consider showing the indicative temperature range that could be reached at the end of century for several RCPs; • in the figure, about “tropical crop yield decline”, we suggest to provide explanation (possibly in the general caption) on why there is a focus on tropical crop yield; • in the figure, about “costs from soil erosion”, we suggest to find another title as the current one, with a reference to “costs”, lacks of clarity. Soil erosion is a process affecting land degradation. Furthermore, why is "soil erosion" considered as less risky than all other processes? At least it should follow vegetation loss as when soil is no more protected by vegetation the erosion rate increases. • In the figure, about “dryland aridity”, we suggest a harmonisation of the terms used with the figure SPM 1, where “desertification” and “water scarcity” are the words used. • In the figure, about “vegetation loss”, please check if it is the net primary productivity of the loss of diversity that is targeted. • In the figure, about “permafrost degradation”, please consider a homogenization with the SPM text, where “permafrost thawing” is far more frequently used; <p>Regarding Panel B:</p> <ul style="list-style-type: none"> • In the text, faire référence à l'encadré A7 page 9 sur les SSP pour inviter les lecteurs à s'y rapporter s'ils souhaitent plus d'informations à ce sujet. • In the figure, about “food insecurity”, please check the consistency with the “food system stability” part of the Panel A, that shows high risk (medium confidence) as 1.2-1.5°C rise relative to pre- industrial time.

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4418	13	1	14	27	KEY ISSUE [GRAPHICS]: What is the empirical basis for cross-comparability of risk levels among these different land system elements. In other words, it seems like a judgement call rather than an empirical basis for defining "very high risk" for tropical crop yield decline vs., e.g., for costs from soil erosion. Also, the solid line portion of bar charts (historical impacts?) is confusing and needs a clear explanation of how to interpret them. Can this element of the diagram be clarified? Is there an empirical basis for indicating that permafrost degrades at 2-3°C in a "very high" category whereas wildfire is in "high"? The fundamental metrics – permafrost degradation, wildfire damage – are very different things. Then there is a step of assigning subjective notions of "how bad is it?" How do you put this "how bad" on a scale More importantly, can you really compare the two scales and/or put them all on one scale? For an Inuit in the tundra, the permafrost issue is much worse than wildfire damage further south. How did the authors decide? Somehow they decided that costs in soil erosion don't get to a very high level of risk at 5°C, for example. For global policymakers, tropical crop yield decline is clearly more of an issue than others. [United States of America]
4420	13	1	14	27	This is the first time bio-energy appears, but it's not discussed until later in the SPM. [United States of America]
1428	13	1	20	24	Whereas we think that section B is quite complete, we would prefer to put section B.7 as first section, as it highlights potential solutions and is most relevant for policy-makers. Afterwards the section could be continued with current section B.1 etc. [Luxembourg]
2606	13	1			Fig. SPM.2, Panel C, if kept: Confidence levels are M, L, M from top to bottom - please check whether this is an error. If this is correct, please explain why confidence decreases and increases again. [Germany]
2608	13	1			Fig. SPM.2, Panel A (global risk): The connection to "human systems at risk" is visually and conceptually not convincing, but adds a further layer of information into an already complex graph. Suggest to delete the "human system at risk" part of the graphic. Also, given that the next graph differentiates risk between SSPs, the question arises what socioeconomic projections the global risk in these "ambers" is based on? This should be stated explicitly in the description/caption/legend. [Germany]

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2610	13	1			<p>Fig. SPM.2, Panel B: We have several issues with the second panel in this graph: while the notion of linking climate risk to socioeconomic development is very welcome, the representation here raises questions: first, the original RFC do not have a time dimension but refer to T-levels, however the SSPs are time specific pathways and therefore introduce a temporal dimension into the RFC concept while retaining temperature as the reference; this is a challenge for comparability, also, the T-scale here ends at 2.8°C, while panel 1 reaches 5°C, this merits an explanation; second, the differentiation of socioeconomic futures raises the question which reference the original RFCs are based on - assuming today's socioeconomic situation? some sort of BAU-future? Fig.19-5 in Oppenheimer et al., 2014 explains that the RFCs refers to an assumed "medium exposure and vulnerability" world with "moderate trends" underlying socioeconomic development - how does this relate to the SSPs presented here? Third, the graph, especially if taken out of context, could be misread as stating that even with almost 3 degrees of global warming, climate change risk is only moderate as long as the underlying socioeconomic pathway is "sustainable" (following SSP1) - this seems to be in contradiction with panel 1 of this graph and also with central messages of the SR1.5. Also, to our knowledge, the SSP framework is not explicit about adaptation, even if certain development pathways obviously increase resilience. Please check and remove the words "and high adaptation" from the description of SSP1. Given these challenges, we'd recommend to remove panel B from the RFC graphic, and include the information in either written format or an alternative visual representation, e.g. in connection with the modified Figure SPM.4, please see our comments below. Alternatively, SPM.2 could be revised in a way that more clearly addresses the influence of exposure and vulnerability on risk, e.g. by showing one or several "ambers" both in aggregated and decomposition (SSP-specific) format, explaining how the latter would be collapsed into the former. [Germany]</p>
2612	13	1			<p>Fig. SPM.2, Panel C: The representation of risk as a function of land use in the format of the RFC is very challenging. We'd strongly urge the authors to reconsider the use of this graphical format for this specific finding. First, the change of reference from a sliding T- scale to a single temperature-time-slice is very difficult to comprehend (2° scenario(s) in 2050 - what temperature level is that? And which scenarios are included here, the whole scenario base for RCP2.6, or a single scenario? climate change impacts that are not considered in SSPs are not included in panel C?); second, according to section B7.3 the amount of land for Bioenergy and BECCS used in scenarios ranges between 0.8 and 6.6 Mha depending on warming level. As no year is specified, this assumedly refers to "over the course of the 21st century", with BECCS use typically growing towards 2100. So it would seem that 7-10 Mha of BE-land use in 2050 is highly speculative and misleading in the context of this graph. Should the graph be maintained, we recommend to include the range of BE/BECCS assumed in models as a separate, vertical line; third, how is the combined risks to food systems, TES and water scarcity being assessed and weighed? Are these mutually reinforcing/synergistic? Given these challenges, we'd strongly suggest for the authors to consider to remove this panel from the RFC figure SPM.2 and find a different visual representation, e.g. a sliding scale from low to high risk that does not use the RFC framing. This information could then be included in Figure SPM.4, which deals with land-demand of different scenarios and currently misses clear information about the climate change and mitigation risk component. [Germany]</p>

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2614	13	1			Fig. SPM.2, general comment: We find the use of the RFC visual for three different frameworks within the same graphic highly challenging to comprehend and would urge the authors to avoid such a mixing of concepts. For example, we have general concerns of comparisons based on the SSPs for various risks since it is hard to compare the effects of different policies if human population is the driving factor. It is also not clear how temperature has been obtained (from the SSPs or from CMIP?) and if and how climate change impacts are considered in the individual panels. While we agree that each panel carries important information that should not be lost (please see our specific comments on each panel for details), we are not convinced that the RFC-visual is the best way to convey that information in parallel. Please consider to revise and split this Figure or include the information in written format. [Germany]
2616	13	1			Fig. SPM.2, Panel C, if kept: The bold heading does not reflect the co-benefits and scale-dependency of a sustainable bioenergy deployment, particularly as part of sustainable integrated agricultural systems. The text below the bold heading indicates this opportunity – but understanding may be compromised by the unconditional wording (“causes”) of the bold heading. The text in the CH6 P4, L35-38 reads as follows: "Some options, such as bioenergy and BECCS, are scale dependent. The climate change mitigation potential for bioenergy and BECCS is large (up to 11 GtCO2 yr-1); however, the effects of bioenergy production on land degradation, food insecurity, water scarcity, GHG emissions, and other environmental goals are scale and context specific (high confidence)." There is more detailed language in the "Cross-Chapter Box 7: Bioenergy and Bioenergy with Carbon Dioxide Capture and Storage (BECCS) in mitigation scenarios" in CH6 P48-51, especially under the sub-heading "Co-benefits, adverse side effect, and risks associated with bioenergy" on P49 L31 - P50 L42, where it is clearly stated: "Synergistic outcomes with bioenergy are possible, for example, strategic integration of perennial bioenergy crops with conventional crops can provide multiple production and environmental benefits including management of dryland salinity, enhanced biocontrol and biodiversity, and reduced eutrophication (Davis et al. 2013b; Larsen et al. 2017; Cacho et al. 2018; Odgaard et al. 2019). Additionally, planting perennial bioenergy crops on low carbon soil could enhance soil carbon sequestration (...)" [Germany]
2618	13	1			Fig. SPM.2, Panel A: We are wondering, what the pillar 'food system stability' means and why the risk is so high featuring the earliest onset and why e.g. it shows higher risks compared to the tropical crop yield decline. Please clarify if "food stability" should be understood in the sense of the food security pillars? [Germany]
2620	13	1			Fig. SPM.2, Panel C, if kept: Mitigation through bioenergy deployment ... many options are scale-dependent and cause conflicts with food security etc. in case of application on large areas. Bioenergy is the only option described as especially risky, also large-scale afforestation can have such effects. Recommendation: Describe preconditions for positive contributions of bioenergy. [Germany]
2622	13	1			Fig. SPM.2, Panel C, if kept: Current area of land used for bioenergy given is 0 - 0.14 M km2 - this areas appear very low, does this figure include fire wood use? Please specify. [Germany]
2964	13				Suggest colour coding the grey curves in the top panel that are intersecting. [Australia]
2966	13				Suggest including panel labels like in SPM Fig. 1 (e.g., A, B, C). [Australia]

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2968	13				Suggest reconsidering the chart related to bioenergy. Currently it is implied that bioenergy deployment is necessarily linked to additional land needs; when in fact there is much scope for deploying bioenergy from existing biomass sources as derived from existing primary industry harvest activities and from biomass processing facilities [Australia]
2970	13				Suggest that bioenergy not be identified as a particular land use and then combined in presentation with product use and multiple risks. The SSP approach in the bioenergy panel (SPM.2 & SPM.3) combines multiple factors (e.g., population and barriers to trade) and this can then be confusing when attributing to an individual system (e.g., bioenergy) that combines the land used for production of the biomass and the product (energy). This is particularly so when the risk impacts are mixed ('ecosystem losses and additional hunger) in SSP3 in the graphic "Mitigation through bioenergy....". [Australia]
2972	13				Suggest rewording the legend: "very high risks of severe impacts/risks" is circular. The aspect "attributable to climate change" is not applicable for the bioenergy panel. [Australia]
1800	13				Figure SPM.2, subfigure 'Risks as a function of land use'. The upper limit of surface area in the figure is 10 Mkm ² . Does this properly illuminate the background report? In the text B5.2 the range from 2 to 6 Mkm ² is given, and in b7.3 the range from 0.8 to 6.6 Mkm ² . Please check that given surface areas are consistent and please consider if the upper limit in the subfigure could be presented as 6 Mkm ² ? [Finland]
1816	13				Figure SPM 2, first part. The lines between human systems at risks and the columns above are not easily readable. For example, why there is not line between the column on food system stability and livelihoods, or between food system stability and human and ecosystem health? It is suggested to remove the lines and the boxes below them to simplify and clarify the figure. [Finland]
1426	13				Figure SPM.2: We find this figure very useful as it highlights the impacts of climate change on different elements of the land system as well as the influence of non-climate related drivers via the SSPs. On the last part of the Figure related to bio-energy deployment we would like to have indicated which RCP and which year in time we are considering here? [Luxembourg]
106	13				Panel C of figure SOM.2 focuses on the risks induced by bioenergy deployment. However, this issue is not covered in the document until page 18, line 27. Therefore, it would be better to remove this panel from figure SPM.2 as its information is somewhat included in Figure SPM.3, which is properly framed in the text. See also comment 15. [Spain]
8262	14	2	14	2	include 'terrestrial ecosystems' ... oceans and marine ecosystems are not included in this figure. One could state that this will be tackled in the upcoming SROCC [European Union (EU)]
1850	14	2	14	3	Burning ember diagrams (BEs) are unclear: Are they about impacts or risks (that is different)? What is the scale - country, region, globe? Which methodology is used to produce these diagrams? How were confidence levels assigned, through expert judgements only? Have these questions been answered in the main report? Suggestion: omit BEs. [Russian Federation]
8264	14	4	14	4	as a function of global mean surface temperature INCREASE. [European Union (EU)]
5138	14	4	14	17	Should need to display the 'Panel A, B and C' in the chart, page 13. [Republic of Korea]
4964	14	4	14	17	There are no A-C labels in the figure [Sweden]
1430	14	4	14	25	We suggest to label charts as Panel A, B, C in order to establish a better link with the explanatory text found on page 14. [Luxembourg]

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4966	14	7	14	8	Suggest a clearer formulation "The links shown are illustrative and not intended to be comprehensive." As the rest is pretty much already stated in the sentence just before. [Sweden]
1432	14	8	14	8	The last part of the sentence "and not intended to be comprehensive" is not very comprehensive. [Luxembourg]
8266	14	11	14	12	The wording on irrigation is unclear and awkward. Possible rewording: "[...] and vulnerable to water scarcity, as well as increased water demand for irrigation." [European Union (EU)]
1256	14	15	14	15	Please clarify what is meant by a "disability adjusted life year" ? [Canada]
4424	14	15	14	15	The link between food security and an increase in DALYs should be explained more clearly. [United States of America]
7328	14	16	14	16	Does "unmitigated climate change" refer to RCP8.5? If so, could you make this clear? [United Kingdom (of Great Britain and Northern Ireland)]
4968	14	17	14	20	There are risks associated with massive expansion of bioenergy. But as it is described here, all expansion would appear to be linked to the need for more land or competition for land. Biomass for bioenergy expansion does not start with such an expansion - but with residue streams in forestry, agriculture, aquaculture and more efficient use of biomass. Bioenergy is already today by far the largest renewable energy source used with large quantities used inefficiently in developing countries. Increased use of available biomass and more efficient energy conversion systems should be included in the storyline together with e.g. reduced food waste etc. [Sweden]
4970	14	20	14	20	Does this mean that high risk equals to two of the three and moderate risk one of the three? Is the risk level related to the number or also severity of the respective impact? [Sweden]
4972	14	22	14	25	The methodological details would be best to leave to the underlying report, they do not add much to the SPM, and thus diminish its lucidity. [Sweden]
262	14	23	14	25	Figure SPM.2 is very intriguing in terms of the comparison between SSP1 and SSP3 and is important in a wider sense. It is based on expert judgement, and detailed information of the expert judgement would be needed for ensuring the value of the figure. [Japan]
8900	14	24	14	24	Provide a short explanation (in a footnote) on the modified-Delphi technique and the Sheffield Elicitation Framework. [Liechtenstein]
8824	14	24	14	24	Provide a short explanation (in a footnote) on the modified-Delphi technique and the Sheffield Elicitation Framework. [Switzerland]
4426	14	24	14	25	Is this a method that is quantifiable and objective, or is this subjective (expert) analysis? [United States of America]
4422	14	1	16	47	The section foci is on the developed world and also on some of the breadbaskets in Pakistan area. It would be good to suggest how these price spikes affect other regions that are also vulnerable, such as in Sub Saharan Africa and island nations, etc. [United States of America]
1688	15	20	4	21	It is not clear, how fire management would lead to adverse side-effects. An example could make this statement more comprehensible. [Hungary]
1438	15	33	14	33	The concept of "ambition" could be part of a definition box that we suggested. [Luxembourg]

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7762	15	1	15	8	Effective traffic- and infrastructure planning plays an important role in climate change adaptation, climate change mitigation, reversing land degradation and enhancing food security. Please consider to address this in the SPM. [Norway]
2624	15	1	15	34	How does the statement of TS P34, L19-22 "The applicability and efficacy of response options are region and context specific; while many value chain and risk management options are potentially broadly applicable, many land management options are applicable on less than 50% of the ice-free land surface (high confidence)." link to the two last sentences of paragraph B1.2? The statement from the TS is much clearer, please reconsider the SPM-text. [Germany]
4428	15	1	15	34	KEY ISSUE [ALIGNMENT/ACTION]: This subsection presents a number of mitigation and adaptation measures, including avoided deforestation. This is very important material from Chapter 6, but the basic message conveyed in the SPM is "it just depends, it all depends". In comparison, the Executive Summary of Chapter 6 is quite well-written and very clear, laying out eight response options that have large mitigation potential >3 Gt without adverse impacts and listing them. Recommend using that sort of language here and throughout the SPM. [United States of America]
466	15	2	15	2	Replace "five challenges" to "challenges, including" unless referencing a source which refers explicitly to five challenges [Ireland]
4976	15	2	15	2	Unless "land challenges" is an established framework, the "the" could be omitted. Or replace by "... address five land-related challenges...". [Sweden]
4434	15	2	15	2	These are not land challenges; they are challenges affecting or relating to land use. [United States of America]
1780	15	2	15	3	be consistent in order of mitigation and adaptation in headlines and text. [Denmark]
576	15	2	15	4	B-1 - May add "Biodiversity conservation" to the existing options to address land challenges. [India]
7330	15	2	15	4	What are 'land challenges'? This may not be terminology that is clear to all readers. Moreover, why is there no mention of biodiversity loss as a challenge? [United Kingdom (of Great Britain and Northern Ireland)]
5614	15	2	15	8	Response options to combat desertification are not stated in this section. [Algeria]
812	15	2	15	8	We suggest to add elements about the risk of maladaptive outcomes in B1.3 and to reflect the key findings on this topic in B1. [France]
8268	15	2	15	34	B1 general comment. The messages in this section are fairly vague, basically amounting to less specific versions of the arguments elaborated in detail in the rest of Section B. Meanwhile key arguments of the underlying chapters are not fully reflected in the SPM. For example, Ch 6 identifies with high confidence eight options for delivering benefits related to multiple land challenges, eight options with high mitigation potential without adverse side effects, and 16 options with high adaptation potential. Could these options be incorporated into Section B1? thereby forming an introduction to the more granular information in the rest of Section B. Also, Section B7 should come at or near the start of section B, with the other (more specific) sections following it. [European Union (EU)]

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5358	15	2	15	34	Avoiding deforestation and forest degradation, as well as improved forest management should be mentioned in this section B1, as these are important measures in the near-term for addressing all five land challenges. In the executive summary 6 as well as Section 6.4 it very clearly states that "reduced deforestation" is an option that delivers medium-to-large benefits for all five challenges, and has large mitigation potential. This should be included more clearly in the SPM. It would also be valuable to elaborate on the role of avoided deforestation in emissions pathways for 1.5°C. [Gambia]
5360	15	2	15	34	Should this be that land-based mitigation options cover "the equivalent" of up to a quarter of the total mitigation proposed by countries in NDCs? As written, this point currently suggests that the NDCs include mitigation measures in the land sector that make up a quarter of the total pledged mitigation. However, the underlying literature provides an estimate of potential mitigation from land-based measures without assessing whether or not such measures are incorporated into the NDCs. [Gambia]
5140	15	2	15	34	When response options are grouped at B1 paragraph, other paragraphs from B1.1 to B1.4 should be explained in the basis of groups. There could be many confusions for readers and PMs. [Republic of Korea]
1716	15	2	15	34	The SR 1.5 is clear about the importance of reducing emissions in all sectors – and not only land – in order to achieve the temperature goal of the Paris Agreement, and in the previous draft of the SPM this section was consistent with this message. However this is not the case any longer in the current version. Please re-insert this message in the SPM to ensure that it is clear that improved land management is, by itself, insufficient for mitigating and adapting to climate change, and also to align the SPM with the statements included in the executive summaries of Chapters 1, 2, 6 and 7, as well as for example 2.7.3 ("CDR is not a substitute for climate action in the energy sector") [Saint Kitts and Nevis]
4436	15	2	15	34	The key message suggests that response options can be grouped into those based on land management, on value chain management, and on risk management. In the detailed paragraphs below, land management options are emphasized and there is little discussion of risk management. Should consider restructuring the discussion so that the key message corresponds to the text. [United States of America]
4974	15	2	15	44	The section of adaptation and mitigation response options is generally missing a wider discussion of ecosystem-based adaptation or nature-based solutions as an adaptation measure. It is briefly discussed in section B2.1, but it deserves a wider adoption and evaluation in this section. For example, as also put forward in IPBES, it is important to highlight the potential in preservation and restoration of healthy ecosystems and biodiversity as an adaptation tool. The SR1.5 report furthermore explicitly expressed the potential of intact and well-preserved ecosystems (such as wetlands, coral reefs, oyster banks or mangrove) which have a strong ability to withstand and protect communities from negative effects of climate change such as flooding or erosion. The argument for nature preservation as an adaptation tool should thus be expressed in the SPM. [Sweden]
7332	15	3	15	3	How does combating desertification differ from reversing land degradation? This may make sense for readers who are familiar with UN CCD, but this is an IPCC report with a primary audience of climate people. Many of these terms won't be familiar. Please make greater effort to define terms and ensure that you are writing for the broadest possible audience [United Kingdom (of Great Britain and Northern Ireland)]

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8270	15	4	15	5	here it needs to be explained that demand side management is part of value chain management. As many have other connotations with the word value chain management demand/dietary issues are not always part of this term. Recommendation: refine by including 'Value chain management which include demand side measures such as dietary change' [European Union (EU)]
7334	15	4	15	7	Some of the groupings (value chain management and risk management) aren't really mentioned again during section B1 and I think this sentence could be removed and replaced with a more focused message such as "Response options can deliver benefits across all land challenges (high confidence), although some have trade-offs" (from Chapter 6 p 3 L32-33). [United Kingdom (of Great Britain and Northern Ireland)]
4438	15	5	15	5	Risk management would seem to be an overarching category that would apply also to land management and value-chain management. [United States of America]
8794	15	6	15	6	The phrase "many take time to be effective" does not add information. I suppose that you want to say that some of options take more time than others to be effective. Please clarify. [Venezuela]
808	15	6	15	7	To improve the consistency with paragraphs B1.3 and B1.4, please consider adding "when properly implemented" before "are synergistic". [France]
810	15	6	15	7	Please consider elaborating on the type of co-benefits here referred to [France]
416	15	6	15	7	This statement is important and should be the opening sentence for the high level message [Ireland]
264	15	6	15	7	It is ambiguous to state that "many mitigation and adaptation options are synergistic and can provide co-benefits and reduce costs" because synergy or trade-off is determined by the extents to which mitigation/adaptation are implemented. Please add explanation on how this point is considered. Also more clear definition is requested on what kind of cost is included in the "reduced cost". [Japan]
8272	15	6	15	8	B1 Rightly highlights the significant potential for synergisms between adaptation and mitigation options. It would be useful to emphasize that such synergisms can be greatly facilitated by appropriate policies and measures, which should also aim at reducing potential conflicts. [European Union (EU)]
7764	15	6	15	8	Important to keep sentence "Many mitigation and adaptation options are synergistic and can provide co-benefits and reduce costs." [Norway]
112	15	7	15	7	Cost reductions mentioned in this line should be further specified as to what costs are reduced (adaptation, options for mitigation and adaptation) [Spain]
4440	15	9	15	9	KEY ISSUE [TERMS]: Early on, "deforestation" needs to be defined. Recommend defining it as a change from a forest use to a different use (otherwise in conflict with U.S. definitions). [United States of America]
4442	15	9	15	10	KEY ISSUE [LAND-COMPETITION]: Is there any analysis in this report that accounts for not only the competition for land with food but with energy production as well? Similarly, are there any analyses that actually calculate the economics of broad-based renewables? Costs associated with storage, transport, intermittency, loss of natural resources for, say, intensive CSP developments are not trivial. [United States of America]
7338	15	9	15	11	Please also consider including ecosystem/habitat restoration eg of peatlands and wetlands - see para C1 'ecological restoration' [United Kingdom (of Great Britain and Northern Ireland)]

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8274	15	9	15	13	<p>the two issues mentioned under this bullet are not connected while the impression is given that current implementation is covering one quarter of mitigation proposed (while this is not the case, but the impression is given). The text also ignored that while afforestation is indeed happening at small scales there is still a net loss of forest globally.</p> <p>Suggest qualifying the first part of this bullet point. The intended meaning is surely that, while these measures are occurring at a small scale, significant scale-up would be needed to reach the full mitigation proposed by the NDCs, let alone more ambitious mitigation.</p> <p>Also, it should be clear the mentioned measures "being implemented" can be considered "response options" only to the extent they are done with the intention of mitigation and/or adaptation. Many of the activities mentioned have been done routinely in many parts of the world before climate change became an important concern. Business-as-usual activities are part of the baseline and should be separated from "response options" for conceptual clarity and to avoid double-counting. [European Union (EU)]</p>
1558	15	9	15	13	<p>This is useful, but could probably be more informative. How can total land-based reductions included in the NDCs be assessed ? Is the total emission reduction reported by the countries consistent with total removals calculated in IPCC reports ? Are total land-based mitigation in NDCs consistent with the 1.5 or 2°C scenarios from the literature ? [Belgium]</p>
7336	15	9	15	13	<p>While the prevalence of land-based mitigation in existing NDCs is a useful message, a more useful one would be how they can narrow the ambition gap. Text from the underlying report could be inserted as follows: "Response options relying on the use of land could provide around a third of the additional mitigation needed in the near term (2030) to close the gap between current policy trajectories based on NDCs and what is required to achieve a 2°C (>66% chance) or 1.5°C (50 to 66% chance) pathway. [United Kingdom (of Great Britain and Northern Ireland)]</p>
4444	15	9	15	13	<p>The fact that these actions are occurring is helpful, but it would be more helpful to know to what extent they are occurring and if they are having any measurable effects. [United States of America]</p>
4446	15	9	15	13	<p>It may be useful here to cite recent studies showing that AFOLU may contribute up to one-third of the pre-2030 mitigation potential (see Griscom and others). [United States of America]</p>
2638	15	10	15	10	<p>"land-based renewable energy" - is this referring to "bio energy"? Please be more clear. [Germany]</p>
4832	15	10	15	10	<p>Change "renewable energy " to "low-carbon energy" [Iran]</p>
32	15	10	15	10	<p>Add: sustainable forest management [Poland]</p>
1258	15	11	15	12	<p>In addition to specifying that land-based mitigation covers up to 1/4 of the proposed mitigation actions under NDCs, it would also be useful to note the percentage of countries who are planning to implement land-based mitigation, which at present is over 60% (based on LULUCF alone, i.e. not including agriculture). Source: "Accounting of the land-use sector in NDCs under the Paris Agreement", Oka Institut, GIZ, BMUB Germany, September 2018. [Canada]</p>
8276	15	11	15	13	<p>B1.1 Explain what these land-based mitigation options are. Is it true that land-based 'mitigation options' cover ~25% of NDC mitigation, or merely that this is the level of aggregate pledges deducible from 3rd party study of the NDCs? [European Union (EU)]</p>

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5362	15	11	15	13	In order for this statement to be more useful for policymakers, actions that "avoid losses" should be clearly named, by mentioning for example the terms "Avoiding deforestation and forest degradation" of which the potential to "help to meet short term goals" is clearly mentioned in B3.3. They should also be classified more clearly as response options with immediate effects (given the first sentence of B1.4 it may currently read like the opposite). [Gambia]
418	15	11	15	13	Impornat information and helpful for analysis global responses [Ireland]
5142	15	11	15	13	This statement does not need to have confidence level. It should be a fact based on NDC. [Republic of Korea]
7340	15	11	15	13	This final sentence of B1.1 has been assigned a medium confidence in the SPM compared to a low confidence in the underlying report (line 19, page 2-92, section 2.7.3). This should be consistent between the two. Additionally, the text in the SPM does not truly reflect the finding, as it sounds as if this 'quarter' figure is an assessment of the actual pledges in the NDCs as opposed to an estimation of their implementation. It might be better to use the text from the underlying chapter which states "The land sector is expected to deliver up to 25% of GHG mitigation pledged by countries by 2025-2030 in their NDCs [United Kingdom (of Great Britain and Northern Ireland)]
266	15	12	15	12	Suggest adding "Intended" before "Nationally" in order to be consistent with Chapter2 Page92 line17 and ensure the accuracy. [Japan]
4448	15	12	15	12	You should clarify what the "Nationally Determined Contributions" are in this context. [United States of America]
8278	15	14	15	15	Replace "and some" with "whilst others". [European Union (EU)]
8280	15	14	15	18	B1.2 does not add much. The fact that response options are context-specific is already captured in the B1 headline statement, and then in greater detail in later parts of Section B & C. Either add more specific information to this bullet or delete, since it adds little value as currently written. [European Union (EU)]
2642	15	14	15	18	The subparagraph B1.2 is so general that the messages are almost trivial. Please be more specific about the relevant contexts and regions in each case. [Germany]
7342	15	14	15	18	This paragraph is quite difficult to understand and it's not clear that it adds new information. In the interests of clear policy-relevant key messages you could consider removing this paragraph. [United Kingdom (of Great Britain and Northern Ireland)]
7344	15	14	15	18	The term 'biophysical' will not be understood by a non-expert and should be explained. The meaning of the phrase 'cut across land use types' is also not clear. Instead of talking about response options being 'context and region specific' or in 'specific biophysical conditions', it would be more useful to talk about them being 'more or less effective' in certain regions, contexts or conditions. [United Kingdom (of Great Britain and Northern Ireland)]
468	15	15	15	15	Clarify what is meant by "fire management" [Ireland]
2644	15	15	15	16	It is not clear what is meant by the phrase "cut-across land use types". Please rephrase. [Germany]

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2646	15	16	15	17	We acknowledge that food value chain management is context and region specific. However, we understand from the discussion in 5.3.4 that there are severe consequences for land if the average diet and meat consumption of certain regions were globally adopted (95 - 178% of the global habitable land would be needed for agriculture). Even for the BAU dietary trends, 55% more land would be needed. Linking this information to the high number of undernourished people in certain regions and the even higher number of overweight people in other regions helps policy makers to understand the relevance of region-specific dietary changes. [Germany]
110	15	16	15	17	It is stated that risk management is "region specific". This is very relevant for policy makers and deserves further elaboration, and probably deserves an specific figure. [Spain]
8282	15	19	15	19	Insert a qualifier like "improved" before "soil management, to read "improved soil management". As recognised in the report, soil management (tillage) has historically been part of the problem (both for emissions and resilience), and cannot be unconditionally considered a mitigation or adaptation option. [European Union (EU)]
1260	15	19	15	19	In relation to discussion of synergies between adaptation and mitigation actions, the example is given in the next line of how "fire management may have adverse side-effects", without explaining further or providing any examples. Unless examples of how fire management in some cases (and would suggest being quite specific) has adverse side-effects, suggest that this sentence be deleted. Without further context, this is not a helpful addition given that fire management in many cases is aimed at reducing damage and costs, which of course of direct impacts on human health, livelihoods, value of land, and infrastructure. Moreover, this is inconsistent with the findings on page 19, lines 23-34, which indicate that there are some mitigation and adaptation actions (e.g. fire management) which have the "potential to make positive contributions" to sustainable development and other societal goals" and noting that some (e.g. fire management) "provide almost exclusively positive impacts on sustainable development." [Canada]
2652	15	19	15	19	"...increased productivity and reducing food loss..." change to either "increased productivity and reduced food loss" or "increasing productivity and reducing food loss". [Germany]
1434	15	19	15	19	The concept of "increased productivity" could be part of a definition box that we suggested. [Luxembourg]
5144	15	19	15	19	It states that agroforestry is a very large carbon source in front. It needs to check whether agroforestry is the proper use in the reduction adaptation or not. [Republic of Korea]
4452	15	19	15	19	Should be "adaptation and/or mitigation" options. [United States of America]
50	15	19	15	20	The sentence states: "Most adaptation and mitigation options, ... increased productivity ... generate synergies across all land challenges" should be moderated to fx: "... can generate synergies to land challenges", as the other phrasing is to absolute and not always true. [Denmark]
814	15	19	15	20	Productivity is very broad and not defined here. As the sentence refers to synergies across all land challenges, there may, at minimum be added "sustainable" before productivity. Otherwise, we suggest to add "in some cases" after "increased productivity" as increased productivity is not everywhere a mitigation/adaptation measure. See for instance B2.5 in dryland areas or B5.3. [France]
816	15	19	15	20	The words "and others agroecological practices" should be added to "agroforestry". [France]
818	15	19	15	20	We suggest to add "including positive effects on biodiversity" after "across all land challenges". [France]

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2654	15	19	15	20	We learned in the TS that dietary changes to plant-based diets are one of the eight options that feature high mitigation potential without adverse side-effects for other challenges (TS P34 L35-38) and dietary change feature high adaptation benefits (Figure TS.12). Also, in combination with reducing food loss, dietary shifts will also free land significantly (see SPM P25 L13-16). Therefore, we kindly request to add dietary change in this list of options generating synergies across all land challenges. [Germany]
7766	15	19	15	20	We miss "restoration" in this list of adaptaion and mitigation options. We also miss reference to the fact that wetland restoration can produce relatively rapid results in water management and other mitigation results [Norway]
7350	15	19	15	20	Biodiversity loss should be included as a 'land challenges' and ecosystem/habitat restoration should be included as synergistic option. See paras B1.4, B2.3, B7.3 [United Kingdom (of Great Britain and Northern Ireland)]
4454	15	19	15	20	This sentence is awkward at best. Are authors trying to say that the synergies across land options (agriculture, soil, etc.) create challenges in land management? How does one actually declare that degradation rates are neutral? [United States of America]
7346	15	19	15	21	Is it possible to include a confidence statement relating to these synergies and trade-offs? It would be very useful and relevant to the broad theme of the report. The Executive Summary of Chapter 6 assigns high confidence to these points (pages 3 - 4), so these could be applied here too. [United Kingdom (of Great Britain and Northern Ireland)]
8284	15	19	15	23	The sentence appears too categorical. The following formulation may be more realistic: "Most adaptation and mitigation options, such as agroforestry, improved soil management, increased productivity and reduced food loss, can generate synergies across a number of land challenges." * It should be recognised that trade-offs are possible, and as stated (without being qualified) they may not always constitute mitigation and/or adaptation. For example, increasing productivity can contribute significantly by reducing land demand elsewhere, but if it is achieved with significantly increased inputs, then the risk of trade-offs with at least some of the challenges (such as land degradation or emissions linked to inputs) can be considerable. * Reconsider the use of 'such as'. While it is nice to give examples of potenital measures, the 'such as' formulation strongly influences the message. Why give these examples and not others such as dietary change that arguably fit the description equally well? * 'Adverse side effects of fire management' should be explained. Surely the adverse effects of uncontrolled fire are worse? [European Union (EU)]
2650	15	19	15	26	The current B1.3 presents land-related mitigation and adaption options and land degradation neutrality in a quite negative framing. We suggest rewriting this text in a more positive way linking the options to sustainable land management and to the important objective to reach LDN. [Germany]
8678	15	19	15	26	Is it also worth highlighting that some options, like wetlands restoration, may appear to come at costs, eg, loss of grazing land, but may generate net positive benefits overall, through water quality and security, nutrient process, sediment capture, ecosystem habitat, and tourism. [New Zealand]

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7348	15	19	15	26	Using fire management as an example of a response measure with adverse side effects seems to be a poor choice - when looking at figure SPM3, it appears to have synergies across all 5 land challenges - not adverse effects. It would be better to choose reduced grassland conversion to cropland, reforestation, afforestation, biochar addition to soil, or one of the others that is shown to have negative impacts in figure SPM3. [United Kingdom (of Great Britain and Northern Ireland)]
1436	15	20	15	20	In the same line of referring to agroforestry practices, it is suggested to stress out agroecological practices. [Luxembourg]
2978	15	20	15	21	Suggest rephrasing the statement on fire management having 'adverse side -effects'. It is ambiguous and adds confusion and doubt to the sentences preceeding it. [Australia]
5500	15	20	15	21	fire management was presented as having potential adverse side-effects, but this measure has mostly sinergies within the land challenges as seen on Figure SPM3, and should be undestood as "low-regret". [Brazil]
578	15	20	15	21	Statement seems incorrect. It gives wrong impression that fire management is bad - due to adverse side effects. Please explain. [India]
268	15	20	15	21	In the section B1.3, "fire management" is referred to as an option which has adverse side-effects. However, it seems to be inconsistent with Figure SPM.3 and the underlying report. Japan suggest modifying "fire management" to other options (e.g. afforestation, reforestation, or bioenergy and BECCS). [Japan]
108	15	20	15	21	Consider deleting or reformulating the sentence "Others, such as fire management, may have adverse side-effects", as is not accurate, at least when applied regarding the Mediterranean region. [Spain]
114	15	20	15	21	Adverse side effectc of fire management should be specified mentioning specific effects and their intensity. Otherwise, this reference should deleted. [Spain]
7352	15	20	15	21	any particular practice within 'fire management'? [United Kingdom (of Great Britain and Northern Ireland)]
4456	15	20	15	21	What does fire management mean exactly? And how might it have adverse side effects? If the idea is that fire management means forest protection and less new cleared land to produce food, consider the increasingly robust research showing how forest-derived food increases nutrition for nearby communities. See references listed here: https://www.cifor.org/scientific-staff-detail/3433/amy-ickowitz?page_pub=3&sort=&type=&page_pub=3&sort=&type= Chapter 6 states ""Other options: improved cropland management, improved grazing land management, integrated water management, forest management, fire management, improved food processing and retailing, and improved energy use in food systems, have moderate mitigation potential, without adverse side-effects for other challenges (high confidence)"" (p. 6-3, lines 40-44). Suggest revising the SPM statement or removing it. [United States of America]
820	15	20	15	23	This sentence is not consistent with the findings line 26 page 19 of the SPM where fire management is presented as a response options providing most exclusively positive impacts. Instead, we suggest to replace "fire management" by "BECCS and bioenergy" that are, as shown in figure SPM 3 page 21, the response options with the most important side-effects. [France]
822	15	20	15	23	Please consider providing more elaborated explanations on how large the adverse side-effects can be in comparison to the main effect [France]
1264	15	21	15	21	Explain the context of the purpose of achieving 'land degradation neutrality'. Is it part of the sustainable development goals or part of mitigation/adaptation efforts. Further context is needed here. [Canada]

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2658	15	21	15	21	Please be more specific on fire-management, as such it remains unclear what is meant. [Germany]
4978	15	21	15	21	"land degradation neutrality" should be clearly defined also in the SPM, not least as it is frequently used from this point onwards. Does it, for example, exclude land restoration? Or no negative effects (while allowing for positive ones?) [Sweden]
7354	15	21	15	21	What does achieving land degradation neutrality mean? Please clarify. Additionally, could you please clarify why you are discussing land degradation here? Is it specifically related to the potential impact of adaptation and mitigation on land degradation? If so, make that clear. Please also make clear why you have chosen specifically to focus on land degradation in the context of adaptation and mitigation options and not some other potential synergies/trade-offs in key areas (e.. desertification). [United Kingdom (of Great Britain and Northern Ireland)]
7356	15	21	15	21	Can an example of an adverse side effect be added? [United Kingdom (of Great Britain and Northern Ireland)]
4458	15	21	15	21	KEY ISSUE [TERMS]: This is the first use of the term "land degradation neutrality". This must mean 'no net change' – that is, if areas are degraded, comparable areas are restored – but this still seems quite vague. Precisely define the term. [United States of America]
420	15	21	15	22	Give example of adverse effects? [Ireland]
1262	15	21	15	23	There is no agreed UN definition of "degradation", and the concept of "land degradation neutrality" is defined in the Glossary solely in relation to ecosystem functions and food security, per the definition used in the UNCCD. However, the SR on Land addresses broader issues across broader contexts, including climate change. As noted in this SR, the ability to maintain or achieve "land degradation neutrality" in a changing climate becomes increasingly challenging, and perhaps more so in some countries than others. Given the lack of a universal, operative definition of "degradation", and the questionable value of establishing a notional target of "land degradation neutrality" in the context of this report, would suggest deleting references to "land degradation neutrality". [Canada]
824	15	21	15	23	Please consider adding "demographic changes" as there are an indirect driver of degradation (line 15 page 4-26). [France]
826	15	21	15	23	This sentence is not very informative. Consider revising. [France]
2656	15	21	15	23	Please explain what land degradation neutrality is, because it is a central concept to section B and C. Please specify what is helpful to achieve it: "Achieving land degradation neutrality depends on the integration of multiple responses across local, regional and national scales, multiple sectors including agriculture, water and energy, and types of use including food, feed, shelter and industry." - or change into: "Achieving land degradation neutrality depends on many factors and actors of different levels and sectors." Please note also our request to include a box on core concepts central to this report, which should contain LDN. [Germany]
8286	15	23	15	23	Finish the sentence with "energy" by deleting the subsequent text, as it is unclear what it is referring to (uses of what?). [European Union (EU)]
7768	15	23	15	23	Please consider to include onshore oil and gas activity and fracking. The sentence could then read "...including agriculture, water and energy (including onshore oil and gas activity and fracking), and types of use including..." [Norway]

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828	15	24	15	24	Productivity gains may have adverse side effects also depending on how these gains are obtained (fertilizer use, soil degradation etc see B5.3 SPM p 18) [France]
2660	15	24	15	24	What are "productivity gains"? Please be more clear e.g. "improvements in crop yields" or is this referring to some other form of productivity? Please modify accordingly. [Germany]
2662	15	24	15	24	Please include the relevant information from Ch3 P4 L36-38 in the SPM, e.g. at the beginning of line 24 of at para B1.3 "Integrated crop, soil and water management measures can be employed to reduce soil degradation and increase the resilience of agricultural production systems to the impacts of climate change (high confidence)." [Germany]
5502	15	24	15	25	supply side and demand side... Not clear what is this scope (present in many other paragraphs as well...). If it is related to food supply and demand, better be more direct: agricultural production, on the one hand, and food demands on the other. [Brazil]
1072	15	24	15	26	"and trade": We suggest to better reflect the findings about trade, land and climate change (see in particular lines 32-34 page 1-2, lines 21-28 page 1-32, section 5.7 and section 5.8.1) Besides, we suggest that statements about trade, land and climate change better highlight the potential of supply chain sustainability management options such as zero-deforestation commitments. [France]
4460	15	24	15	26	This last sentence doesn't tie in well with the previous sentences in this paragraph. Break up the points to highlight supply-side and, separately, demand-side responses? [United States of America]
8288	15	25	15	25	Revise or delete "demand side measures". "Nutritionally balanced diets" (compared to current diets) do not necessary contribute, as for many people it would mean higher impacts. If it means a reduction of excessive calory intake or meat consumption, it should be mentioned. It is also not entirely "demand-side", as the consumer is often not in the position to influence the nutritional value of the food they consume. Food waste should be reduced throughout the supply chain. Trade, by definition, connects supply and demand, thus cannot be put only in one category. Whilst there are trade measures that can make important contributions towards making the food system more sustainable, others may act in the opposite direction, so the presentation should be more nuanced. [European Union (EU)]
1590	15	25	15	25	Not clear how/in which sense here "trade" is considered to support sustainable food systems [Italy]
8902	15	25	15	25	Here, the report should not refer to "nutritionally balanced diets", but to "sustainable diets", which can be defined as follows: "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources." Source: FAO, 2010, Sustainable Diets and Biodiversity, accessible at http://www.fao.org/3/i3004e/i3004e.pdf . [Liechtenstein]
8904	15	25	15	25	It is not clear what is meant by the sole word "trade". Could an explanation/qualification be provided? [Liechtenstein]
8906	15	25	15	25	"Demand side measures" would include food waste, but would not include food loss [Liechtenstein]
8908	15	25	15	25	It is written that "trade (...) can support sustainable food systems". It should be specified that not trade per se, but a (more) sustainable trade - for instance complying with the SDGs and/or other sustainability criteria - can support sustainable food systems [Liechtenstein]

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8826	15	25	15	25	Here, the report should not refer to "nutritionally balanced diets", but to "sustainable diets", which can be defined as follows: "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources." Source: FAO, 2010, Sustainable Diets and Biodiversity, accessible at http://www.fao.org/3/i3004e/i3004e.pdf . [Switzerland]
8828	15	25	15	25	It is not clear what is meant by the sole word "trade". Could an explanation/qualification be provided? [Switzerland]
8830	15	25	15	25	"Demand side measures" would include food waste, but would not include food loss [Switzerland]
8832	15	25	15	25	It is written that "trade (...) can support sustainable food systems". It should be specified that not trade per se, but a (more) sustainable trade - for instance complying with the SDGs and/or other sustainability criteria - can support sustainable food systems [Switzerland]
7358	15	25	15	26	Could you please clarify what aspects of trade you are referring to here? Do you mean using trade to reduce food loss and waste? [United Kingdom (of Great Britain and Northern Ireland)]
4462	15	25	15	26	Recommend changing "trade," which is overly broad, to "market diversification". [United States of America]
8290	15	27	15	27	Replace "impacts" with "results" (or "their intended benefits"). [European Union (EU)]
1266	15	27	15	27	Can "impacts" here be replaced by "benefits or measurable results"? "impacts" in IPCC reports refers to has been defined previously (e.g. AR5 WGII report) as effects from climate change. Here the context is the benefits of mitigation and adaptation options. [Canada]
830	15	27	15	27	"take time to deliver impacts" : Please provide a range so that we know if it is 10, 50 or 100 years [France]
7770	15	27	15	27	Sentence is now "... response options take time to deliver impacts" We suggest "impacts" changed to "positive results" to improve the clarity of the text as "impacts" could also be negaitve [Norway]
8292	15	27	15	28	include after ...reforestation: ' ecosystem conservation and restoration' [European Union (EU)]
834	15	27	15	29	Please consider adding "demographic change" after "dietary change". [France]
2664	15	27	15	29	We do not understand, why dietary changes "take time to deliver impacts". Dietary shifts to plant-based diets could immediately reduce the emissions in the food system and the pressure on land. We witnessed global behaviour changes in the past, which happened very sudden (e.g. personal computer, internet). We understand that cultural barriers might obstacle the implementation of this mitigation option, nevertheless we would like to stress that compared to the other options listed here, dietary shifts do not need infrastructure to be installed or forests to be planted. Changing dietary and consumption habits require suitable policies (awareness campaigns/education, through nudges, government procurement) and price incentives with potential synergies with climate, health and equity by addressing growing global nutrition imbalance (see 1.4.3.2 and 5.7.2). It is not an issue of time. In addition, in FAQ 1.2, changing dietary habits are referred to "rapid" social transformation. Therefore, we request to delete the time reference to dietary changes here. [Germany]
470	15	27	15	29	Clarify and quantify response options [Ireland]

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7360	15	27	15	29	The second sentence of B1.4 is unnecessarily complex when trying to convey a simple message. "these include those which address biological-dependent processes such as afforestation and reforestation" could be replaced with "For example, effective mitigation from afforestation depends on the slow growth rate of trees". [United Kingdom (of Great Britain and Northern Ireland)]
8294	15	27	15	34	Suggest incorporating any unique messages from this para into Section D. The general point, that short-term action is vital even if many of its benefits are delayed, is captured there in greater detail. [European Union (EU)]
5364	15	27	15	34	This point isn't very clearly connected to the section subtitle - it seems to be more about climate change mitigation than desertification [Gambia]
4464	15	27	15	34	How does this text support the introductory sentence (which is an important point): "Many response options take time to deliver impacts." There is mention of scaling up, but additional information about the rate of change and transitions may be of more use to policymakers. [United States of America]
4466	15	27	15	34	Not sure what the point of this paragraph is. It seems repetitive with previous paragraphs in Section B.1. Suggest deleting it. [United States of America]
4980	15	28	15	28	"biological-dependent" sounds strange. Would be good to redraft. [Sweden]
5504	15	29	15	29	dietary changes: the world has over 7 billion people, living in 5 continents, with an incredible diverse set of diets , based on local production characteristics, as well as traditions. The report uses often the term "diet", and the need for "diet changes", and that there are "diet changes undergoing"... it would be helpful to understand what are these changes, and what it implies world wide. Are all diets changing? what are the evidences of that? Or are these affirmations based on specific regions and cultural backgrounds? what is the impact of this suggested change (the report has a tendency to affirm that the world needs to change its diet), on traditions and cultural identities? [Brazil]
8912	15	29	15	29	Write: "...land systems, and societal transitions such ..." [Liechtenstein]
8836	15	29	15	29	Write: "...land systems, and societal transitions such ..." [Switzerland]
8296	15	29	15	30	insert after ... can avoid the loss: " and foster the conservation and restoration" of high carbon ecosystems [European Union (EU)]
832	15	29	15	31	Please check the correctness of this sentence as it seems some words are missing, probably "sustainable management of peatlands, wetlands, ...". [France]
836	15	29	15	31	Please consider adding "rangelands in dry and arid areas" (see section 5.5.1.2). [France]
8680	15	29	15	31	Useful, please retain [New Zealand]
1782	15	30	15	30	Should grass-land also be included? [Denmark]
556	15	30	15	30	The reclamation of degraded soils also have significant potential for mitigation and thus can be included here. [India]
2666	15	30	15	31	Please add the important information "Some actions can avoid the loss of high-carbon ecosystems, such as peatlands, wetlands, mangroves and forests, which provide multiple services that are difficult to replace" to the headline statement B1 signalling which ecosystems are most beneficial for different purposes/ climate mitigation. [Germany]
472	15	30	15	31	Are the lands or the services difficult to replace? Rephrase for greater clarity [Ireland]

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8298	15	31	15	31	Replace "are difficult to" with "cannot be" or "often cannot be". Some of these services are unique and cannot be fully replaced or even substituted. [European Union (EU)]
422	15	31	15	31	Expand on what difficult to replace means e.g. on human timescales or similar, or never. [Ireland]
4468	15	31	15	31	If retained, it should be noted that some services cannot be replaced at all. Suggest that the sentence be more specific on 'ambition' (toward what end?). On ambition for lowering emissions or limiting temperature rise? On temperature outcomes, or political targets? Given the number of variables involved, recommend changing "would" to "could" to more clearly state non-certain outcome. Consider replacing the word 'ambition' itself as it is vague (whose ambition?) and somewhat policy-prescriptive. [United States of America]
7772	15	31	15	32	Line 32: This line should also cite restoration as an important action. Suggest that "large scale restoration of forests" is inserted before "soil carbon mangement", so that it would read "Scaling up responses quickly and expanding their scope to include, for example, large scale restoration of forests, soil carbon mangement and land degradation neutrality, would ..." [Norway]
838	15	31	15	33	We suggest to improve the sentence by: - to attenuate the strength of the statement : the current expression is too strong since the kind of responses addressed here are not sufficient alone for meeting the ambition. We suggest to replace "... would allow current and future ambition to be met." with "... would contribute to meet current and future ambition." - to elaborate on the meaning of "current and future ambition" by adding "in tackling the different land and climate challenges". [France]
2668	15	31	15	33	We learned in Figure TS.6 on the mitigation potential of certain response options that reducing food and agricultural waste and shifting to plant-based diets feature two of the highest mitigation potentials (0.76 - 4.5 and 0.7 - 8 GtCO2 per year). Scaling up these response options would also significantly help to meet current and future ambitions. We therefore request to mention these demand side options here as well. [Germany]
7942	15	31	15	34	Not clear what this sentence says: what 'current and future ambitions'? Ambitions of who? [Netherlands]
7362	15	31	15	34	It is unclear what is meant by 'would allow current and future ambition to be met'. What targets are being referred to here? Is this national targets? The Paris Agreement? NDCs? This should be specified. [United Kingdom (of Great Britain and Northern Ireland)]
7364	15	32	15	32	Again, what is land degradation neutrality. Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]
270	15	35	15	40	The contents of first and second sentences in SPM B.2 seems redundant . We suggest deleting the second sentence and add the one describing "importance of preventing desertification" in Chapter 3 (p. 3-44, line 2-3): "Many activities and measures for combating desertification can contribute to climate change adaptation and mitigation, with further sustainable development co-benefits, but the potential for residual risks and maladaptive outcomes is high (high confidence). As preventing desertification is strongly preferable and more cost effective than allowing land to degrade and then attempting to restore it." [Japan]
7998	15	35	15	40	Please add last sentence B1.3 to the bold text [Netherlands]

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7366	15	36	15	36	Could this please be rephrased as "with co-benefits for the Sustainable Development Goals"? This would be more aligned with the explicit use of the term in the Special Report on 1.5°C. [United Kingdom (of Great Britain and Northern Ireland)]
8300	15	37	15	37	include after ..desertification and halting biodiversity loss with those ... (see inter-alia the Egyptian Initiative launched by CBD COP 14 COP President) [European Union (EU)]
840	15	37	15	39	We suggest to also consider climate mitigation alongside climate adaptation [France]
7368	15	37	15	39	What is the balance between the increase in resilience compared to the potential for residual risks and maladaptive outcomes? I think it's important to highlight that there is potential for maladaptive outcomes but it would be helpful for policymakers to know how they can avoid these and tip the scales in favour of resilience. [United Kingdom (of Great Britain and Northern Ireland)]
474	15	38	15	40	Should be clearer on risks and outcomes for ecosystems and services [Ireland]
842	15	39	15	39	We suggest to move the elements about maladaptive outcomes in B1.3 and B1 as they are not only linked to desertification. We suggest to homogenize the wording between "side-effects for adaptation" (B4) and "maladaptive outcomes" (B2 and B2.5). [France]
8302	15	41	15	41	remove the word 'technological' as the options mentioned in the next sentence are not always only technological [European Union (EU)]
844	15	41	15	41	« Technological » is not necessary here and may be misleading. The sentence should also consider socio-economical solutions and include nature-based solutions. [France]
4470	15	41	15	44	What about water storage strategies and micro-irrigation (i.e., sand dams and related techniques?) [United States of America]
846	15	42	15	44	Please consider improving this sentence with the following proposal: <ul style="list-style-type: none"> - homogenize the level of details and technical explanation to correspond to a language intended for policy-makers - provide explanation on the meaning of "adjusting land use". - add "and other agroecological practices" after "agroforestry*"; - check if conservation tillage is the correct wording or should not be replaced by conservation agriculture. Indeed, most of the time the application of the tree principles of conservation agriculture (no tillage, crop rotation and soil cover) are necessary to observe increase of soil organic carbon. See for instance Corbeels, M., K. Naudin, et al. (2018). "Is the 4 per Thousand Initiative for soil organic carbon storage achievable in sub-Saharan Africa? Insights from agroforestry and conservation agriculture." Soil and Tillage Research. [France]
8304	15	43	15	43	Delete "in plantations". There is no reason to limit the statement to plantations, and plantations are among the least likely subjects of restoration efforts. [European Union (EU)]
8306	15	43	15	43	"exploring" should probably be replaced with "exploiting" (or it would benefit from some explanation). [European Union (EU)]
8308	15	44	15	44	Add "ecosystems" to "species", as drought resilience is not only an attribute of single species, but certain aspects can only be realised at the ecosystem/landscape level (e.g., due to spatial and structural attributes, interspecific relationships and the redundancies of complex ecosystems). [European Union (EU)]
4474	15	44	15	44	KEY ISSUE [TERMS]: Define 'ecosystem-based adaptation'. [United States of America]

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4450	15	16	16	8	KEY ISSUE [LAND-COMPETITION]: Add a new paragraph in B5 that addresses the role of productivity improvements. A number of response options – such as increased productivity, sustainable intensification, efficiency improvements, and waste reduction – can reduce pressure on the land, thereby potentially freeing land and creating opportunities for enhanced implementation of other response options. [United States of America]
7370	15	41	16	2	It is not particularly useful to just have a long list of response options. If a policymaker wants to read a list of things, they can go to the underlying chapter. The SPM should be providing policymakers with information about these options, not simply stating that they exist. For example, what are the strengths and weakness of these approaches, what are the priority options, which work best in particular contexts etc etc? Would suggest deleting this paragraph to reduce length (unless it can be fleshed out and made more useful) [United Kingdom (of Great Britain and Northern Ireland)]
7374	15	41	16	2	B2.1 does not contain many useful findings; it simply lists policies. Given that in B1, the three groups of response options have been defined, but not used much throughout the rest of the SPM, it might be more useful to define which response type has greater synergies across the other land challenges, with a particular emphasis on climate mitigation and adaptation, or highlight the policies with the highest number of synergies. [United Kingdom (of Great Britain and Northern Ireland)]
4472	15	41	16	2	Are there analyses that take into consideration the COSTS of reversing desertification? Both costs in terms of financial as well as unknown consequences for trying to return a system to a state that it perhaps cannot without massive intervention. The issue is really how to manage for TODAY without dreaming about yesterday? [United States of America]
7372	15	41	16	6	Points B2.1 and B2.2 could be combined as currently B2.2, mentions no relevance to climate change, and this would also serve to strengthen point B2.1 by giving some context and showing benefits and synergies to some measures. Suggested text could be taken from the underlying Executive Summary of chapter 3 (for example on page 4) "Site-specific technological solutions, based both on new scientific innovations and indigenous and local knowledge can combat desertification while contributing to climate change mitigation and adaptation (high confidence), and can reduce negative socioeconomic effects. For example, afforestation for windbreak creation can reduce dust storms, avert desertification, and increase carbon sinks (high confidence)". [United Kingdom (of Great Britain and Northern Ireland)]
8910	15	27	17	27	Write: "Many mitigation and adaptation response options take years to decades to deliver impacts." [Liechtenstein]
8834	15	27	17	27	Write: "Many mitigation and adaptation response options take years to decades to deliver impacts." [Switzerland]

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7376	15	41	17	23	Many paragraphs under B2 and B3 appear to have significant overlap and it is not clear how the points they are trying to make differ apart from simply referring to different policies. For example, B2.4 states that sustainable land management solutions have synergies with climate change mitigation and adaptation. However B2.3 talks about vegetation restoration and tree plantation - i.e. response measures also listed under land management options - also having synergies with climate change mitigation or adaptation, thus saying the same thing, unless these do not count as sustainable for some reason? Additionally, given that desertification overlaps significantly with land degradation and the response options that address them are broadly similar and thus have similar synergies and cobenefits, it might be more useful to combine sections B2 and B3 into one, and structure this new section by going through the three types of response measure and state broadly where each of them have synergies with the other land challenges (and broader cobenefits) and pick out the most effective options - otherwise, it is unclear why these three groups have been defined in the first place. [United Kingdom (of Great Britain and Northern Ireland)]
1068	15	1	20	22	We suggest to be much more specific and concrete on the implementation of these measures, by providing quantified and detailed information of the areas involved, as well as the amount of emissions reductions and increase of removals triggered by these measures. We also suggest to reorganize the B section to highlight first all sub-sections that support climate action, especially B7, before introducing sub-sections that present limitations and difficulties of implementation. [France]
4430	15	1	20	22	This section goes back and forth between statements about the value of various actions and statements about actions that are happening. A consistent pattern of themes and evidence would be clearer. [United States of America]
2632	15	1	22	35	Transparency about the quality of the scientific statements provided is key to the credibility of IPCC reports. We appreciate the provision of confidence statements for most of the key statements in the SPM. We miss however general information about potential knowledge gaps in the SPM. We suggest adding a paragraph along the lines of TS P40 L41- P41 L3 to the section B: "Many response options have been practiced in many regions for many years; however, there is limited knowledge of the efficacy and broader implications of other response options (high confidence). For the response options with a large evidence base and ample experience, further implementation and upscaling would carry little risk of adverse side-effects (high confidence). However, for other options, the risks are larger as the knowledge gaps are greater; for example, uncertainty in the economic and social aspects of many land response options hampers the ability to predict their effects (medium confidence). Furthermore, Integrated Assessment Models, like those used to develop the pathways in SR1.5, omit many of these response options and do not assess implications for all land challenges (high confidence)." [Germany]
4432	15	1	22	35	Section B does not accurately or adequately summarize the benefits of holistic grazing management, which rotates livestock daily onto new forage sources and rests the land from additional grazing for 2-3 months between rotations. [United States of America]

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2626	15	1	22	36	<p>Section B: The current version provides many details, lacks a narrative, the focus of the individual sections and their order is unclear, the focus of the individual sections and their order is unclear, in particular B1 and B7 as well as B5 and B6 seem to address the very similar issues. In addition, duplications in Sections B, C and D should please be removed.</p> <p>We would like to provide some suggestions the framing of Section B and structural improvements of Section B1 :</p> <ul style="list-style-type: none"> - Section B should start with strong statement putting climate change "adaptation and mitigation response options" , the main subject of the IPCC, in the context of relevant international environmental policy related to land. Relevant information has been extensively assessed in CH6. The first headline statement of Section B could begin with the following sentence: "A suite of coherent climate and land policies advances the goal of the Paris Agreement and the land-related SDG targets on poverty, hunger, health, sustainable cities and communities, responsible consumption and production, and life on land." (cf. TS P45, L22-24) - The SRCCL clearly positions Sustainable Land Management as the central approach. However, this key role has not been highlighted sufficiently in the current version of the SPM. The overarching concept of sustainable land management (SLM, also part of the SRCCL's title) is integrated in all chapters instead of being handled in a separate chapter. In order to give due diligence to this concept also in the SPM we strongly suggest to mention SLM in the first headline statement of Section B. In order to facilitate understanding of SLM we suggest including its definition in the headline statement. In addition, please mention the relevance of SLM for achieving climate resilient development in addition to land-based climate change mitigation and /or adaptation in this headline. To implement these two suggestions we propose expanding the current B3 to read (changes highlighted in uppercase): "... adaptation to climate change (very high confidence), mitigation of climate change (high confidence), AND CLIMATE RESILIENT DEVELOPMENT (CONFIDENCE?), {4.2.5, 4.9, Table 4.2}, THROUGH THE STEWERDSHIP AND USE OF LAND RESOURCES, INCLUDING SOILS, WATER, ANIMALS AND PLANTS, TO MEET CHANGING HUMAN NEEDS, WHILE SIMULTANEOUSLY ENSURING THE LONG-TERM PRODUCTIVE POTENTIAL OF THESE RESOURCES AND THE MAINTENANCE OF THEIR ENVIRONMENTAL FUNCTIONS." (please see e.g. 4.9.6) and include this text in the headline statement B1. - The sub paragraphs of B1 should please provide a general introduction to the issue. The current B1.1 and B1.2. refer to the specificity of individual options and conditions, but the reader was not yet provided with basic conceptual information and context nor information about the relevance of these practices. The current paragraph B2.4 is the first time that SLM is mentioned in the current SPM, albeit without a proper introduction of this important concept and its relevance to climate change mitigation and adaptation. The same holds for LDN in the last sentence of the para. In addition, both concepts are introduced under the headline B2 which refers to desertification while SLM and LDN are relevant to the full land sector. We suggest revising this paragraph and moving it to section B1. Please see also our individual comments on Section B. [Germany]

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2628	15	1	28	23	Please consider including the following statements that provide concrete information and link land management with the Paris Agreement well as Figure TS.9 into section B or C: "Lack of action to address land degradation will increase emissions and reduce carbon sinks and is inconsistent with the emission reductions required to limit global warming to 1.5°C or 2°C. (high confidence). Better management of soils can offset 5–20% of current global anthropogenic GHG emissions (medium confidence). Measures to avoid, reduce and reverse land degradation are available but economic, political, institutional, legal and socio-cultural barriers, including lack of access to resources and knowledge, restrict their uptake (very high confidence). Proven measures that facilitate implementation of practices that avoid, reduce, or reverse land degradation include tenure reform, tax incentives, payments for ecosystem services, participatory integrated land use planning, farmer networks and rural advisory services. " (TS P26 L1-12). [Germany]
2670	15	35	30	21	Please consider including the highly relevant information on avoiding traditional usage of biomass for energy purposes from the TS P 24 L11-19 "Reducing unsustainable use of traditional biomass reduces land degradation and emissions of CO2, while providing social and economic co-benefits (very high confidence). Traditional biomass in the form of fuelwood, charcoal and agricultural residues remains a primary source of energy for more than one-third of the global population leading to unsustainable use of biomass resources and forest degradation and contributing around 2% of global greenhouse gas (GHG) emissions (low confidence). Enhanced forest protection, improved forest and agricultural management, fuel-switching and adoption of efficient cooking and heating appliances can promote more sustainable biomass use and reduce land degradation, with co-benefits of reduced GHG emissions, improved human health, and reduced workload especially for women and youth (very high confidence)." for example as an additional paragraph in section or B2 or D2. [Germany]
2630	15	1	31	5	The SRCCL identifies a number of no to low regret options with high mitigation potential and co-benefits for biodiversity, development of rural communities and other SDGs, that could be employed in the short term, most prominently halting deforestation and destruction of other high carbon lands, agroforestry, improved forest and agricultural management, reduced waste and demand side measures such as dietary change (e.g. ES 6.1). Those options should receive a more prominent treatment (beyond the current cursory mentioning in B6.1), as they are extremely relevant to policymakers who seek to take action. [Germany]
7946	15	1			Throughout section B, the term 'sustainable land management' is often referred to as a seemingly panacea to mitigate various (potential) negative trends. However, the term is not properly defined or delineated and hence appears to be a generic notion comprising each and every possible action to prevent or repair negative impacts on land. Using in this way is neither scientifically sound, nor helpful for understanding the issues. Suggest to introduce a Box to introduce the concept and how it should be understood in the context of the report, including examples of what it may comprise in different areas and for different challenges. [Netherlands]

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2634	15	2			The SPM calls adaptation and mitigation as response options to land challenges but at the same time lists them as two of the five land challenges. It does not seem appropriate that adaptation and mitigation - that aim at alleviating the impacts of climate change and hence land challenges - are mentioned at the same level as desertification, land degradation and food security. In addition, it might be confusing to non-experts that adaptation and mitigation are a challenge and a response to this challenge at the same time. We suggest to use terms such as "reducing GHG emissions in the land sector" and "climate change impacts" instead. Please revise, also in Fig. SPM.3 if this was kept. In addition, please add an assessment of climate change itself and its impacts to the list of land challenges. [Germany]
5498	15	4			Include word (concept). "...and food and WATER security" [Brazil]
2636	15	6			Please add scale-sensitivity of many land-based options, especially those leading to land-use changes: implemented at large scale (on larger land area) adverse effects may occur. [Germany]
2640	15	10			Please add "forest and wetland restoration" to the list of mitigation options that are already being implemented. [Germany]
2648	15	17			The scale-sensitivity is named only for land management responses linked to freshwater resources, how about other response options? [Germany]
7384	16	6	1	6	The phrase 'increasing carbon sinks' here may be slightly confusing as it does not explicitly state that this means there is a synergy with climate change mitigation. Given that this is named as one of the land challenges, and that term is used in the headline statement, it should be used in the underlying text if relevant. [United Kingdom (of Great Britain and Northern Ireland)]
8310	16	2	16	2	After "systems", insert "as well as interventions". [European Union (EU)]
4476	16	2	16	2	Can there be an assessed high confidence without taking financial responsibilities into consideration? Not just for developing but for developed countries. [United States of America]
272	16	3	16	5	The first sentence of SPM B2.2 seems a bit awkward because "combat desertification" appears twice. Therefore, suggest revising it for better understanding. "Limiting dust and sand storms and sand dune movement can reduce the negative socioeconomic effects of wind erosion, culminating into the improvement of capacity to combat desertification." [Japan]
7378	16	3	16	5	Clearly 'measures combating desertification' (start of sentence) will improve 'capacity to combat desertification' (end of the sentence). Suggest removing one of them. [United Kingdom (of Great Britain and Northern Ireland)]
4478	16	3	16	5	Can you limit sand storms? This sentence also seems to go round and round. "Measures combating desertification ... improving capacity to combat desertification." [United States of America]
5616	16	3	16	6	Please also add air quality and health co-benefits from the measures which combat desertification and limit dust and sand storms. This is very important element. There are millions of premature mortality because of air pollution, in which great part is due to dust particles suspended in the atmosphere during sand storm events. [Algeria]
7944	16	3	16	6	In B.2.2 planting trees as windbreakers may be limited due to water limitations in the relevant areas; this caveat should be added. [Netherlands]
7380	16	3	16	6	Limiting sand and dust storms sounds like a significant challenge. Could you include an assessment of the feasibility of doing so and some idea of the options available? Is it just afforestation for windbreaks? [United Kingdom (of Great Britain and Northern Ireland)]

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7382	16	3	16	6	It seems fairly obvious to say that measure combating desertification improve capacity to combat desertification. Is this trying to make the point that there are especially high socioeconomic cobenefits to this type of repsonse measure compare to other response measures, or is it that this type of repsonse measure has a positive feedback, enabling the implementation of other types of response measures (and thus should be a starting point for any response strategy)? Either way this should be clarified. [United Kingdom (of Great Britain and Northern Ireland)]
4480	16	3	16	6	Consider adding: "Afforestation in dryland areas can also improve micro-climates, water retetention, and soil micro-nutrients." [United States of America]
4482	16	3	16	6	Afforestation programs may have a positive impact on averting desertification if appropriate species with low water needs are used. If species with high water requirements are used, they can exacerbate desertification. Suggest making this clear. (B5.4 also refers to the relationship between afforestation and water use.) [United States of America]
8312	16	5	16	5	Replace/broaden "Afforestation". Afforestation is aimed at creating forests, and the mentioned interventions seem to have a different purpose. Suggest: "afforestation, tree planting and ecosystem restoration programmes" [European Union (EU)]
848	16	5	16	6	As the word "windbreaks" is not very commonly used, we suggest to use "windbreaks in the form of 'green walls' and 'green dams' " as it is written in the main text (line 4 page 3-5). [France]
4484	16	5	16	6	The sentence on afforestation programs is unclear as to where it might apply geographically. Is it meant to apply to arid lands? [United States of America]
274	16	6	16	6	SPM B2.2 applies "avert desertification" instead of "avert wind erosion" in Chapter 3 (p. 3-5, line 5). We suggest that SPM quote the same words with those of each Chapter. [Japan]
7386	16	7	16	7	Isn't this already mitigation? Could you clarify the text for example "Measures to combat desertification that sequester soil carbon..." [United Kingdom (of Great Britain and Northern Ireland)]
850	16	7	16	8	Please consider adding a definition of soil carbon sequestration in the glossary. We suggest the following definition: "net CO2 removal from the atmosphere to the soil , where the carbon is stored in soil organic matter." From Feller, C., Bernoux, M., 2008. Historical advances in the study of global terrestrial soil organic carbon sequestration. Waste Manag. 28, 734–740. [France]
5366	16	7	16	8	We thank the authors for including information on limits to adaptation and residual risks. However, would the residual risks listed here be more appropriate for the food security section, as they refer to yield losses caused by climate change and soil fertility loss ? [Gambia]
116	16	7	16	8	Consider adding "as well as climate change adaptation" at the end of the sentence, as this is particularly relevant in semi-arid regions (due to an increase in the water retention capacity of the soil linked to higher rates of soil organic -and inorganic- carbon). [Spain]
276	16	7	16	9	SPM B2.3 is written as if expected rates of carbon sequestration (0.04-0.4 tC/ha) had a big contribution to climate change, while Chapter 3 (p. 3-46, line 20-24) points out that the value of 0.04-0.4 tC/ha is relatively low, and it may take a protracted period of time. More clarification is suggested about the significance of the numbers of sequestration rates (0.04 - 0.4 tC/ha), for example by adding explanation that this rate is relatively low compared to XX and that it may take a protracted period of time for C stocks to recover once it is lost. [Japan]

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7388	16	7	16	14	Could you be more explicit about synergies with adaptation and biodiversity here? The links with mitigation are fairly clear but for example, lines 10-11 "natural vegetation restoration and tree plantation" can also be a form of adaptation to climate change and can promote biodiversity and ecosystem services. [United Kingdom (of Great Britain and Northern Ireland)]
4486	16	7	16	14	KEY ISSUE [FLUXES]: Many things proposed to be implemented will mean more plant growth and more residue to soil so perhaps carbon accumulation. But when you account for emissions from pumping irrigation water and that a lot of irrigation water (most?) is supersaturated with CaCO ₃ which then comes off as CO ₂ , can we not really say these systems are net sinks? This management / manipulation of dryland soils might actually be a source of CO ₂ to the atmosphere. [United States of America]
7390	16	8	16	8	In the text referring to expected rates of carbon sequestration, it should be clear whether this is referring to the expected observed rates, or the expected potential rates. [United Kingdom (of Great Britain and Northern Ireland)]
852	16	8	16	10	To be effective such measures should developed on long term. Soil carbon storage may be reversible if land management do not take into account soil carbon storage. [France]
854	16	8	16	10	"to conservation agriculture practices": It should be noted that conservation agriculture may use more herbicides to combat weeds due to no tillage practices. See : Chauhan, B. S., Singh, R. G., & Mahajan, G. (2012). Ecology and management of weeds under conservation agriculture: a review. Crop Protection, 38, 57-65. Conservation agriculture should be added to the glossary. [France]
1440	16	8	16	10	It would be good to get the same carbon sequestration rates for other agricultural lands, not only drylands. The Figures could maybe be included in a table [Luxembourg]
7392	16	8	16	10	Please make it explicit that the expected rates of carbon sequestration varies depending on local and/or regional circumstances/conditions. [United Kingdom (of Great Britain and Northern Ireland)]
4488	16	8	16	10	The reference to expected rates of C sequestration should indicate whether these are total rates or incremental rates as a result of some intervention. [United States of America]
1666	16	9	16	9	The unit is mistaken here. It is suggested that "tC ha-1" be replaced by "tCha-1yr-1". [China]
8610	16	9	16	9	conservation agriculture' is not defined and is therefore somewhat ambiguous [New Zealand]
7394	16	9	16	9	"following changes to conservation agriculture practice" please clarify, from what to what? [United Kingdom (of Great Britain and Northern Ireland)]
7396	16	9	16	9	Please be specific about what sorts of things you mean by "changes to conservation agricultural practices in drylands" - currently this is quite vague. [United Kingdom (of Great Britain and Northern Ireland)]
7398	16	9	16	9	I don't think that this value of sequestration (0.04-0.4tC ha) will mean very much to the average policymaker reading the document. What they will want to know is whether this is a significant amount of sequestration? Can it provide a meaningful land-based contribution to mitigation? This value alone is not informative, so please remove or provide appropriate context [United Kingdom (of Great Britain and Northern Ireland)]
4490	16	9	16	19	What "changes" does the text refer to? What conservation practices, and which starting points? [United States of America]
8316	16	10	16	10	Replace "plantation" with "planting". [European Union (EU)]

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2674	16	10	16	10	Suggest to rephrase and shorten sentence to: "(...) tree plantation in degraded lands ENRICHES organic carbon in the topsoil and subsoil." [Germany]
2676	16	10	16	10	Only in the discussion of combating desertification the term "natural vegetation restoration" is used. How does this measure compare to afforestation vs. reforestation? If this measure encompass other aspects, we suggest, that it should also be used in discussion elsewhere in the SPM in order to be consistent. [Germany]
1668	16	10	16	11	Natural vegetation restoration and tree plantation have effects on soil organic carbon and inorganic carbon in arid and semi-arid regions. It is suggested that the effect of inorganic carbon be supplemented against the underlying report. [China]
856	16	10	16	11	Please precise if natural qualifies also "tree plantation". Furthermore, please consider adding that the effectivity of such measures should be considered on longer term, as soil carbon storage may be reversible if land management is not sustainable and does not take into account soil carbon storage. [France]
7926	16	10	16	11	Currently published study by Simon L. Lewis, et al 2019 argues that plans to triple the area of plantations will not meet 1.5 °C climate goals. This new study has therefore shown that to store carbon, regenerate natural forests is preferred to plantation. To our view, emphasizing regeneration/restoration of ecosystems is policy relevant and should be included. [Norway]
2678	16	11	16	14	The last sentence of this statement is a very helpful summary of the importance of combating desertification in a long-term perspective as it would help to reduce carbon emissions in the future and its contribution to food security. We strongly suggest to include these aspects in the headline statement summarizing the paragraph on desertification B2. [Germany]
8318	16	13	16	13	Suggest replacing "thus reducing" with "reduce". As currently written this may be misunderstood: these measures would not only reduce carbon emissions from the soil, but also remove CO2 from the atmosphere and increase soil organic carbon, through different mechanisms. [European Union (EU)]
278	16	14	16	14	Delete 3.7.2 from the reference. Section 3.7.2 doesn't contain any discussion about soil. [Japan]
2980	16	14	16	15	Suggest including C losses from deforestation. Suggest the addition of something along the lines of "Avoided land clearing and deforestation for food production is an effective mechanism to avoid soil C losses. Avoided clearing in favour of maximizing the productivity of existing agricultural land and applying best management practices to that lands production system would avoid the loss of, or at least slow the loss of soil C. However, with a growing population and changes to dietary expectations, more land is likely to be required for agriculture. Where landclearing is unavoidable, applying management practices to minimise the intial loss of soil C is desirable for emissions avoidance. [Australia]
8320	16	15	16	16	Replace "Sustainable land management solutions, such as controlled grazing and the management of forest land and cropland" with "Sustainable land management solutions, such as improved grazing, forest and cropland management". Controlled grazing may or may not be desirable (depending how it is controlled). The management of cropland and forest may or may not be "sustainable", it must be qualified. [European Union (EU)]
4492	16	15	16	16	"the management of forest land": This seems to contrast with statements about "natural/unused forests" vs "used forests" earlier in the SPM? [United States of America]
4494	16	15	16	17	Does this account for subsidies to reduce grazing herds? Does this also account for decreased livestock production and availability for market? [United States of America]
8716	16	15	16	20	adverse side effects of fire management should be teased out further [Ireland]

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8718	16	15	16	20	Poverty reduction and food security also leads to political stability which is a very important component in the climate change challenge. Should this benefit be mentioned here? [Ireland]
7774	16	15	16	20	The role of controlling grazing might be controversial. Controlling grazing might have an implication on the number of domestic animals. Then, households/farmers might be forced to reduce the number of animals and this might influence households' income and food security. Moreover, controlling grazing land for restoration of degraded land might accelerate degradation in the remaining grazing land uses since the number of grazers per unit area in the uncontrolled/open grazing land are expected to increase. Thus, please try to accommodate both views. [Norway]
7776	16	15	16	20	Controlled grazing is not a guarantee for attaining sustainable land management, for instance the case of invasive species community. Findings has indicated that moderate-intensity cattle grazing can be used to restrict the invasive potential of exotic grasses and maintain native plant communities (Beck et al. 2015). https://doi.org/10.1890/14-1093.1 Thus, the effect of grazing should be evaluated with respect to frequency and intensity. Please consider including this. [Norway]
8322	16	17	16	17	Insert "can" after "these" ("These can have"). [European Union (EU)]
8324	16	17	16	18	Delete "among dryland populations". The benefits can be broader. [European Union (EU)]
280	16	17	16	18	There is inconsistency in the description for confidence between "...among dry land populations (medium confidence),..." of SPM and "...with further sustainable development co-benefits for poverty reduction and food security (high confidence)" in Chapter 3 (p. 3-44, line 2). [Japan]
118	16	19	16	20	The scale considered when talking about degradation neutrality measures is of great importance, and therefore it should be mentioned in this sentence. The achievement of land degradation neutrality by a whole country could lead to soil erosion and degradation in most vulnerable regions and soil gains in the most favourable lands of the same country. [Spain]
860	16	21	16	22	We suggest to add "important" before "considerations". [France]
7400	16	21	16	22	This is a very generic comment (it's obvious, for example, that we should avoid maladaptive outcomes) and offers nothing particularly insightful the policymakers. Suggest that it is deleted to reduce SPM length. [United Kingdom (of Great Britain and Northern Ireland)]
7404	16	21	16	22	Limits to adaptation...are considerations in...". Should this say "are important considerations in..."? It feels like the implications of this paragraph are left as an exercise for the reader, when they should be made explicit. [United Kingdom (of Great Britain and Northern Ireland)]
8326	16	21	16	23	Statement is unclear and needs sharpening. unclear why the statement is limited to vulnerable communities unclear why a statement on limited empirical evidence and unconvincing is included in the SPM (esp since the limited evidence is the statement itself rather than a bracketed confidence statement accompanying it - as per usual IPCC conventions) [European Union (EU)]
7402	16	21	16	28	This is quite a complicated point and mixes up limits to adaptation and residual risk from desertification and climate change. It could benefit from more clearly stating delineating between these two, or where, as in the example cited in lines 24-28, it might not be possible, making it clear how desertification and climate can interact as drivers of adaptive limits/residual risks. [United Kingdom (of Great Britain and Northern Ireland)]

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8328	16	21	16	29	B2.5. Figure SPM2 implies that there is substantial scope to adapt to desertification - since its impacts can fall dramatically if switching from an SSP3 to SSP1 future. This paragraph gives a different message. Is it possible to reconcile the two or explain the differences? [European Union (EU)]
858	16	21	16	29	We suggest to homogenize the wording between "side-effects for adaptation" (B4) and "maladaptative outcomes" (B2 and B2.5). [France]
5368	16	21	16	29	B3.3 - what are the "short-term goals" referred to here regarding avoided deforestation and degradation? Are these climate goals or land degradation goals, or other goals? It would be helpful to here or elsewhere elaborate on the importance of rapidly reducing deforestation and forest degradation for all land challenges. [Gambia]
282	16	21	16	29	Although SPM B2.5 seems to summarize section 3.7.4 in Chapter 3, "Limits to Adaptation, Maladaptation, and Barriers for Mitigation", there is no information about costs. Most of parties would be concerned about the costs of adaptation and mitigation. We suggest adding the sentence of Chapter 3 (p. 3-61, line 16), "Even when solutions are available, their costs could be prohibited presenting the limits to adaptation." [Japan]
4496	16	21	16	29	The sentences within this paragraph lack confidence statements. [United States of America]
4498	16	21	16	29	Consider adding a sentence on increasing population pressure. This may make it very hard to effectively adapt in many dryland areas. Fodder and water are essentially finite. [United States of America]
7406	16	22	16	28	It is unhelpful to state that the evidence for limits to adaptation is limited before then listing potential limits anyway. Either there is evidence for them or not - if there is not sufficient evidence, they should not be listed; if there is sufficient evidence, they should be listed with an appropriate confidence statement, not a prefacing sentence casting doubt on the finding. The subsequent section on residual risks is confusing and it is unclear what the key message is this - if it is just further examples of limits to adaptation, this could possibly be removed as the simple example of loss of productivity from irreversible desertification is enough. [United Kingdom (of Great Britain and Northern Ireland)]
8330	16	24	16	28	This sentence is difficult to follow. It could be shortened for better clarity. [European Union (EU)]
2982	16	24	16	28	Suggest clarifying this sentence. It does not make sense. [Australia]
2680	16	24	16	29	Please divide this long phrase into shorter statements and make sure the meaning does not get reversed by using multiple-negatives. The meaning of the sentence is currently not clear, a verb or conjunction seems to have been lost somewhere during editing. [Germany]
7778	16	24	16	29	The term "sustainable land management" is widely used throughout the SPM. However, the term is used in various settings and in many cases the examples connected to sustainable and management are not necessarily in line with the current definition in the glossary. Please consider to clarify the content of sustainable land management in this report, perhaps in a text box that could also explain how sustainable land management could be achieved. [Norway]
7408	16	25	16	26	is this just in dry lands? Or more widespread? Please be more specific. [United Kingdom (of Great Britain and Northern Ireland)]
476	16	25	16	28	References to land yields should seek optimum yields rather than maximum - varies across geographic regions [Ireland]
2682	16	26	16	27	Please add the word "unsustainable" so that the statement reads "... favouring unsustainable intensification in dryland..." [Germany]

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8332	16	27	16	27	What does "initial productivity" mean here. Is this "initial low productivity"? [European Union (EU)]
8334	16	28	16	29	Insert at the end of the sentence "or by creating new dependencies [on vulnerable resources]". The risk is not only that they may have impacts, but that they may not work. For example, oversized irrigation systems may run out of water and can thus increase losses. [European Union (EU)]
862	16	28	16	29	Please consider providing some examples. [France]
7410	16	28	16	29	It would be good to be specific here and include a reference to salinisation of soils due to poor irrigation management as an example of maladaptation causing irreversible land loss. [United Kingdom (of Great Britain and Northern Ireland)]
7412	16	29	16	29	Could you provide an example of such negative impacts please [United Kingdom (of Great Britain and Northern Ireland)]
8336	16	30	16	30	In regions with water scarcity (at risk of desertification) the promotion of hydropower can aggravate problems by affecting the services that aquatic ecosystems can provide. [European Union (EU)]
4834	16	30	16	30	Change "renewable energy resources" to "low-carbon energy resources" [Iran]
4836	16	30	16	30	Add after such as "natural gas" [Iran]
478	16	30	16	30	Try to be more consistent in use of the phrases biofuels, bioenergy and biomass across the document [Ireland]
4500	16	30	16	30	This statement is oversimplified at this point. The tradeoffs need to be included that might negate any net benefit. [United States of America]
2684	16	30	16	31	There is a contradiction in B2.6 as "bioenergy" is also seen as a means "to mitigating climate change and combating desertification through decreasing use of fuelwood and crop residues for energy". The renewable energy resources mentioned here, should be limited to "hydro-energy, solar and wind energy". The text should therefore read: "Developing renewable energy resources, such as hydro-energy, solar and wind energy, can contribute to mitigating climate change and combating desertification through decreasing use of fuelwood and crop residues for energy while increasing the diversity of energy supply". A second sentence should be added stating "This can also hold true for modern bioenergy, particularly as part of sustainable integrated agriculture systems; however unsustainable intensification or expansion of land use for bioenergy, particularly in areas at risk of desertification can have adverse effects" (see 4.6, 5.6.4, Cross-Chapter Box 7). [Germany]
5618	16	30	16	32	Please add: and intensive water consumption (ground water and non renewable water). [Algeria]
8338	16	30	16	33	B2.6 Bioenergy is listed here as a mitigation option that can combat desertification, while fuelwood and crop residues are described as energy sources whose use should decrease. Explain the difference between the two. Considering what stated later in point B5.3, this statement should be better qualified, as not every form of bioenergy will contribute positively to combating desertification. A solution could be to replace "bioenergy" with "biogas based on manure or waste". These can deliver the claimed benefits without increasing pressure on land. [European Union (EU)]
2984	16	30	16	33	Suggest clarifying this point (in the context of bioenergy/ crop residues) [Australia]

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5506	16	30	16	33	the paragraph proposes renewable energy sources as an alternative to the use of fuelwood and crop residues. It would be more accurate to mention that these sources are an alternative to fossil fuels and other non renewable energy sources. If the focus is on mitigation. [Brazil]
1268	16	30	16	33	Bioenergy is presented here (and throughout the report) as a mitigation measure which can contribute to climate mitigation, combat desertification, and increase the diversity of energy supply. However, at the same point, this report also notes in many places that the amount of land used for bioenergy crops in 2050 under a 2C carries risks to food systems, terrestrial ecosystems, and water scarcity (e.g. graphic on page 13) and can lead to land use change and increased land pressures (page 18, line 16-20), which appears to create an inconsistency at best, and potentially a total incompatibility. The assumption of a high bioenergy uptake scenario also does not seem to be consistent with the planned land-based mitigation actions outlined in current NDCs under the Paris Agreement - nor with current bioenergy production globally. Therefore, suggest that an explanation is needed here as to why a mitigation action with such high potential risks and with current limited uptake is being presented as a positive contribution to climate mitigation. Additionally, it is questionable to present this given that the focus should presumably be on solutions that provide both mitigation and adaptation benefits - and it is not clear how increased bioenergy production, given the negative impacts cited on page 13, is consistent with this approach. A clearer presentation of the trade-offs between increasing land use for bioenergy production, and meeting other socio-environmental objectives would be helpful. Additionally, focusing on the scalability and implementability of land-based mitigation options that do NOT have such adverse impacts (e.g. those noted on page 19, lines 15-17, 24-26: improved cropland management, improved forest management, increased soil organic content, peatland conservation, coastal and forest restoration, and fire management) is perhaps more useful to policy makers. [Canada]
864	16	30	16	33	Please consider better distinguishing, for example into two different sentences, the cases of hydro-energy, solar and wind, from the case of bioenergy, for which only some forms are able to contribute to climate change mitigation and combating desertification. Alternatively, please consider adding "some forms of bioenergy". [France]
600	16	30	16	33	There is a reference to the potential of renewable energy sources such as bioenergy crops etc. We also need to be aware of its limitations and adverse consequences such as diverting forest lands to grow bioenergy crops which will affect biodiversity, etc. Solar energy and wind energy also have their limitations. [India]
1592	16	30	16	33	A link with land-use issues for Bioenergy vs Food should be inserted here. Consider Cross-Chapter link with B5.2 where this issue is reported. [Italy]

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284	16	30	16	33	<p>For SPM B2.6, we suggest following points.</p> <ul style="list-style-type: none"> - Some advantages are stated here. We suggest clarifying whether the advantage or disadvantage is specific to renewable or not (e.g., nuclear power, energy efficiency improvements of fossil fuel power, energy saving in end-use sectors) for further understanding. - SPM B2.6 discusses the use of renewable energy resources rather than fuelwood and crop residues, and avoiding the use of fuelwood could be found to be reasonable based on the paragraph in Chapter 3 (p. 3-56, line 25 - p. 3-57, line 6) . However, we wonder why crop residues are not regarded as effective renewable energy sources. In the text of Chapter 3, there are no statements which correspond to the SPM, that is, Chapter 3 doesn't mention that using crop residue would be deterrence of combating desertification. Also, considering the definition of Bioenergy in glossary, it is appropriate to classify crop residues as Bioenergy. We suggest to include the crop residue in renewable energy sources or add the reason why crop residue needs to be avoided. - Suggest adding disadvantages with using renewable energies too, for example, due to use of low density energy requiring large land areas, and discussions about such disadvantages are desirable. [Japan]
7414	16	30	16	33	<p>This section doesn't really make sense. Use of crop residues for energy is a key component of bioenergy (and often potentially quite a sustainable option), so it is unclear why developing bioenergy should decrease the use of crop residues for energy. Unless you are trying to make a specific point about crop residues and their impact on desertification - in which case this isn't clear. Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]</p>
4502	16	30	16	33	<p>KEY ISSUE [LAND-COMPETITION]: This is the first reference to bioenergy in the text (appears in Figure SPM.2). Chapter 6 does a pretty good job of explaining that not all bioenergy is actually good for climate mitigation but here in B2.6 is listed without comment alongside solar and wind. The SPM needs to do a better job generally in discussing bioenergy to track Chapter 6, but recommend here that the examples of renewable energy are removed from that sentence. Currently the sentence reads: "Developing renewable energy resources, such as bioenergy, hydro-energy, solar and wind energy, can contribute to mitigating climate change and combating desertification through decreasing use of fuelwood and crop residues for energy while increasing the diversity of energy supply (medium confidence)." In checking Sections 3.7.3 and 3.7.4 which are cited, this text comes from p. 3-56 lines 25-27 which states: "Transitioning to renewable energy resources contributes to reducing desertification by lowering reliance on traditional biomass in dryland regions (medium confidence)." Suggest just leaving it as in the original saying "renewable energy resources" rather than specifying the renewable sources without more information about their pros and cons. [United States of America]</p>
4504	16	30	16	33	<p>B2.6 should also address the negative land-use consequences of bioenergy, and for that matter the implications on land use of large-scale deployment of other forms of renewable energy. [United States of America]</p>
8340	16	31	16	31	<p>Replace "any" with "various" or "different". Not all practices are applicable at all scales. [European Union (EU)]</p>
1442	16	31	16	31	<p>Another prospective source of energy is energy from algae. [Luxembourg]</p>

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5620	16	31	16	33	Please add: and enabling access to decentralized energy for local-farmers (e.g., solar water pumping for irrigation) [Algeria]
4506	16	31	16	33	Crop residues are also a biofuel feedstock; the use of biofuels does not necessarily reduce the use of crop residues for energy, though it may change how they are used, and the associated efficiency. [United States of America]
8914	16	33	16	33	Write: " ... supply (medium confidence) but there are trade-offs." [Liechtenstein]
8838	16	33	16	33	Write: " ... supply (medium confidence) but there are trade-offs." [Switzerland]
480	16	34	16	34	Rephrase "provides" with "can provide" [Ireland]
4508	16	34	16	34	It is not certain that all efforts to reduce and reverse land degradation will be "cost effective." Line should be redrafted to reflect this: "Reducing and reversing land degradation can provide immediate benefits that may be cost effective to communities by enhancing ecosystem services." [United States of America]
866	16	34	16	40	We suggest to ensure that all notions quoted in the highlighted title be reflected in the subsequent paragraphs. Currently, it is not the case for adaptation and we suggest to add findings about adaptation in the subsequent paragraphs. [France]
868	16	34	16	40	Please check if there is no redundancy between section B3 and section B6. [France]
580	16	34	16	40	B-3: Repeated para. This has been said in the earlier paras. B-3 can be deleted. [India]
424	16	34	16	40	Useful statements [Ireland]
8682	16	34	16	40	Useful, please retain [New Zealand]
4510	16	34	16	40	Authors may want to include something about impacts to food supply. [United States of America]
870	16	37	16	38	In order to no disrupt key expressions, we suggest ot use "sustainable land management including sustainable forest management". [France]
8342	16	39	16	40	How do you justify differentiating between very high and high certainty here? [European Union (EU)]
8344	16	41	16	41	Replace "For sustainable land management to be successful," with "For land management to be sustainable,". [European Union (EU)]
872	16	41	16	42	Please consider deleting "biophysical and social" or replacing them by a more complete list such as "environnemental, biological, geophysical, physical and socio-economic". [France]
2686	16	41	16	44	Considering the definition of SLM (glossary) we find the statement in section B 3.1. somewhat misleading. Reason: Sustainable Land Management is per se context-specific, and can only function in a truly sustainable manner, if it considers local biophysical and social conditions. There is no one-size-fits all process for attaining SLM. We therefore propose rephrasing para B3.1 as follows: "Sustainable land management implies taking into account local biophysical and social conditions thereby ensuring compatibility between specific land management practices and socio-economic conditions, including land tenure and gender. (very high confidence) ..." [Germany]
7422	16	41	16	44	It is unclear what compatibility is essential for in B3.1 - adding the phrase 'for its success' to the end of the sentence may help this. [United Kingdom (of Great Britain and Northern Ireland)]

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4514	16	41	16	44	"Compatibility between specific land management practices and socio-economic conditions, including land tenure and gender, is essential (high confidence)." This is good as far as it goes. Listing a few additional points would make it stronger – for example, "including traditional practices and their relationship to local community structure, power, and authority". [United States of America]
7424	16	42	16	42	Could the word "biophysical" be replaced by "climatic and social conditions" or "climate, ecosystems and social conditions" for clarity? [United Kingdom (of Great Britain and Northern Ireland)]
7784	16	42	16	43	Please consider to include indigenous people, as they manage 80 % of the terrestrial biodiversity. The sentence would then read: "Compatibility between specific land management practices and socio-economic conditions, including land tenure, gender and indigenous people, is essential..." [Norway]
2688	16	42	16	44	How is a management practice "compatible with gender"? We assume the intention is to stress the importance of SLM being designed in a way that is appropriate for/coherent with specific local circumstances and regulations, also recognizing the important roles of existing land-tenure systems and gender-specific barriers and opportunities? Please rephrase. [Germany]
7426	16	42	16	44	It's not clear what is meant by "land tenure and gender" and its link to land management practices - could this be clarified? And perhaps draw an explicit link to the relevant SDGs? Also, what is the compatibility essential for - could you be more clear on this? [United Kingdom (of Great Britain and Northern Ireland)]
1690	16	43	16	43	The gender perspective is first mentioned in paragraph B3.1. We think that the connection between sustainable land management and gender is not generally known, so some additional explanation would be needed here. [Hungary]
4516	16	43	16	43	The references to land tenure and gender would benefit from a more careful treatment. [United States of America]
7428	16	43	16	44	Add 'common property rights' as another specific land management practice and socio economic condition. [United Kingdom (of Great Britain and Northern Ireland)]
8346	16	44	16	44	Is gender a socioeconomic condition? [European Union (EU)]
7780	16	34	17	23	Somewhere in B3: consider including a more general sentence on the potential mediating effect natural vegetation/ecosystems has on several different climate impacts such as flood, landslide, runoff, etc (i.e. ecosystem service/naturebased solutions for climate adaptations). [Norway]
7782	16	34	17	23	There is need for quantified information on the the need and potential for emission reductions in the FOLU sector (agriculture is covered well in B.4). It should draw on numbers for the total potential in key mitigation reduction options, like forests, soils, wetlands, BECCS . Having som aggregate numbers would also make the figure on page 21 more useful, which otherwise is hard to interpret in the way of adding mitigation potential accross categories. [Norway]
7416	16	34	17	23	This whole section (B3) is very focused on land degradation, so that climate change feels a bit like an afterthought and isn't mentioned at all within points B3.2, B3.3, B3.4 and B3.5. The current approach is not really in line with the agreed outline for report so I suggest trying to draw out the co-benefits and synergies with mitigation and adaptation much more strongly in these paragraphs (I have made these points again below). Following that, it might be more helpful for policymakers for point B3.6 to be replaced with a paragraph highlighting which measures have the storngest synergies or trade-offs, how they could be scaled up etc to better facilitate decisionmaking. [United Kingdom (of Great Britain and Northern Ireland)]

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7418	16	34	17	23	The scope is very clear that assessment of the evidence around response options to land degradation should identify links to the Sustainable Goals where possible, which isn't clear here - could you include more explicit synergies and trade-offs with the SDGs? [United Kingdom (of Great Britain and Northern Ireland)]
7420	16	34	17	23	B3 does talk about how actions to address land degradation help with climate change mitigation, but is not very direct in doing so, explicitly linking to the goals of the Paris Agreement. It would be helpful to put the following text from underlying executive summary of chapter 4 into the headline text of B3: ""Lack of action to address land degradation will increase emissions and reduce carbon sinks and is inconsistent with the emission reductions required to limit global warming to 1.5C or 2C." [United Kingdom (of Great Britain and Northern Ireland)]
4512	16	34	17	23	What about the role of technology improvements and break throughs? [United States of America]
8314	16	9			Are the indicated rates of carbon sequestration of 0.04-0.4 tC/ha on an annual basis? [European Union (EU)]
2672	16	9			Please explain the unit "tC ha-1", do you refer to annual carbon sequestration per hectare? [Germany]
122	17	1	7	7	The appropriate management of organic wastes from livestock (and other organic matter sources) and their application into crop lands should also be included here. [Spain]
8378	17	26	16	26	It is not clear to which part of the sentence the "medium confidence" is referring. Is it the 25-30 % of the total GHG emissions? [European Union (EU)]
8348	17	1	17	1	insert after "reduced tillage": and agroforestry. Rationale: agroforestry is an agronomic as well as a forestry measure, hence it should also be included here [European Union (EU)]
1542	17	1	17	1	Please explain intercropping. What's the difference with cover crops ? [Belgium]
1544	17	1	17	1	In some cases, reduced tillage may increase N2O emissions (Ch2 P83 L23). The report should assess this as clearly as possible : is the effect on total GHG emissions favourable in most cases or are there many cases where the result of actions such as reduced tillage is unknown or an increase in total emissions ? If the level of GHG emission reduction significantly depends on local conditions and/or how these methods are implemented, please consider adding this information. [Belgium]
876	17	1	17	1	We suggest to add "agroforestry and other agroecological practices" to this list. [France]
8350	17	1	17	2	the fact that "reduced tillage can ... increasing soil carbon stocks (very high confidence)" clearly contradicts 4.9.11 "Reduced tillage (or no-tillage) is an important strategy for reducing soil erosion and nutrient loss by wind and water...But the evidence that no-till agriculture also sequesters carbon is not compelling". Please revise the sentence on reduced tillage, making clear that the "very high confidence" does not extend to zero-tillage. [European Union (EU)]
874	17	1	17	3	Such agronomic measures should also be evaluated regarding other GHG emissions like N2O for instance. It is also important to note that in some case use of pesticides is necessary to control the adventitious flora when tillage is totally abandoned. [France]
2690	17	1	17	3	"...intercropping...increasing soil carbon stocks (very high confidence)". Only in cases where intercropping systems produce/fix more carbon from biomass compared to their monocropping equivalents they may increase soil carbon stocks. From case to case intercropping systems may produce more or less carbon. Hence the very high confidence is doubtful for intercropping and soil carbon stocks. [Germany]

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7434	17	1	17	3	The regional variability of the success of increasing soil carbon stocks via the different measures should be clarified. The success rate of the different agronomic measures is not uniform across the globe, and this should be made explicit. [United Kingdom (of Great Britain and Northern Ireland)]
484	17	1	17	7	Should have local and regional contexts. Could add a footnote reference to UNCCD objectives [Ireland]
7430	17	1	17	7	This paragraph could be more explicit about the links between these measures and mitigating and adapting to climate change, for example when discussing biochar mention also that as well as sequestering carbon it can also reduce emissions of other GHGs like N2O from soil (p. 83 Chapter 4). [United Kingdom (of Great Britain and Northern Ireland)]
7432	17	1	17	7	This paragraph is a little repetitive - the third sentence could be worked into the first sentence which would help to reduce SPM length. [United Kingdom (of Great Britain and Northern Ireland)]
4518	17	1	17	7	KEY ISSUE [GRAPHICS]: The strength assigned to some of these "proven agronomic measures" is highly questionable and needs to be carefully reviewed – especially "Adding biochar to soil sequesters carbon (very high confidence)". A farmer might apply char and then find more carbon in the soil at end of year but this ignores CO2 emitted during production and application of char and it assumes char is stable, which field measurements find is not well-justified (e.g., Gurwick et al. 2013, PLoSOne). Gurwick et al. also showed generally that the rhetoric about biochar's mitigation potential was far ahead of the evidence base at that time. A 2006 paper by Davidson was also equivocal about biochar's promise as a mitigation strategy. Figure SPM.3 needs to be adjusted accordingly. The alleged potential of biochar appears at multiple points in Chapter 6 and should be corrected throughout. When examined carefully, the literature simply does not support these claims. [United States of America]
7436	17	2	17	3	Comment refers to the very high confidence stated next to the increasing soil carbon stocks claim. In section 4.9.1.1 in Chapter 4, the text specifically says "...evidence that no-till agriculture also sequesters carbon is not compelling (VandenBygaart 2016)." This is then followed by evidence for bias. There is no reference to findings that reduced tillage increases SOC. Therefore this sentence is not an accurate reflection of the underlying chapter and is misleading. Please update accordingly, along with the uncertainty language. [United Kingdom (of Great Britain and Northern Ireland)]
8352	17	3	17	3	Suggest to change in "Adding biochar to soil is a measure to sequester carbon" [European Union (EU)]
1540	17	3	17	3	Adding biochar to soil sequesters carbon: this sentence needs to be put into a context and adverse effects in B.5.1. should be mentioned as well. [Belgium]
540	17	3	17	3	Seems to say adding carbon to soil adds carbon to soil? Is this statement needed? [Ireland]
7786	17	3	17	3	Adding biochar to soil has multiple advantages such as stabilizing a long-term carbon storage e. g., 100+ years! and offset total carbon emissions and enhancing soil bio-physio-chemical properties. Thus, please consider to lift it forward by addressing the role of biochar in climate change mitigation and management of land degradation and desertification (4.10.5 Biochar). [Norway]

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8354	17	3	17	4	The "very high confidence" assigned to sequestration by "biochar" should be revisited. Adding charcoal to soil can clearly increase the carbon content of the soil, but it is only sensible to apply it to soils if it significantly improves the soil (and adverse impacts are avoided) with high certainty. Otherwise the charcoal could be sequestered more efficiently and safely in other locations (e.g., landfilled), with much higher confidence in sequestration. Moreover, the potential carbon benefits of applying charcoal amendments to soil should be considered together with the inevitable emission cost of producing the charcoal, including its feedstock. Those emissions can be substantial, as recognised in paragraph B5.1. [European Union (EU)]
878	17	3	17	4	Other techniques than biochar, such as organic amendments and recycling of organic matters, should be presented. More emphasis should be given on the recycling of organic matters (including compost, biogas), giving benefits for the soil fertility, the cycles of N, P and K, and with benefits for biodiversity. Biochar is presented as a good solution, whereas "evidence is limited and impacts of large scale application of biochar on the full greenhouse gas balance of soils, or human health are yet to be explored" (Chap 1 lign 36-37 page 36). Indeed research is still undertaken to know if there aren't negative impacts when used on agricultural soils, and the costs can be important. Moreover, it should be explained that life cycle analysis shows that we need to differentiate the biochar made from wastes and with an optimised use of the heat produced during the pyrolysis, from the others. Finally, limitations of biochar should be better highlighted, and their capacity to ensure that the carbon and nutrients ratios required for plant growth are respected need to be questioned. [France]
2692	17	3	17	4	This statement on biochar seems very confident given the diversity of biochar-technologies and the divergent literature on the subject. It is also not entirely consistent with the assessment in Figure SPM.3, and in conflict with the recently adopted update to the IPCC guidelines on GHG inventories chapter on Biochar. Please revise language here and throughout the SPM to make sure that statements on Biochar are consistent, balanced and reflect the latest scientific findings. [Germany]
7438	17	3	17	4	We welcome the revision to the text about biochar in Ch.5 (p.84 rows 16-19) but the SPM text is now inconsistent with the underlying chapter. Please replace "Adding biochar to soil sequesters carbon and can improve soil conditions in some locations." with "Adding biochar to soil has been proposed to sequester carbon, but there is considerable uncertainty about the benefits and risks of this practice." to match Ch.5. [United Kingdom (of Great Britain and Northern Ireland)]
7440	17	3	17	4	Section 4.10.5.2 mentions reports that finds negative or no impacts of biochar on soil. While this might be captured in the 'medium confidence' uncertainty, the negative or nil results ought to be highlighted, especially as the underlying chapter highlights that further research is done. [United Kingdom (of Great Britain and Northern Ireland)]
2694	17	4	17	4	The statement "can improve soil conditions in SOME locations" should please be more specific. What do you mean by "some locations"? [Germany]

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5146	17	4	17	4	The parts on biochar would be better to be removed because of its rare use in the world. If it should be inserted, other things such as charcoal, continuous application of organic matter or agricultural residue should be inserted. [Republic of Korea]
1546	17	4	17	5	Deep root perennial cropping systems cannot completely replace annual crops (wheat, maize, rice) to produce basic food and feed: what is the feasibility of this option? [Belgium]
880	17	4	17	6	This is a risky assumption. For instance, conversion of annual crops to vineyards often leads to increased soil erosion and to lower soil organic carbon stocks. Add the word "diversified" to the previous sentence to show that the conversion to perennial monocropping systems is not always a good solution: "Changing annual crops to deep rooted and diversified perennial systems, including agroforestry, ..." [France]
8612	17	5	17	5	should be 'reduce' not 'reducing'. [New Zealand]
4520	17	5	17	5	reducing --> reduce [United States of America]
8732	17	5	17	7	This paragraph makes an argument for deep rooted perennial cropping systems which have the potential to substantially reduce erosion and nutrient leakage while building soil carbon. Should the paragraph also include the need to use native/local seed which has the advantage of being adapted to local climatic conditions and beneficial for local biodiversity [Ireland]
8356	17	8	17	8	It does not seem justified to suggest that avoiding deforestation and (in particular) forest degradation would help meet (only) "short term" goals. The text should avoid creating a false dichotomy between the (supposedly short-term) benefits of avoiding deforestation/degradation versus the (longer-term) benefits of sustainable forest management. As confirmed by the following paragraph, they are inseparable. The forest cannot be sustainably (or otherwise) managed if it had been deforested. Moreover, degradation is a gradual process, thus reducing it can bring little benefit on the short run, but much more on the long run, by avoiding the gradual carbon stock loss and the long-term productivity loss of the forest. It may be best to delete the paragraph, as its valid messages are covered elsewhere in text. Alternatively, it should be reformulated, perhaps combined with B3.4. [European Union (EU)]
2698	17	8	17	8	"Avoiding deforestation and forest degradation" is a mitigation approach (acronym REDD+) with co-benefits (enhanced biodiversity ecosystem services, reduced vulnerability to climate change, wellbeing) which has short term mitigation benefits and long term benefits like resilience and also accompanying enhancement of carbon stocks. Therefore, please drop the reference to "short term goals", instead wording could be "can contribute already on a short term to reduce emissions, to conserve biodiversity and in the mid-to long term increase resilience and enhance ecosystem services" [Germany]
288	17	8	17	8	Suggest replacing "short term goals" with "green emissions reductions mitigation goals" in order to be consistent with Chapter4 Page65 line16. [Japan]
290	17	8	17	8	Suggest addressing not only "the avoiding deforestation and forest degradation" but "sustainable forest management", which is more comprehensive expression including the avoidance of deforestation and degradation, and the use of wood products contribute to the mitigation goals referring to 4.9 and 4.10. This line might be modified to "Sustainable forest management, which can prevent deforestation and degradation, and the use of wood products can contribute towards greenhouse emissions reduction goals, (...)". [Japan]

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8614	17	8	17	8	to avoid ambiguity, should specify which 'short term goals' are being referred to [New Zealand]
4522	17	8	17	8	Authors need to specify what the short-term goals are? It's not clear. [United States of America]
1270	17	8	17	11	This text 'Avoiding deforestation and forest degradation can help to meet short term goals , while sustainable forest management and agroforestry aimed at providing timber, fiber, biomass, non timber resources and other ecosystem services can provide long-term livelihoods for communities (high confidence)," implies that avoiding deforestation has only short-term benefits, and could be read as implying that it is better to replace primary forest with managed forest or agroforestry. Chapter 5 ES notes 'Lower carbon density in re-growing forests compared to carbon stocks before deforestation results in net emissions from land use change (very high confidence).' and 'Conversion of primary to managed forests..... result in greenhouse gas emissions (very high confidence)'. Section 2.7.1.2 notes that 'The mitigation potential for reducing and/or halting deforestation and degradation ranges from 0.4 to 5.8 GtCO2 yr-1 (high confidence)'. And D3.3 in this SPM assesses 'Delays in implementing response options to stem losses and reverse ecosystem changes (including reducing deforestation..) leaves these carbon-rich ecosystems at risk, with long-term consequences such as the potential irreversibility of the ecosystem change..'. Recommend revising B3.3 to give more emphasis to the benefits of avoiding deforestation for closer consistency with the assessment of Chapters 2 and 5. [Canada]
882	17	8	17	11	"can help to meet short term goals": Not clear, the same wording as in 4.9.4 should be used : "While reducing deforestation and forest degradation may help directly meet mitigation goals, sustainable forest management [and agroforestry] aimed at providing timber, fiber, biomass and non-timber resources [and other ecosystem services] can provide long-term livelihood for communities" [France]
5370	17	8	17	11	There would also be synergies with ecosystem restoration / biodiversity [Gambia]
2696	17	8	17	11	Please consider including the important statement "In areas where afforestation and reforestation occur on previously degraded lands, opportunities exist to restore and rehabilitate lands with potentially significant co-benefits (high confidence) that depend on whether restoration involves natural or plantation forests." from the TS P23 L47- P24 L3 in paragraph B3.3 of the SPM. [Germany]
2700	17	8	17	11	The use of "while" here indicates an opposition between "avoiding deforestation and forest degradation" and "sustainable forest management", what is not the case. Suggestion: replace "while" by "and". [Germany]
286	17	8	17	11	We would bring up the following two points regarding SPM B3.3. Readers may get the impression that "avoiding deforestation and forest degradation" cannot accomplish "long-term livelihoods". Therefore, we suggest revising this sentence; "Simple measures to avoid deforestation and forest degradation can help to meet short term goals, and its measures through sustainable forest management and agroforestry aimed at providing timber, fiber, biomass, non-timber resources and other ecosystem services can provide long-term livelihoods for communities (high confidence)". [Japan]

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7788	17	8	17	11	We propose that the sentence is changed eg. by substituting "can help to meet short term goals" by "can contribute to short and long term goals together with activities such as". The way the paragraph is drafted seems to imply that avoided deforestation and forest degradation only is related to short-term goals (through the use of "short-term" and "while"). It is important for the paragraph to recognize the contribution of natural forests, and of avoiding deforestation and forest degradation in the long term not just the short term. Eg. preserving carbon sinks contribute to the long term goal of the Paris agreement. Many indigenous communities are also dependent on their natural forest both in the short and the long term. Please also consider to include bioenergy (including BECCS) in the list in second half of the sentence. [Norway]
7442	17	8	17	11	Could you be clearer about the barriers, costs and incentives of these measures? Also it's not clear what the short term goals in line 8 are referring to (mitigation? Development?) or how measures such as sustainable forest management and agroforestry relate to climate mitigation and adaptation here. [United Kingdom (of Great Britain and Northern Ireland)]
7444	17	8	17	11	The key message of B3.3 is unclear - it should be rephrased to specify what 'short-term goals' are being referred to. Are these goals relating to climate change, or to land degradation? Are they national targets, international targets or goals of people or communities? [United Kingdom (of Great Britain and Northern Ireland)]
4524	17	8	17	11	The authors should clarify how avoiding deforestation and forest degradation differ from sustainable forest management. Avoiding deforestation and forest degradation can also help to limit climate change and support livelihoods in the long term. Suggest rephrasing. [United States of America]
4526	17	8	17	11	Does the long-term livelihoods assumption account for fire, flood, or other loss of commodity that was unplanned? [United States of America]
8952	17	8	17	14	Sections 3.3 and 3.4 on forest management. These two sections have to present facts and numbers. Currently these are just too general statements and much of help informing policy making. [Estonia]
8684	17	8	17	14	Could helpfully distinguish between exotic and indigenous afforestation. These two forest types are managed differently, and bring different risks and benefits [B3.3, B3.4] [New Zealand]
2986	17	9	17	9	Suggest emphasising the high quality timber to reduce likelihood of harvest for wood burning. Suggest change to "Avoiding deforestation and forest degradation can help to meet short term goals. Sustainable forest management and agroforestry aimed at providing high quality timber, fibre, biomass....." [Australia]
8686	17	9	17	10	Suggest naming some of the non-timber resources and other ecosystem services that forests can offer, including water regulation, habitat provision, and cultural services [B3.4] [New Zealand]
34	17	10	17	10	Add at the end of sentence: , as well as to provide long term mitigation options. Source:Land-based mitigation options cover up to a quarter of the total mitigation proposed by countries in Nationally Determined Contributions submitted under the Paris Agreement (medium confidence). {2.7.3, 4.6.3; 6.4.4} [Poland]
292	17	11	17	11	Suggest to add the sentence below, taken from the lines 32-34 on page 24 of the TS. Although the mitigation potential of the use of wood products is elaborated in the underlying chapter (CH4.9.4) as one of the important mitigation options, it is not referred to throughout the SPM. "Carbon storage in long-lived wood products and emission reductions from using wood products to substitute for emissions-intensive materials also contributes to mitigation objectives." [Japan]

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2702	17	12	17	12	Please change to "Sustainable forest management and agroforestry" as one is belonging to forestry and the other to agriculture; We suggest to cover the whole set of forest and trees outside of the forest definition (Sylvopastoralism, Agroforestry, trees in dryland, mangroves....) by the term forest landscape "Sustainable forest management, agroforestry and forest landscapes". [Germany]
1598	17	12	17	12	Is "Agroforestry" necessarily as a per se form of sustainable management ? Maybe better to rephrase with "including sustainable agroforestry"? [Italy]
884	17	12	17	14	"Sustainable forest management, including agroforestry, ": Please correct this sentence as agroforestry is not a forest management activity but an agriculture activity, as highlighted in figure SPM 3 page 21. [France]
1704	17	12	17	14	More practices of sustainable forest management might be highlighted. [Hungary]
7446	17	12	17	14	Again, this point doesn't really address climate change - it might be helpful to add in how SFM also contributes to climate mitigation or adaptation, as well as linking to the SDGs. [United Kingdom (of Great Britain and Northern Ireland)]
482	17	15	17	15	Replace "will occur" with "is projected to occur" [Ireland]
1600	17	15	17	15	It's unclear the link between "residual degradation" and "coastal erosion and degradation of permafrost regions". [Italy]
1272	17	15	17	16	Proposed edits for clarification purposes: "Residual degradation such as that due to coastal erosion and permafrost thawing will occur in some situations even with measures to address land degradation" [Canada]
8358	17	15	17	17	the sentence seems to imply that climate change is the reason behind coastal erosion; it would be useful to rephrase in a way that does not seem to imply that cc is the sole or main reason for coastal erosion. [European Union (EU)]
8360	17	15	17	17	The language of the paragraph would benefit from some clarification on the interpretation of "degradation". Coastal erosion degrades some land, but the main effect is the net loss of land to the encroachment of the sea. The thawing of the permafrost is a serious and adverse change to the region, but it often involves the expansion and aggradation of vegetation. Not all undesirable changes constitute "degradation". [European Union (EU)]
1274	17	15	17	17	The statement is unclear. In the case of permafrost, the adaptation might be to make the infrastructure (through its design) more resilient but the changes in permafrost conditions might still occur. It is therefore unclear whether the statement refers to adaptation to reduce permafrost degradation itself. Another key point is that the adaptation may on slow or reduce processes like erosion in permafrost thaw rather than completely prevent it so time is an important factor. The statement doesn't consider this aspect. [Canada]

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2704	17	15	17	17	<p>It does not seem appropriate to merge information on the fundamentally different processes of coastal erosion and permafrost thaw in the same paragraph without further specifications of the reasons and significance of their risks. CH4 P4 L 21-34 attributes these risks to climate change "Climate change exacerbates the rate and magnitude of several ongoing land degradation processes and introduces new degradation patterns (high confidence). Permafrost thawing due to warming (high confidence), and coastal erosion due to sea level rise and impacts of changing storm paths (low confidence), are examples of land degradation affecting places in which it has not typically been a problem." This text in CH4 does however not link to limits to adaptation, and the confidence statement for coastal erosion is only medium not high confidence as in the SPM.</p> <p>We suggest replacing B3.5 by CH4 P6 L 25-32 which gives more comprehensive information related to limits to adaptation "Even with adequate implementation of measures to avoid, reduce and reverse land degradation there will be residual degradation in some situations (high confidence). Limits to adaptation are dynamic, site specific and are determined through the interaction of biophysical changes with social and institutional conditions. Exceeding the limits of adaptation will trigger escalating losses or result in undesirable changes, such as forced migration, conflicts, or poverty. Examples of potential limits to adaptation due to climate change induced land degradation are coastal erosion where land disappears, collapsing infrastructure and livelihoods due to thawing of permafrost, and extreme forms of soil erosion." (The last sentence is included in SPM A6.2, but would better fit in the suggested B3.5 which should provide the full range of reasons for adaptation limits.). In addition, please reconsider the confidence statements in this paragraph taking into account the medium confidence in coastal erosion cited above. In addition, it would be useful to provide information on the level of risk for different levels of warming. [Germany]</p>
5148	17	15	17	17	In case of 'limits to adaptation', what should people do? This special report to address this kind of 'beyond adaptation situation'. [Republic of Korea]
1718	17	15	17	17	This is a useful and important point. It would be helpful to expand upon what is meant by "residual degradation" in this context. For example, how is the occurrence of residual degradation affected by the degree of climate change mitigation? [Saint Kitts and Nevis]
7448	17	15	17	17	This point could benefit from more clarity around the drivers of limits to adaptation - is the permafrost degradation occurring because of land degradation processes alone? Is there a confidence statement that can be associated with the second half of the paragraph? [United Kingdom (of Great Britain and Northern Ireland)]
7450	17	15	17	17	Residual degradation has not been defined and it is therefore difficult to understand what is meant by B3.5. If this statement is trying to say that there are limits to adaptation to land degradation, and therefore some areas of land will degrade even if response measures are implemented to their full extent, then this should be explicitly stated. [United Kingdom (of Great Britain and Northern Ireland)]
4528	17	15	17	17	This sentence lacks a confidence statement. [United States of America]
4530	17	15	17	17	Corrections need to be made for grammar and punctuation. Add an 's' to the end of situation, remove ")" after degradation. [United States of America]
558	17	16	17	16	bracket after 'land degradation' should be removed. [India]
8616	17	16	17	16	replace 'situation' with 'situations' [New Zealand]

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5150	17	16	17	16	land degradation) → Remove ')' [Republic of Korea]
1548	17	16	17	17	Repetition of the word 'scales': please find another word [Belgium]
294	17	17	17	18	Suggest adding Urban and peri urban agriculture, and more generally the implementation of urban green infrastructure, can contribute to climate change mitigation (medium confidence) as well as to adaptation (high confidence), including co-benefits for food security and reduced soil-water-air pollution.{Cross-Chapter Box 4: Climate Change and Urbanisation in Chapter 2, 4.10 Table 4.2, 4.10.1} [Japan]
8362	17	18	17	18	The aim given under B.3 is not "land degradation neutrality", but rather reducing and reversing land degradation. It is suggested to modify the wording accordingly [European Union (EU)]
1596	17	18	17	18	From a logical point of view, it would be better to change "avoid and reduce" with "reduce and avoid" [Italy]
1276	17	18	17	20	This sentence talks about "adoption of sustainable land management (SLM)" as if it is an easily available option--it is recommended that this statement should acknowledge the difficulties in achieving true SLM. [Canada]
886	17	18	17	20	We suggest to add "measures to ensure the conservation of non-degraded lands" in this list. [France]
2706	17	18	17	20	Is it correct that "adoption of SLM" is the only possible measure that can "avoid and reduce land degradation"? If not, please mention other measures as well. [Germany]
4532	17	18	17	21	These two sentences lack confidence statements. For clarity, suggest removing either "commonly" or "also". [United States of America]
7790	17	18	17	23	Achieving land degradation neutrality is important and keeping the reference to this is important. Could it also be strengthened? With reference to measures for restoration, land degradation improvement and more measures to avoid degradation? [Norway]
7792	17	18	17	23	B3.6 is good and should be kept. [Norway]
5152	17	18	17	23	The policy regarding land degradation neutrality in field should be introduced in detail. German's eingriffsregelung as an example of sustainable land management policy and CBD's offset policy should be included in proper chapters. [Republic of Korea]
120	17	18	17	23	The scale considered when talking about degradation neutrality measures is of great importance, and therefore it should be mentioned in this paragraph. The achievement of land degradation neutrality by a whole country could lead to soil erosion and degradation in most vulnerable regions and soil gains in the most favourable lands of the same country. [Spain]
8364	17	20	17	20	insert after "degraded" land: "and ecosystems [European Union (EU)]
8366	17	20	17	21	You could also add adaptation and food security to the mitigation benefits. [European Union (EU)]
8368	17	21	17	21	include after "mitigation": "and adaptation" [European Union (EU)]
888	17	21	17	23	"provides impetus": Please reconsider this wording, as it could be perceived as policy-prescriptive. [France]
7452	17	21	17	23	It's not really clear what this sentence means so in the interests of clarity I suggest removing it, if the rest of B3.6 is strengthened related to climate change (and similarly the rest of B3). [United Kingdom (of Great Britain and Northern Ireland)]
8370	17	22	17	22	include after ... to address land and ecosystems degradation and climate change [European Union (EU)]

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8372	17	24	17	24	Delete the word "to". [European Union (EU)]
486	17	24	17	24	The "25-30%" figure should be consistent with figures used earlier in the document [Ireland]
8916	17	24	17	24	Indicate the absolute value of the total GHG emissions [Liechtenstein]
8840	17	24	17	24	Indicate the absolute value of the total GHG emissions [Switzerland]
1670	17	24	17	26	<p>The calculation method for this conclusion, which is inconsistent with the 2006 Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 Guidelines), does not meet the relevant limits defined in the 2006 Guidelines. The calculation of agricultural greenhouse gas emissions made under the 2006 Guidelines only considers the process of agricultural production, while that of greenhouse gas emissions from the agricultural system here includes the processes of production, processing, transportation, storage and consumption across the industrial chain, which would result in repeated calculation of greenhouse gas emissions in different fields. Under such circumstances, the formulation that greenhouse gas emissions from the food system accounting for about 25-30% of the global total emissions tends to mislead policy makers. Besides, there is no comparability with greenhouse gas emissions from other systems. The author team is suggested to make improvements.</p> <p>In this section, in addition, the greenhouse gas emissions from agricultural production and land use are given in lines 26-28, and the ratios of supply chain activities, food losses and waste to the food system in terms of emission are given in lines 29-30. It is suggested to reunify the expression of a conclusion with a single emission quantity or emission ratio. [China]</p>
4534	17	24	17	26	KEY ISSUE [FLUXES]: The B4 headline statement is worded in a confusing way that appears to contradict other data used in the SPM. As written, it appears that the global food system contributes 25-30% of total GHG emissions. Elsewhere the SPM says that AFOLU contributes 22% of total emissions. Suggest shifting "... contributes to approximately 25-30% of total GHG emissions ..." to the end of the sentence, thereby defining what is actually in the global food system. [United States of America]
8374	17	24	17	32	It is confusing to have this mix of absolute and relative (%) contributions. How much does 25-30 % and 5-10 % correspond to? [European Union (EU)]

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2708	17	24	17	32	<p>The first three sentences of this statement contain figures of GHG emissions and are not addressing aspects of response options directly as it is done in all other headline statements of section B. Since GHG emissions are addressed in Section A, we request the authors to revise whether these three sentences better fit in section A, e.g. in A4 as individual statement on emissions from the food sector. We would also like to point out that the sub statements in B4 are only cursorily addressed in the last sentence. We suggest that the headline statement should be more specific and address the main results of supply-side and demand-side measures. Please consider adding the following statements:</p> <ol style="list-style-type: none"> 1) "Diversification in the food system is a key strategy to reduce risks from climate change (medium confidence)." (B4.1) 2) For supply-side practices, "significant synergies exist between adaptation and mitigation, for example through sustainable land management approaches (high confidence)". (B4.1) 3) Shifting to plant-based diets "can simultaneously reduce GHG emissions and increase resilience to climate change" and present major opportunities for "improving health outcomes". (B4.2) 4) "Reduction of food loss and waste can lower GHG emissions and contribute to adaptation through reduction in additional land area needed for food production and associated food system vulnerabilities (medium confidence)." (B4.3) 5) Dietary change and waste reduction "are necessary for achievement of a sustainable food system" and "only adopting a 'flexitarian diet' as a global average, would climate change be limited to under two degrees." (Ch. 5 p. 89 ll. 25-31). This is supported by more recent evidence in FAO projections showing that "rebalancing diets is key to increasing the overall sustainability of food and agricultural systems world-wide." (Ch. 5.4 p. 66 ll. 10-14). <p>We also suggest to point out in the headline statement summarizing these options that such measures neither compete with other measures (e.g. no extra land-demand) nor feature adverse side-effects (TS p. 34 ll. 35 - 42) and therefore their mitigation potential can be added up. We request to include the aggregated total mitigation potential of all demand-side and supply-side measures, which might be in the range of 3 - 16 GtCO₂eqyr⁻¹ (c.f. TS.6 and SPM p. 17 l. 41).</p> <p>Please see also our overall comments to demand-side measures of the food system and our specific comments to the individual sub statements. [Germany]</p>
2710	17	24	17	32	<p>We are concerned that the impacts of deforestation free supply chains are underestimated in this report probably due to a lack of research published in peer reviewed literature, but there are important (initiatives like TFA 2020, Consumer Goods Forum, Cerrado Manifesto, action plans to reduce imported deforestation by France, California, possibly EU). [Germany]</p>
560	17	24	17	32	<p>Provide the percentage of GHGs from different components of food systems. [India]</p>
296	17	24	17	32	<p>The boundary of global food system is ambiguously described. These values of emissions depend on the definition of the food system. More clarifications of the boundary would be needed. [Japan]</p>
8000	17	24	17	32	<p>Please add last two sentences of B4.1 to the bold text [Netherlands]</p>
7928	17	24	17	32	<p>Please consider to clarify if "the global food system" here includes fisheries and fish farming. Please also consider to give the absolute number for the total GHG emissions of the food system in addition to the percentage (Ref. Table 5.4). The three components and total GHG emissions of food system should be expressed by the same unit, % or Gt CO₂eq yr⁻¹. [Norway]</p>

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124	17	24	17	32	It might difficult for the reader to understand the exact contributions of "agricultural production", "associated land use change", and "supply chain activities and food loss and waste", as the first two items are expressed as estimated total emissions while the latter is expressed as percentage. [Spain]
7454	17	24	17	32	In the headline B4 statement, it would be helpful to either state the current level of global emissions, or the level of emissions that the 25-30% figure corresponds to, or to phrase the emissions from agricultural production and associated land use change in terms of percentages (as has been done with supply chain activities and food loss and waste), as it is currently difficult to compare these numbers. [United Kingdom (of Great Britain and Northern Ireland)]
4536	17	24	17	32	A great deal of talk is given to the perils of a globally integrated food system. And within that discussion, and indeed within this report (Chapter 5), the suggestion is made that the GHG costs of food transport are so excessive as to virtually require local production of agricultural products to take serious steps toward meeting emissions goals. However, this paragraph and the chapter upon which it is based then fail to call out the actual magnitude of that contribution: 2-3% of the overall GHG footprint of the food system. Transport is an almost trivial contributor to the overall GHG picture of the food system alone. Yet authors fail to report on this, in favor of stating that local production – with all of the environmental and economic costs of producing unfamiliar products in a localized area – is somehow favorable? There are certainly isolated situations where that is the case. Food security includes the issue of food preference, which is locally determined, and indigenous or other communities that wish to maintain economic or cultural independence should be empowered to do so. The suggestion in Chapter 5 (page 11) that this statement is (partially) based upon – that is, that local production is not subject to instabilities – is demonstrably untrue. Extreme events routinely decimate and eradicate whole production seasons around the world every year. The authors need to rebalance this discussion to better reflect the available data so that responsible management decisions lead toward better GHG emissions outcomes, as well as better food security outcomes. [United States of America]
1692	17	24	17	44	In paragraph B4. the agricultural related emissions would be more comprehensible if there was a chart or diagram wich contained all the related data in a detailed way. [Hungary]
2712	17	26	17	28	Please give % also for agr. production within the food system and land use change (as in line 24: 25 - 30 % of GHG emissions). [Germany]
7456	17	26	17	30	The way this sentence is written currently sounds as if emissions from food loss and waste are additional to those from agricultural production and land use change, rather than being a subset of them. Point B4.3 (page 18 lines 10-11) is much clearer on this - could you rephrase this sentence to make this clear e.g. "Reducing food waste and loss can reduce emissions, which combined with supply chain activities contribute to 5-10% of food system emissions". [United Kingdom (of Great Britain and Northern Ireland)]
5154	17	28	17	28	CO2 → CO ₂ [Republic of Korea]
8380	17	29	17	29	terminology not consistent 'supply chain management' vs earlier 'value-chain management'. Use one sets of terminology and explain what it includes upon first mentioning [European Union (EU)]
488	17	29	17	29	Food system GHG emissions should be expressed in GtCO ₂ to be consistent with the rest of B4 [Ireland]
890	17	29	17	30	Please check the consistency with lign 11 p 18 B4.3, and avoid redundancy. [France]

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7458	17	29	17	30	Supply chain activities and food loss and waste are quite different categories so it is strange to see their emissions being aggregated together. Please separate out. [United Kingdom (of Great Britain and Northern Ireland)]
4538	17	29	17	30	KEY ISSUE [ALIGNMENT/ACTION]: The estimate that supply chain activities and food loss and waste contribute 5-10% of food system GHG emissions is not consistent with that provided in B4.3. In general, this estimate seems low given the commonly cited statistic that one-third of all food produced is wasted. Some further discussion may be warranted. [United States of America]
8008	17	30	17	32	Replace last sentence of B4 with last two sentences of B4.1 "Total potential (...) management approaches (high confidence). " [Netherlands]
4540	17	32	17	32	Maybe add sentence along the lines of "Given the very large GHG emissions associated with land-use change, even modest reductions in this source of GHGs could be beneficial while also preserving natural habitats." [United States of America]
5508	17	33	17	33	supply side and demand side... Not clear what is this scope (present in many other paragraphs as well...). If it is related to food supply and demand, better be more direct: agricultural production, on the one hand, and food demands on the other. [Brazil]
892	17	33	17	33	Please consider rewriting this sentence. It should be written in another way as the solutions proposed do not all bring synergy between mitigation and adaptation, maybe rephrase as "that can contribute to adaptation and/or to mitigation" [France]
8618	17	33	17	35	Slight rewording required -- as 'reductions in N2O emissions from fertilisers' and 'reductions in CH4 emissions from paddy rice' are not 'practices', per se (at least not in the same way that 'erosion control' and 'genetic improvements' are). [New Zealand]
2716	17	33	17	44	How do the various approaches listed relate to SLM? The last sentence does not help in this regard. Please revise this paragraph, possibly organising the narrative around SLM. Please note also our suggestion for a box on "core concepts central to this special report" with the suggestion to explain SLM and its relation to other concepts of sustainable integrated agricultural practices. [Germany]
2718	17	33	17	44	Please add sentence "technological innovation, precision farming and circular economy offer windows of opportunity for GHG mitigation" (e.g. CH5, P95, Box 6 and CH5, P105, table 5.6 and CH5, P73, section 5.5.1.4). [Germany]
7796	17	33	17	44	B4.1 is good and should be kept. Please consider also to address the fact that agricultural practices with decreased emissions can be good economy for farmers. [Norway]
7460	17	33	17	44	B4.1 comes across as a list of policies, without any useful key information coming out of it. It would be more useful to analyse any trends within those policies, such as which have the highest mitigation potential, synergies with addressing other land challenges, or co-benefits with wider societal priorities or which can be scaled up most effectively or which have the highest mitigation potential etc [United Kingdom (of Great Britain and Northern Ireland)]

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4542	17	33	17	44	Food loss in the developing world is very important, as the authors have noted, and occurs largely inside the "farm-gate." A change in weather can mean that a ripe crop is lost before it can go to market - e.g., heavy rains just before harvest can mean that there is no harvest, or a very limited one, leading to the loss of an entire season's resources. More limited food production types can make better use of mechanization. Mechanization can speed planting, harvest, and a host of other management activities, leading to better food security and sustainability outcomes. Diversification reduces some kinds of risks. Specialization reduces other kinds. Additional analysis in this discussion and the underlying material is necessary prior to arriving at this conclusion, which has failed to consider the range of adaptation options. [United States of America]
2720	17	34	17	34	In general, a better nitrogen use efficiency would be more effective than only focussing on N2O emissions. Therefore, please mention nitrogen fertilisation management, see FAQ6.1 and change the sentence to "reduction in N2O emissions from fertilizers and improved nitrogen fertilisation management". [Germany]
8382	17	36	17	36	List of livestock options seems quite incomplete- food additives, vaccination, animal breeding, and simply improved health of the livestock are notably missing. [European Union (EU)]
894	17	36	17	36	We believe herd management is a good pool of practices that can lead to mitigation, and propose to add in B5.2 of the SPM that Herd management can also be improved (decreasing birth mortality, improving sanitary conditions and health, herd renewal...) in order to decrease unproductive periods, when GHG are emitted with no outcome), and there are also some genetic responses with the choice of adapted races for the animals, and also for the species used as feed (grazing management, protein content and equilibrium of the amino acids etc.). Some of these options are present in the chapter 6 (6.3.1.3), but not all of them, 6.3.1.3 could be completed. For some solutions proposed in this paragraph to reduce emissions from enteric fermentation, there is few evidence on the long term effects on the animals and on the environment, on the costs, on the social acceptance and regulatory authorisations (for example ionophores / antibiotics, propionate enhancers, archaea inhibitors, nitrate and sulphate supplements,; microbial technology such as archaeal vaccines, methanotrophs, acetogens, defaunation of the rumen, bacteriophages and probiotics). We propose to have these practices appart from the others, and with a warning message on the possible side effects for the animals and the environment. [France]
2722	17	36	17	36	"genetic improvement" - if this refers to genetically modified organism (GMO), please add information on the potential risks of such technologies. [Germany]
2724	17	36	17	36	"[...], options include better grazing AND FEEDING management, [...]" as shown in Fig. 5.10, CH 5, P72. Please modify. [Germany]
8640	17	36	17	36	Presumably the reference to heat and drought tolerance refers to plants and not animals [New Zealand]
7798	17	36	17	36	Please clarify what genetic improvement does refer to. Does it include genetic modification? Please consider to elaborate or delete. [Norway]
8724	17	36	17	37	improved animal health which aids overall performance and directly affects the output of the animal should be included here [Ireland]
4544	17	37	17	38	It is unclear what is meant by this sentence. Is it referring to absolute emissions reductions from reduced emissions intensity only occurring in scenarios of stable herd size? This should be more clearly articulated. [United States of America]
8918	17	37	17	39	It is not clear what is meant by "appropriate governance for total production" [Liechtenstein]

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8842	17	37	17	39	It is not clear what is meant by "appropriate governance for total production" [Switzerland]
7462	17	37	17	39	I don't really understand what this sentence means. Could you please clarify what is meant by "appropriate governance for total production" and why this needs to be accounted for to ensure absolute reduction in emissions [United Kingdom (of Great Britain and Northern Ireland)]
4546	17	37	17	39	This is unclear. How governance is connected? [United States of America]
8384	17	38	17	39	Not clear what is meant by "provided there is appropriate governance for total production". Presumably refers to somehow preventing increased demand through rebound effects. Appropriate governance is important in general, but it seems to apply similarly to many (if not most) other land-based measures. It may be better to address it more generally, not only in the context of livestock. [European Union (EU)]
2726	17	38	17	39	What does "provided there is appropriate governance for total production" mean? "Provided that total production does not increase"? Please explain. [Germany]
4838	17	38	17	39	Delete ", provided there is appropriate governance for total production" [Iran]
4548	17	38	17	39	This sentence is a little indirect. Consider: "Reductions in GHG emissions intensity from livestock can support absolute reductions in emissions, provided there that appropriate governance measures moderate total livestock production increases (medium confidence)." [United States of America]
4550	17	38	17	39	The reference to appropriate governance for total production is unclear. Suggest rephrasing. [United States of America]
490	17	39	17	39	Should refer to 'production systems' rather than 'total production' [Ireland]
896	17	39	17	40	We suggest to put this sentence in the subsequent paragraph B4.2 to avoid repetition and also to avoid putting too much ideas in a same paragraph. [France]
1602	17	39	17	40	The sentence "Diversification in the food system is a key strategy to reduce risks from climate change" is more related to adaptation, but it is placed in the middle of a mitigation issues. Maybe it would be better to move the sentence elsewhere. [Italy]
7464	17	39	17	40	What is meant by "diversification in the food system" in the context of this paragraph (i.e. supply side)? Is it counted in the mitigation potential in the next sentence? Is it the same thing as diversification of diet referred to in B4.2? Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]

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4552	17	39	17	40	Diversification is one strategy that works under some circumstances. Specialization is also effective, and carries with it different risks but also different opportunities for sustainability. Multiple crop and animal production types can mean that under stress or extreme conditions, while some crops may fail, others will survive, and some food will continue to be produced. As the authors have effectively stated. But each of those production types require different inputs, different management strategies, and, overall, are more expensive (both monetarily, time-wise, labor-wise, and so on) than more limited production schemes. A more limited range of production types requires fewer inputs and lower labor costs, though it can be more subject to particular stresses or extremes, leading to widespread failure under certain circumstances. These differing strategies have different risk profiles under the rubric of sustainability (which has three definitional pillars: environmental, social, and economic). The multi-type that the authors promote in this report limits farm-household income. Globally speaking, farmers are (ironically) among the most vulnerable to food insecurity, and income (for education, for weathering bad years, for expanding operations, for trying different crops or animal production types, for value-added activities) therefore must be a central consideration. The more limited production type tends to provide higher incomes for farmers on average. The risk of catastrophic crop failure is of course higher, but the economic capacity to weather such a failure is also higher. There is a much more complex and important analysis here than what is currently presented by the summary or the underlying material, and the conclusions presented here are unsupportable in its absence. [United States of America]
900	17	40	17	42	"livestock activities": It is agreed that red meat consumption needs to be reduced. A point should nevertheless be raised as reducing livestock may also induce the destruction grassland / permanent pasture altering soil carbon stocks. It will reduce carbon sequestration... [France]
2728	17	40	17	42	How is the carbon price linked to the mitigation potential of these activities? Please explain. [Germany]
1444	17	40	17	42	Does the "total potential" also include demand side and dietary changes? If not please specify they are excluded [Luxembourg]
7466	17	40	17	42	There needs to be significantly more detail on the sentence relating to prices for mitigation from crop and livestock activities. In particular, what kind of price is this (is it a marginal abatement cost? If so, this should be stated explicitly), and secondly do these prices take into account the benefits of mitigation from avoided climate impacts and wider co-benefits? [United Kingdom (of Great Britain and Northern Ireland)]
4554	17	40	17	42	It may also be helpful to provide an estimate of mitigation potential for later time periods, e.g., 2050. [United States of America]
8386	17	41	17	41	It would seem appropriate to replace "prices" with "costs". Prices assume a market mechanism, which may not be essential (or even possible) for many activities considered, whilst cost-effective mitigation can also be attained through other means. If it refers to assumed carbon values in models, it should be made explicit. [European Union (EU)]
5156	17	41	17	41	CO2 → CO2 [Republic of Korea]

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898	17	41	17	42	According to Chapter 5, this range is a direct quotation from IPCC AR5, not a new finding of this special report. (a) This should be made explicit. And (b) it should be explained why this range is still considered valid. This matters because 1.5-4 GtCO ₂ represents from 30% to 80% of current emissions from agricultural production (5.0 to 5.5 GtCO ₂ , as indicated in B4). In other words, this range indicates that it is possible to reduce emissions from agricultural production worldwide by up to 80% IN NO MORE THAN 10 YEARS ("by 2030") at price levels ranging from 20 to 100 USD/tCO ₂ . If valid, this is a very important message about the potential for mitigation in the short term. [France]
5158	17	42	17	42	/CO ₂ → CO ₂ -1 [Republic of Korea]
7468	17	42	17	42	Could you provide some clarity around what this range is dependent on? And if providing costs, could you also provide balance by giving examples of co-benefits of these strategies? [United Kingdom (of Great Britain and Northern Ireland)]
2990	17	42	17	43	Suggest the figure should be modified to reflect the text: it is an accurate statement (supported by Chapter 6) and is not reflected in Figure SPM.3 (Page 21). [Australia]
5372	17	42	17	44	Could the "diversification of diets" be classified as an adaptation measure, as it is mentioned as a potential way to increase resilience to climate change? [Gambia]
2988	17	24	18	11	Suggest clarifying the percentages for food related emissions: 5-10% in B4, but 8-10% in B4.3. [Australia]
8762	17	24	18	11	There seem to be two contradictory statements in paragraph B4 on page 17 and paragraph B4.3 on page 18: First, it says: "Supply chain activities and food loss and waste contribute to 5-10% of total food system GHG emissions" and second says: "Combined food loss and waste amount to a third of global food production (high confidence), contributing to 8–10% of total food system emissions (medium confidence)." Please clarify. [Chile]
8376	17	24	18	15	B4 - The figure that 25-30% of total GHGs come from the food system is similar to the A4 finding that AFOLU accounts for 22% of emissions. Is possible to clarify the difference between these figures? It should be clarified what emissions are considered under the "global food system" in B4, and they should be systematically addressed in the subsequent paragraphs. E.g., transport and packaging are mentioned in B4, but there is no reference to their emissions later, or how they could be reduced. Refrigeration is mentioned in B4.3, but only in the sense that its absence contributes to food loss, without noting how emissions from refrigeration could be reduced. [European Union (EU)]
2714	17	29	18	11	B4 states "Supply chain activities and food loss and waste contribute to 5-10% of total food system GHG emissions (medium confidence)." and B4.3 "Combined food loss and waste amount to a third of global food production (high confidence), contributing to 8–10% of total food system emissions (medium confidence)." Please ensure consistency. [Germany]
7794	17	33	18	15	Please consider to include numbers for the different components of the food system that are described in Table 5.4, agriculture (6.2 ± 1.9, 10-12%), land use (4.8 ± 2.4, 8-10%) and Beyond farm gate (3.8 ± 1.3, 5-10%). [Norway]
126	17	41	18	7	The comparison of the mitigation potentials of "crop and livestock activities" with "dietary changes" is problematic as 2030 is the projected year for the first category while 2050 is used for the latter. [Spain]
8688	17	44	18	3	Useful, please retain [New Zealand]
8388	18	1	18	1	Make clear that this statement is about human diets (not animal). [European Union (EU)]

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Comment No	From Page	From Line	To Page	To Line	Comment
1278	18	1	18	1	The phrase "diversification of diets" could mean many different things, some of which could decrease GHG emissions (e.g. diversifying from a high meat diet to include more plants) whereas some could increase GHG emissions (e.g. diversifying from a mainly plantbased diet to one that included a lot more meat). explain what is meant by diversification in this case. [Canada]
8390	18	1	18	2	the report uses the wording 'healthy and sustainable diets' to refer to low emission diets (low-meat diets). That is the commonly accepted term now. However, here the authors use 'diversification of diets'. This is incorrect, in a lot of contexts diversification of diets leads to higher emissions. Strong recommendation to delete this first sentence and stick to 'healthy and sustainable diets' (and moving to: adjusting current diets towards recommended healthy and sustainable diets). [European Union (EU)]
5374	18	1	18	2	twice "at scale" [Gambia]
2730	18	1	18	2	The diversification of diets does not only support the resilience, but is a requirement to adapt to climate change, as discussed in CH 5.3.4: "Supply-side adaptation measures alone will not be sufficient to sustainably achieve food security under climate change" (CH5 P55 L12-14). We strongly suggest to amend the wording accordingly, clarifying the crucial role of dietary changes for adaptation and sustainable food security. [Germany]
8920	18	1	18	2	"Diversification of diets" might actually also negatively contribute to climate change, such as in the case of an increased consumption of animal products [Liechtenstein]
8844	18	1	18	2	"Diversification of diets" might actually also negatively contribute to climate change, such as in the case of an increased consumption of animal products [Switzerland]
8392	18	1	18	7	B4.2. One the SPM's most striking findings is the difference in resilience in SSP1 scenarios compared to SSP3 (see Fig SPM-2). Is the dietary change mentioned in B4.2 an important contributor to this? If so, it should be stated more explicitly. [European Union (EU)]
2992	18	1	18	7	Suggest reconsidering the statement: It seems somewhat contradictory to assume that diversification of diets, which here would necessarily mean an increase in the area of land required to supply the demand, would be conducted sustainably and result in GHG emissions, whereas for bioenergy systems the underlying assumption is that the modelled expansion of land required would most likely result in negative GHG outcomes. This approach does not seem to be supported by robust science. [Australia]
5510	18	1	18	7	diversification of which diets? the world has over 7 billion people, living in 5 continents, with an incredible diverse set of diets , based on local production characteristics, as well as traditions. All diets should change and be diversified? Or is there a specific region or culture that should make changes? when talking about dietary changes, what the studies show regarding impact on traditions and cultural identities, as well as traditional and characteristic landscapes usually shaped towards specific foods, livelihoods, cultural identities...? [Brazil]
902	18	1	18	7	It is unclear whether the mitigation potentials outlined in sections B41 and sections B42 can be added up or not. If it is not possible to add them up (for example, because they partly overlap), this should be made explicit. Otherwise, it is likely that some reader might conclude that 2.5-4.0 with 1.8-3.4 and conclude that one can reduce emissions by 4.3-7.4 by 2050 at 20-100USD/tCO2 prices. [France]

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Comment No	From Page	From Line	To Page	To Line	Comment
1606	18	1	18	7	In order not to miss the opportunity to provide policy makers with concrete indications of impacts and possible response measures, the quantification of potential reductions for each type of diets should be provided. We suggest to keep the former point B5.4 of the First Draft for Expert and Government review of the SPM: "Demand-side changes, e.g., in food choices and consumption, can help to achieve global GHG emission reductions and improve human health (robust evidence, high agreement). Diets with low embodied GHG emissions tend on average to be healthier and have smaller land footprints. By 2050, the B5.4. Demand-side changes, e.g., in food choices and consumption, can help to achieve global GHG emission reductions and improve human health (robust evidence, high agreement). Diets with low embodied GHG emissions tend on average to be healthier and have smaller land footprints. By 2050, the mitigation potential of dietary changes relative to business-as-usual food demand projections ranges from 2.7 - 3.4 Gt CO2eq yr-1 for Mediterranean diets, 3.6-6.4 Gt CO2eq yr-1 for healthy diets, 4.3-5.3 Gt CO2eq yr-1 for vegetarian diets and 5.2-5.7 Gt CO2eq yr-1 for a flexitarian diet with limited meat and dairy products (robust evidence, high agreement). {1.4.2, 5.5.2}" [Italy]
7800	18	1	18	7	Please include information on the mitigation potential in various diets found in 5.5.2.1, figure 5.12. [Norway]
7470	18	1	18	7	Again it would be good to balance the point around costs by inclusion of some of synergies and co-benefits relating to dietary change - this would be a good opportunity to link to SPM Figure 1 which mentions obesity briefly, and could strengthen these overall synergistic links. [United Kingdom (of Great Britain and Northern Ireland)]
7472	18	1	18	7	B4 does not adequately highlight the incredibly important messages in the underlying report regarding the impact of high levels of consumption of red meat and dairy products on greenhouse gas emissions (and also on health). While it talks in a vague sense about healthy/sustainable diets (without specifying exactly how they are healthy/sustainable), it fails to convey the single most important message of this section which is that dietary shifts to diets lower in meat (especially red meat) and dairy are one of the most effective actions individuals can take to combat climate change. There are a number of quotes from the underlying report which could help emphasise this such as 1) "...[O]nly by adopting a "flexitarian diet", as a global average, would climate change be limited to under two degrees. Their definition of a flexitarian diet is fruits and vegetables, plant-based proteins, modest amounts of animal-based proteins, and limited amounts of red meat, refined sugar, saturated fats, and starchy foods."; 2) "The emissions intensities of red meat mean that its production has a disproportionate impact on total emissions (Godfray et al. 2018). For example, in the US 4% of food sold (by weight) is beef, which accounts for 36% of food-related emissions (Heller and Keoleian 2015)."; 3) For example, halving consumption of meat, dairy products and eggs in the European Union would achieve a 40% reduction in ammonia emissions, 25–40% reduction in non-CO2 GHG emissions (primarily from agriculture) and 23% per capita less use of cropland for food production, with dietary changes lowering health risks (Westhoek et al. 2014b). In China, diets were designed that could meet dietary guidelines while creating significant reductions in GHG emissions (between 5% and 28%, depending on scenario) (Song et al. 2017). Changing diets can also reduce non-dietary related health issues caused by emissions of air pollutants; for example, specific changes in diets were assessed for their potential to mitigate PM2.5 in China (Zhao et al. 2017b). Ideally some of these messages should also be elevated into the headline statement. [United Kingdom (of Great Britain and Northern Ireland)]

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4556	18	1	18	7	<p>KEY ISSUE [FLUXES]: Chapter 5 points to the potential for vastly reducing GHG emissions by switching to insect-based diets. That could be explicitly mentioned here:</p> <p>1) p. 5-7, lines 5-7: ""Meat analogues such as imitation meat (from plant products), cultured meat, and insects may help in the transition to more healthy and sustainable diets, although their carbon footprints and acceptability are uncertain. {5.5.2, 5.6.5}""</p> <p>2) p.5-80, lines 8-18 [5.5.2.4 ""Insect-based diets"" ""Clearly increasing share of insect-derived protein has the potential to reduce GHG emissions otherwise associated with livestock production."" That point should come through in the Executive Summary.</p> <p>In addition, there is no mention of the mechanism for GHG reductions. It is not only that insects are not ruminants. It is also that rearing insects would not require clearing forests, and in fact could free up land that is otherwise caught in the competition between food production, forest conservation, and bioenergy production. Although not yet mainstream in terms of global caloric production, insect-based protein sources could be a game-changer and the reasons for that should be laid out more explicitly. [United States of America]</p>
8922	18	2	18	5	In addition to the examples given of "healthy and sustainable diets", criteria of regionality and seasonality should be considered and adequately applied [Liechtenstein]
7802	18	2	18	5	In this paragraph, please look closely into how this sentence is phrased. We feel that the GHG emissions from animal -sourced products are not only related to whether it is produced in low energy systems, but also to the type of animal. Eg. chicken vs cattle. Furthermore it may as well be related to the where the food is produced. At the same time we feel that the healthiness of the food is not so much related to whether the production is energy intensive or not. Maybe the point here is to underline that there are consumption patterns that can combine climate mitigation with health benefits. [Norway]
8846	18	2	18	5	In addition to the examples given of "healthy and sustainable diets", criteria of regionality and seasonality should be considered and adequately applied [Switzerland]
1282	18	3	18	3	Recommend adding an example of what are "animal-sourced produces" as readers may not be familiar with the phrase. [Canada]
52	18	3	18	3	The sentence states: "Consumption of healthy and sustainable diets, such as those based on coarse grains, pulses, fruits and vegetables, nuts and seeds, and animal-sourced produces produced in low-energy intensive systems, presents major opportunities for reducing GHG emissions from food systems and improving health outcomes (high confidence)." Is it in general true that animal-sourced produces presents a major opportunity for reducing GHGs ? [Denmark]
906	18	3	18	3	The use of the word "legumes" instead of "pulses" is likely more common and easier to understand by a wide audience. [France]
1608	18	3	18	3	Not clear the word "produces" here. Maybe it is a typo and should be deleted ? [Italy]
4558	18	3	18	3	"animal-sourced produces" should be "animal-sourced products" [United States of America]

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1280	18	3	18	4	This example of a diet 'which presents major opportunities for reducing GHG emissions from food systems and improving health outcomes' based on 'animal-sourced produces produced in low-energy intensive systems' is not consistent with the assessment in the underlying chapters. Chapter 5 indicates that such diets are low in animal-sourced foods. Chapter 5 ES states 'Consumption of healthy and sustainable diets presents major opportunities for reducing GHG emissions from food systems and improving health outcomes (high confidence). Examples of healthy and sustainable diets are high in coarse grains, pulses, fruits and vegetables, and nuts and seeds; low in energy-intensive animal-sourced and discretionary foods (such as sugary beverages); and with a carbohydrate threshold.' Section 5.5.1 begins 'A systematic review found that higher consumption of animal-based foods was associated with higher estimated environmental impact, whereas increased consumption of plant-based foods was associated with an estimated lower environmental impact (Nelson et al. 2016). Assessment of individual foods within these broader categories showed that meat – especially ruminant meat (beef and lamb) – was consistently identified as the single food with the greatest impact on the environment, on a global basis, most often in terms of GHG emissions and/or land use.' This statement should be revised to be consistent with the underlying assessment. [Canada]
904	18	3	18	4	"low-energy intensive systems": it should be clearly defined, and the benefits from less intensive but more agroecological systems with all the benefits for biodiversity, resilience, among others, should also be presented here. [France]
2732	18	3	18	4	"animal-sourced produces produced in low-energy intensive systems": such systems may use less energy, but often emit more methane, e.g. cattle grazing systems. Further, these systems tend to occupy large land areas with comparatively low food output. Extensive (low-input) beef production systems (or other ruminants) use very few external energy but are among the systems with the highest emissions per kg of protein output, due to methane and N ₂ O emissions, see CH2-5, 7-9 in combination with CH2-86, 37-41. Therefore, please add "and low in methane emissions" so that the sentence reads "animal-sourced produces produced in low-energy intensive systems and low in methane emissions, ...". [Germany]
492	18	3	18	4	Either use "low GHG intensity" instead of "low energy intensive systems" or give a definition, particularly in reference to livestock [Ireland]
1784	18	5	18	5	delete "economic". It only confused the sentence. [Denmark]
7474	18	5	18	5	Could you please clarify for the reader what "economic mitigation potential" means [United Kingdom (of Great Britain and Northern Ireland)]
4560	18	5	18	5	Improving "human" health outcomes [United States of America]
8394	18	5	18	7	B4.2 Is the mitigation potential from dietary change additional to the 1.5-4 GtCO ₂ e potential mentioned in B4.1? If so, this is an important finding (up to 7 GtCO ₂ e from the food system with sustainable development co-benefits). Perhaps these two figures (and their implications) could form a standalone paragraph exploring how great is this potential and what would be the pros, cons & implications of pursuing it. [European Union (EU)]
908	18	5	18	7	The 1.8-3.4 GtCO ₂ e.yr ⁻¹ range is based on only one study in the body of the report (Herrero et al. 2016a). The medium confidence statement appears at odds with this limited number of sources. [France]
910	18	5	18	7	There are prices/costs given here but they are mentioned as lacking in Figure 3. [France]

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2734	18	5	18	7	<p>We suggest to provide the technical mitigation potential of dietary changes and not only their economic mitigation potential, i.e. instead of the figure of 1.8-3.4 GtCO₂ per year please provide figure of "2.7-6.4 GtCO₂ per year" (Ch. 5, p. 78, ll. 22-23). Reasoning: The total economic potential is only based on one scholar resulting in a medium confidence. The publication states in its abstract that "the mitigation potential of reductions in livestock product consumption is large, but their economic potential is unknown at present". The technical mitigation potential, however, is found to have high confidence, since similar ranges are reported from many scholars (in chapter 5.5.2 at least 10 different scholars state such higher potentials), some of them are summarized in Figure 5.12. It would also improve consistency, since only the technical mitigation potential of dietary changes is discussed in the other chapters: "5 Gt CO₂ to 10 Gt CO₂ yr-1" (Ch.1 p. 33 ll. 10-11), "0.7-8 GtCO₂eq yr-1 (high confidence)" (Ch.2 p. 86 ll. 37-38), and "0.7-8 GtCO₂eq yr-1 (high confidence)" (Ch. 6 p. 58, ll. 3-4 and Table 6.18). In this regard, we would like to ask to cross-check figure 5.12, because we did not expect a vegetarian diet to be more emission intense than a flexitarian diet. Also, we are wondering why the term vegan diet is not mentioned in the SPM, although it features the highest mitigation potential by far. Lastly, the provision of the technical mitigation potential would allow for comparing to mitigation potential of other response options discussed in the SPM.</p> <p>We also kindly request the authors to delete the reference to the CO₂ price range. This figure is only reported by one scholar and in the underlying chapter it is mentioned that many more studies are needed "that compute the economic and calorie costs of these scenarios" (Ch. 5 p. 78 l. 14), pointing out the knowledge gap of such economic statements. This figure is not consistent with the discussions in other chapters in the underlying report, where such cost estimations are not provided for dietary changes, since "no data is available" (c.f. Ch. 6), resulting for instance in a "no data" indicator in SPM.3. It is also not consistent with other value chain measures, for which the economic costs are not provided in the SPM. In addition, we find this figure misleading, since it could be perceived as if dietary change has a direct cost of 20 - 100 USD per ton CO₂. This is especially problematic, because there is evidence that dietary change will result in significant reduction of health care costs, which are not considered in the economic costs stated here. E.g. the adoption of healthier diets with less meat consumption in the US alone could reduce the "health care cost by USD 77-93 billion per year" (Ch. 5.6.3 p. 88 ll. 34-43).</p> <p>Summarizing, we request the authors to amend this sentence to e.g.: "The total technical mitigation potential of dietary change is estimated at 2.7-6.4 GtCO₂ eq yr-1 (high confidence)." [Germany]</p>
298	18	5	18	7	<p>Costs of dietary change are very difficult to estimate since the costs due to utility loss of dietary change differ across eating culture etc. 5.5.2 (P78 L14-15) states "Importantly, many more studies that compute the economic and calorie costs of these scenarios are needed.", and the estimated costs values seem to be derived based on a model of Herrero et al. (2016a). Please add more explanation on this model based estimated costs values, for example the definition of dietary costs, and the estimation methodology. [Japan]</p>
7804	18	5	18	7	<p>According to the Technical Summary page 32 line 14-16, the numbers 20-100 USD/tCO₂eq does not include the economic health benefits of a shift to more plant based sustainable diets. This is very relevant information as an inclusion of this would potentially change the costs dramatically. Please consider to include this relevant piece of information. [Norway]</p>

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4562	18	5	18	7	It may also be helpful to provide an estimate of mitigation potential for earlier time periods, e.g., 2030. [United States of America]
8396	18	6	18	6	It would seem appropriate to replace "prices" with "costs". Prices assume a market mechanism, which may not be essential (or desirable) for effect these changes through price mechanisms, as it can disproportionately and adversely affect the neediest people. [European Union (EU)]
5160	18	6	18	6	/CO2 → CO2-1 [Republic of Korea]
5162	18	6	18	6	CO2 → CO2 [Republic of Korea]
4982	18	6	18	7	Do the ranges span over the three SSPs? If not, please add a note on this. [Sweden]
4564	18	6	18	7	KEY ISSUE [TERMS]: This is not the only place, but carbon prices are discussed without any introduction to the assumptions or implementation of carbon pricing. [United States of America]
8398	18	8	18	15	include food waste due to overconsumption (obesity) as it has been shown that such food waste is the same order of magnitude as other food waste [European Union (EU)]
2736	18	8	18	15	We kindly request the authors to cross-check the figure of "8-10% of total food system emissions" of combined food loss and waste. We would expect higher numbers in the range of 30%, if food loss and waste amounts to a third of global food production. For comparison: FAO says that total carbon footprint is estimated to be around 4.4 GtCO ₂ eq (FAO "Food wastage footprint & Climate Change"). Please clarify where this number comes from, and what it includes (e.g. food waste at home, food loss in the supply chain, emissions from waste deposits, deforestation due to increased production). We also suggest to provide yearly CO ₂ eq instead, allowing for a comparison to other provided emission figures. Following the structure of the SPM such emission numbers should be moved to section A4, as suggested for other GHG emission figures given in subsection B4. Instead, we encourage the author to provide concrete numbers on the technical mitigation potentials for food waste and loss as done for other response options. Such figures can be found for example in Figure TS.6 or in 5.5.2.5. [Germany]
494	18	8	18	15	Point could include references to the circular economy [Ireland]
7806	18	8	18	15	Please clarify the definition of food loss in the SPM and in the glossary. I.e. if crop loss is included or not in the term. [Norway]
5164	18	8	18	15	This (reduction of food loss and waste) should be implemented through education. It would be nice to introduce a good example of this case. [Republic of Korea]
7476	18	8	18	15	Is no mitigation potential (with associated C price) available for reductions in food waste? If there is, please provide it here in order to be consistent with the paragraphs above [United Kingdom (of Great Britain and Northern Ireland)]
4566	18	8	18	15	Efforts related to behavior change that reduce the amount of food grocery stores and consumers throw out could also be mentioned. [United States of America]
4568	18	10	18	12	KEY ISSUE [ALIGNMENT/ACTION]: The estimate that combined food loss and waste contributes 8-10% of total food system emissions is not consistent with that provided in B4. In general, this estimate seems low, given that it is one-third of global food production. Further explanation is warranted. [United States of America]
7478	18	11	18	11	please give Gt as well as %. It seems surprising the 8-10% is so much less than one-third, why is this? [United Kingdom (of Great Britain and Northern Ireland)]

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912	18	12	18	13	We suggest to also consider supply-side response options and measures related to marketing and standardization as well as changes in behavioural and consumption patterns to reduce food loss and waste. We suggest to delete "technical" as there are also non-technical options. See section 5.7.2. [France]
2738	18	12	18	13	The list of measures only address the reduction of food loss but not food waste. Please add measures for food waste or clarify the statement accordingly. [Germany]
5622	18	12	18	15	Small and large scale solar drying systems may contribute sustainably to the on-farm storage. [Algeria]
1786	18	12	18	15	Has the mitigation potential been estimated? If yes, the estimate should be given [Denmark]
4570	18	14	18	14	Differ substantially 'in' or 'across' developed and developing? Likely the latter. [United States of America]
8400	18	16	18	16	It is unclear why the direction of change (increased pressure) is predicated on scale. Whilst the scale of application is likely to affect the scale of the impact, it is unclear while the marginal impacts would be scale dependent, and why they would increase, rather than decrease, with scale. In any event, the language should be simplified. The first sentence could read: "Some response options necessary to remove CO2 from the atmosphere[, when applied at the scale of several Gt CO2 yr-1,] lead to land use change and increase pressure on land (high confidence).", with the bracketed part being optional. [European Union (EU)]
2740	18	16	18	16	What is meant with "scale necessary to remove CO2..."? It does not seem possible to identify such a "necessary scale", because it depends on many factors including socioeconomic pathways, as outlined in this report. Please revise. [Germany]
1852	18	16	18	17	Probably, 'at scales' is redundant. [Russian Federation]
128	18	16	18	18	Consider adding "as long as no behavioural changes or changes in the demand-side occurs" at the end of the sentence, in order to be consistent with the rest of the report. [Spain]
2994	18	16	18	20	Suggest clarifying two apparently contradictory statements. "Some response options, when applied at scales necessary to remove CO2 from the atmosphere at the scale of several Gt CO2 yr-1, lead to land use change and increase pressure on land (high confidence). This increased pressure can lead to adverse side-effects for adaptation, land degradation and food security (high confidence)." Seems to be contradicted by Section B6, stating "Most response options can be applied without competing for available land ..." These apparently contradictory statements need to be reconciled. Applying "some" options at scales necessary to remove gigatonnes of CO2 would not seem to leave much scope for applying B6's seemingly benign response options. [Australia]
5376	18	16	18	20	This paragraph is not very intuitive to read. It discusses how different options applied at high scales would increase pressure on land, but it should rather inform on the scale until which they can have positive effects for the five land challenges. The following point that some options are obviously limited in possible spatial extent is clear, but it is not particularly insightful. [Gambia]

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2742	18	16	18	20	Please add the following information to the headline statement B5: "Rapid reductions in anthropogenic greenhouse gas emissions [across sectors] that restrict warming to "well below" 2°C would greatly reduce the negative impacts of climate change on land ecosystems (high confidence). In the absence of rapid emissions reductions, reliance on large-scale, land-based, climate change mitigation is projected to increase, which would aggravate existing pressures on land (high confidence)." (TS, P8, L1-12). This information puts the land-based mitigation options discussed in B5 in context. [Germany]
426	18	16	18	20	Be more specific than 'several' [Ireland]
496	18	16	18	20	Use more standard wording than "response options" [Ireland]
498	18	16	18	20	The underlying text should quantify the rate and scale referred to [Ireland]
300	18	16	18	20	"Some response options, ..." seems to include DAC also in terms of CO2 removal from the atmosphere. However, the following sentences present the impacts of afforestation/reforestation only. In order to avoid confusion, modification is desirable to "Some response options such as afforestation and reforestation". [Japan]
8002	18	16	18	20	please add the last sentence of B5.2 to the bold text [Netherlands]
7808	18	16	18	20	B5 is important and the overall message should be kept. However, we have a few comments. In the first line we are not sure if this necessarily is related only to removal of CO2 since several of the examples given in the text in 5.1 and 5.2 are related to mitigation of emissions. E.g. bioenergy without CCs and reduced grassland conservation. Maybe it would be better to rephrase the sentence to "Some land-based mitigation options when applied at the scale of..." (In 5.2. land-based mitigation measures is used). In the second sentence, please consider to include other adverse side effects, such as water scarcity and biodiversity loss. (Cross-Chapter Box 7, 6-50, lines 38-39: "The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specific (high confidence)." [Norway]
7480	18	16	18	20	Please consider, to provide a fuller picture of challenges associated with large scale BECCS and afforestation etc, discussing issues such as albedo and the complications of CO2 removal vs biophysical impacts on climate (e.g. crudely, don't plant loads of forest at very high latitude) [United Kingdom (of Great Britain and Northern Ireland)]
7484	18	16	18	20	You do a good job in B5 of referring to bioenergy, however a common misconception is that pathways from IAMs rely heavily specifically on BECCS. In reality, even if you restrict BECCS deployment they tend to still have large (or in some cases) even higher amounts of bioenergy. It's important that policymakers realise that not having BECCS doesn't necessarily mean little bioenergy. Therefore, starting this section by referring specifically to removals (even if subsequent sub-points talk more generally about bioenergy) could potentially be misleading. So please rephrase to refer to bioenergy not just removals here [United Kingdom (of Great Britain and Northern Ireland)]

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7486	18	16	18	20	This headline statement does not reflect the underlying paragraphs - some response options lead to land use change and increased pressure on land regardless of the scale they are used at. However, it is only at larger scales that they may lead to adverse side effects. This statement should be rephrased as follows: "Some response options lead to land use change and increase pressure on land. When applied at scales necessary to remove CO2 from the atmosphere at the scales of several GtCO2yr-1, this increased pressure can lead to adverse side effects for adaptation, land degradation and food security." [United Kingdom (of Great Britain and Northern Ireland)]
7490	18	16	18	20	This text could be simplified for clarity. Suggest - "Some options for removing CO2 from the atmosphere require land, and hence may compete with other land uses. If deployed at scales necessary to remove several GtCO2 yr-1, this competition could have adverse side effects for adaptation, land degradation and food security. " Also important to add that these risks can be mitigated/managed. [United Kingdom (of Great Britain and Northern Ireland)]
4572	18	16	18	20	KEY ISSUE [LAND-COMPETITION]: This list of the adverse side effects (for adaptation, land degradation, and food security) leaves out one of the most relevant side effects which is that the response options designed to remove CO2 when applied at these scales can also have the side effect of increasing CO2 emissions as a result of increased pressure on the land. That conclusion is well-documented in several parts of Chapter 6. [United States of America]
4574	18	16	18	20	Since the emphasis of many of the following bullets is on "mitigation", the term should be used in the chapeau. [United States of America]
7810	18	16	18	26	In the current draft SPM the land sectors role in climate change mitigation is less described than in the previous draft. Please consider if it is usefull to mention the land-based mitigation options both in the context of mitigation (including the limitations) and in the context of its impacts on biodiversity and pressure on land. [Norway]
2746	18	17	18	17	Please provide quantitative information about the range of potential annual CO2 removal accompanied by information about the corresponding conditions and warming levels and the uncertainties and knowledge gaps of these figures. This is highly policy relevant information an obvious question to the SRCCL complementing the information from the SR1.5 which was based on IAMs with bottom up information about land. [Germany]
7492	18	17	18	17	Could you be more precise on what is meant by "several"? [United Kingdom (of Great Britain and Northern Ireland)]
1788	18	18	18	18	"can" or "could"? [Denmark]
914	18	18	18	19	We suggest to homogenize the wording between "side-effects for adaptation" (B4) and "maladaptative outcomes" (B2 and B2.5). [France]
8402	18	19	18	19	What conclusions can be drawn for biodiversity loss? How does mitigation action and the fact that it prevents biodiversity loss compare to the fact that some mitigation actions may increase pressy on land degradation? Are there any meanginfull lessons to draw regarding this balance of impacts? [European Union (EU)]
4984	18	19	18	19	Suggest inserting "biodiversity" after "land degradation". This is because biodiversity also gets affected, and biodiversity underpins food security. [Sweden]

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5378	18	21	18	21	how could Reduced grassland conversion to croplands, restoration and reduced conversion of peatlands, and restoration and reduced conversion of coastal wetlands have negative impacts? This result is really not intuitive and the underlying assumptions need to be all the more explicit. [Gambia]
4580	18	21	18	21	"large scales" is better but not clear what this scale actually is. [United States of America]
302	18	21	18	22	Request clarification what kind of action related to "biochar" increase pressure on land. As "biochar" is just noun, it is not clear that "biochar" is "addition to soil." or "land use to provide feedstock" In the latter case, this line might be added "or biochar" after bioenergy. And "and biochar" would be deleted. [Japan]
2996	18	21	18	23	Suggest including qualifiers: the diversification of diets as described in Lines 1-7 in page 18 could also greatly increase pressure on land - in fact any unsustainable land use can lead to increased pressure on land. Suggestion would be to state that those pressures can apply to any land use, instead of singling out certain uses as it has been done here. If the criterion is the scale of the relative land uses, then the Chapter should define more clearly what is meant by "large scale". [Australia]
5512	18	21	18	23	At the beginning of paragraph B5.1., add the text ", and depending on context specificities" after the initial words "When applied at large scale". Moreover, add the following text after the end of the first sentence of the paragraph: "requiring careful management, maximization of positive synergies, avoidance of strong negative impacts, and awareness of tradeoffs." Complete sentence should read: "When applied at large scale, and depending on context specificities, afforestation, reforestation, the use of land to provide feedstock for bioenergy with or without carbon capture and storage, and biochar could greatly increase pressure on land, requiring careful management, maximization of positive synergies, avoidance of strong negative impacts, and awareness of tradeoffs." Justification: Current SPM lacks a clear definition of what is "large scale". Depending on the definition, a large scale total amount of decentralized, landscape-integrated biomass feedstock supply system can actually reduce pressure on land, especially for agroforestry and other perennial crop schemes. There exists a large variety of forest and agriculture management practices, annual and perennial plants, crop rotation systems, and residue/waste flows, which means that bioenergy feedstock supply systems can be integrated components in agriculture and forestry systems, delivering food, fiber and other biobased products. Furthermore, large scale biomass supply systems can come from decentralized restoration of degraded land. Therefore, to avoid the vagueness and ambiguity of current wording of the paragraph, the proposed alternative wording mirrors what is argued in draft Chapter 6, Cross-Chapter Box 7, regarding the necessity of considering both scale and context specificities to assess the sustainability of bioenergy deployment, as well as the existence of both potential tradeoffs and co-benefits and synergies involving sustainable bioenergy deployment. [Brazil]
2748	18	21	18	23	The text lacks a definition of "large scale" – the current wording ignores that a "large scale" total amount of decentral, landscape-integrated biomass supply could actually reduce the pressure on land, especially for agroforestry and other perennial crop schemes. Furthermore, a "large scale" (i.e. aggregated) biomass supply could come from decentralized restoration of degraded land. This is substantiated in the text further down on the same page (L27-34): "Applied over smaller areas, land-based mitigation measures that displace other land uses have fewer adverse side-effects and can even have some positive co-benefits for some land challenges (high confidence)." Please provide further definition and differentiation regarding large scale and conditions for different levels of scale related risks. [Germany]

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4586	18	21	18	23	This sentence lacks a confidence statement. [United States of America]
1604	18	21	18	25	Large scale and small scale can be relative terms. Large scale in small countries can be a small scale in big countries. Furthermore the phrase "...affect smaller land areas, so the impacts of these options would be smaller.." It should be clarified: smaller in respect to what? [Italy]
8404	18	21	18	26	The comparison between bioenergy (first sentence) and other options (second sentence) seems to be based on false equivalence. The difference between them is not just (or even mainly) the size of the area involved (cf "smaller land areas"), but their relation to existing food production. The former is expected to increase the overall land demand for crops (in addition to that needed for food), whilst the latter prevents land from being converted and does not add to overall land demand. This (and not just their size) has implications on their impacts and on related policies. The section should also give an assessment of what land is available for conversion, for instance to what extent do extensive grassland pasture offer an opportunity to change agriculture practices and actually make land available for conversion to bioenergy? This seems absent from this discussion *"smaller land areas" should be clarified. Does it mean less area per unit of abatement, or affecting smaller patches of land, or expected to be deployed on less land overall? *"more variable" is ambiguous. It can mean different types of impacts, different magnitudes or even directions. [European Union (EU)]
7494	18	21	18	26	Is all of B5 supposed to be about CO2 removal options? If so, this paragraph should not talk about reduced conversion (of grassland to cropland, of peatlands, of coastal wetlands) because such conversions cause CO2 to be emitted to the atmosphere and reduced conversion will merely reduce these emissions. [United Kingdom (of Great Britain and Northern Ireland)]
4582	18	21	18	26	It would be helpful to quantify the points raised in B5.1. [United States of America]
8406	18	21	18	35	B5.1 - some of the language from cross-chapter box 7 itself seems more appropriate and informative than the findings as stated in this paragraph. E.g. The production and use of biomass for bioenergy can have co-benefits, adverse side effects, and risks for land degradation, food insecurity, GHG emissions, and other environmental goal. These impacts are context specific and depend on the scale of deployment, initial land use, land type, bioenergy feedstock, initial carbon stocks, climatic region and management regime... While there is high confidence that the technical potential for bioenergy and BECCS is large, there is also very high confidence that this potential is reduced when environmental, social and economic constraints are considered. The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specific (high confidence). Large areas of monoculture bioenergy crops that displace other land uses can exacerbate these challenges, while integration into sustainably managed agricultural landscapes can ameliorate them (medium confidence). [European Union (EU)]
2998	18	22	18	22	Suggest further explanation on how biochar increases pressure on land. The use of biochar can enhance productivity, so reduces pressure on land. Perhaps this refers to use of land for feedstock production? Note that any large scale land use change will increase 'pressure on land'. Significant mitigation through biochar is possible without impacting food security and natural systems, by utilising available biomass and land resources (Woof et al, 2010; {4.10.5.1}) [Australia]
8408	18	22	18	23	"with or without carbon capture and storage" does not seem to add value and could be removed. Suggest to change "pressue on land" to "increase competition for land" [European Union (EU)]

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7812	18	22	18	23	Current experiences show that Biochar are most likely to be produced from forest and crop residues and waste products. Thus, negative implication on the pressure on land might not be relevant in this sentence. Also regarding production of bioenergy the relation to pressure on land will depend on the context, eg. if it is based on waste and residues. [Norway]
916	18	23	18	25	We suggest to better introduce the notion of CDR or negative emissions techniques in order to better explain the link between the two sentences of §B5.1 [France]
918	18	23	18	25	The impact would be smaller for GHG emissions, but enormous in terms of biodiversity. The recent IPBES report should also be kept in mind. Maybe this co-benefit for biodiversity conservation should be mentioned? Implicit in section B6.2 [France]
5380	18	23	18	26	The SPM contains information on the land area for BECCS that could be sustainable. Is there similar scale information for A/R? [Gambia]
7496	18	23	18	26	What is their relative mitigation potential per hectare? Doesn't have to be quantified but for context it would be helpful to know if these less damaging land-based mitigation options have similar (or near-similar) potential for CO2 removal? [United Kingdom (of Great Britain and Northern Ireland)]
2750	18	25	18	25	Please mention also the co-benefits of such measures shown in the underlying report and amend the statement: "...would be smaller, MORE VARIABLE AND DELIVER ADDITIONAL BENEFITS (E.G., BIODIVERSITY CONSERVATION, ENHANCING RESILIENCE AND ECOSYSTEM SERVICES)." [Germany]
7814	18	27	18	27	The first sentence in B5.2 is important in this SPM. Please consider to lift this to the bold text in B5 (line 16-20). [Norway]
5624	18	27	18	30	Please add access to water or water security [Algeria]
5514	18	27	18	30	Delete the first sentence of paragraph B.5.2, since such unconditional negative wording does not adequately reflect the full report and there is actually no reference to the degree of confidence of this rather vague and negative statement. Moreover, this sentence is somehow contradictory with what is stated in paragraph B7.1, which recognizes that bioenergy with BECCS is an important pathway to limit warming to 1.5°C. To adequately summarize the tradeoffs and potential synergies involved in land-based mitigation measures in a meaningful and useful way for policymakers, we propose that paragraphs B5.2 and B7.1 are merged. The merged paragraph read as follows: "All assessed pathways that limit warming to 1.5°C require extensive land-based mitigation, with most including reforestation/afforestation, large-scale bioenergy, and in the majority of cases bioenergy with carbon capture and storage (BECCS) (high confidence). Widespread use of land-based measures at the scale of several millions of km ² can increase potential risks, although the need for negative emissions and the anticipated investments to implement such technologies can also create significant opportunities." [Brazil]
3000	18	27	18	34	Suggest reconciling internal inconsistency: line 28 says bioenergy crops deployed at several million km ² could have a range of negative consequences; line 34 says 2-6 m km ² energy crops has low-moderate risks. [Australia]

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8410	18	27	18	35	<p>B5.2 - Suggest that the arguments in this subsection are instead included alongside those of B7. i.e. it is important to consider jointly the benefits & drawbacks of land-based mitigation including:</p> <ul style="list-style-type: none"> i) the benefits of avoided mitigation itself; ii) the estimated requirement for land-based mitigation in mitigation pathways. iii) the potential for some of the adverse effects to be lessened through smart policies & management <p>B5.2 mentions 2-6 Mkm² as a 'risk zone'. Compare this against the deployment needed in <2°C & 1.5°C pathways (e.g. Fig 2.2.4 from SR1.5, the areas stated in B7.3). Also, how do these risks vary between SSPs, and how can they be lowered if some of the measures mentioned in B4.1, B4.2, B4.3 & C3.1 (5.8 M km² freed) are undertaken?</p> <p>Suggestion: Is it possible to frame the narrative more constructive? i.e. start with an outline of what can be achieved by combining sustainable SSPs with necessary quantities of land-based mitigation, and then move onto to how consequences become more negative as SSPs are less sustainable and the necessary quantities of land-based mitigation increase. [European Union (EU)]</p>
3002	18	27	18	35	<p>Suggest incorporating the very substantial opportunity for increased use of existing biomass (harvest and processing residues; organic waste in landfills, etc...). Increased incentives for such use would reduce the need for widescale plantings of energy crops. Even if no firm estimates exist in the literature quantifying the global potential, it should at least be mentioned here. [Australia]</p>
2752	18	27	18	35	<p>We appreciate the information provided in paragraphs B5.2 and B5.3 setting out the limits and negative side effects of land-based mitigation options. We feel however that this paragraph needs to be complemented by information on the negative and potentially irreversible consequences resulting from climate change at temperature levels above the Paris climate mitigation targets that might be reached when limiting land-based mitigation options. We strongly encourage a more balanced presentation of the land-based mitigation measures and climate change impacts at 1.5, 2 or 3 degree. [Germany]</p>
7816	18	27	18	35	<p>Please consider to include some text to further quantify and explain limitations to the use of bioenergy and BECCS described in the underlying report. Ch 6 ES (6-4, line 36) states that the potential for BECCS is 11GtCO₂y⁻¹, while Ch 2.7.1.5 gives a range for BECCS potential of 0,4 -11,3 GtCO₂y⁻¹ (medium confidence). The range of 2-6 million km² given here seems to imply that only a relatively limited amount (compared to many mitigation scenarios) of bioenergy and BECCS can be used without hampering other SDGs. If the SRCCL can give some indication as to what a sustainable level of bioenergy production and BECCS deployment might be, this would be very helpful to evaluate climate mitigation scenarios - and therefore policy relevant. [Norway]</p>
132	18	27	18	35	<p>The issue of Bioenergy and BECCS would probably need a separate block in section B as, according to sections B7.1 and B7.3, it appears to be a suitable measure within some limits. If this suggestion is considered, then panel C of figure SPM.1 could best illustrate this item. [Spain]</p>
7498	18	27	18	35	<p>This paragraph is extremely important in the wider context of debates about BECCS etc, however it is currently limited in its usefulness. The area that is deemed potentially sustainable (2-6 million km²) needs to be translated into information on mitigation (e.g. how much removals that equates to on an annual basis, or across the century). This then needs to be compared to what is assumed in 1.5C consistent pathways (and also made consistent with what SR1.5 states is sustainable - i.e. based on Fuss et al 2018). [United Kingdom (of Great Britain and Northern Ireland)]</p>

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4588	18	27	18	35	B5.2 appears to assume that bioenergy feedstocks are grown exclusively for bioenergy, and displace other land uses on productive lands. This is not necessarily the case. Crop residues, thinnings, municipal solid waste, algae, etc., are all feedstocks of varying potential. And some bioenergy production systems do not displace farmland or forests (those using waste, residues or thinnings, produced in deserts or on water, etc.). This should be made clear in the paragraph. [United States of America]
920	18	28	18	30	Please consider adding elements about potential impacts on biodiversity decreases or loss. [France]
4590	18	28	18	30	This sentence lacks a confidence statement. [United States of America]
7818	18	29	18	30	Please consider inserting "biodiversity" after "irreversible consequences, for", so that it would read: "...and potentially irreversible consequences for biodiversity, food security, desertification and land degradation.". Again, the latest Ipbes report amongst others highlight that increasing land pressure has devastating effects on biodiversity on the planet. [Norway]
922	18	30	18	32	Please consider giving some examples of "land-based mitigation measures that displace other land uses". [France]
7500	18	30	18	32	The point that "land-based mitigation measures that displace other land uses have fewer adverse side-effects and can even have some positive co-benefits for some land challenges" is a really important one and should be elevated to the chapeau if possible. [United Kingdom (of Great Britain and Northern Ireland)]
7502	18	32	18	32	Suggest clearer wording: "The area of land which can be devoted to bioenergy, with only low to moderate risks to...." [United Kingdom (of Great Britain and Northern Ireland)]
7820	18	32	18	34	SPM 5.2 states that an area of 2-6 million km ² can be used for bioenergy crops with low to medium risk to food security and so on. It would be helpful to also describe how much bioenergy that can be produced on this area, and also if possible how this would limit the potential for BECCS deployment. In terms of scale this range seems to imply that the possible sustainable deployment of BECCS is around half of the 11GtCO ₂ -1 described in Ch 6 ES (6-4, line 36). [Norway]
130	18	32	18	34	Consider adding a confidence qualifier to this statement. [Spain]
4592	18	32	18	34	This sentence lacks a confidence statement. [United States of America]
8412	18	32	18	35	It is unclear where this 2-6 Mkm ² 'limits' figure comes from (Ch6 mentions that 1.5°C studies tend to have an energy crop area of that magnitude, but this is not the same as a 'limit'). Please clarify. Surely the 'safety' of any given bioenergy area is highly context-dependent. Can anything be said about where bioenergy production can have more positive contributions? [European Union (EU)]
5626	18	32	18	35	Please add access to water or water security. [Algeria]
2756	18	32	18	35	It is not apparent from the text in B5.2 nor the explanation to Fig. SPM 2, Panel C (which illustrates the same issue), which part of the SRCCL underlying chapters corresponds to the statement that 2-6 Mio km ² could be used for bioenergy "with low to moderate risks to food security, land degradation and desertification". The link to the main SRCCL text as reference for the SPM needs to be made clear. In particular an argumentation is necessary to justify why the enormous land area of 6 Mio km ² is only associated with "moderate risks". [Germany]

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7996	18	32	18	35	Please last sentence of 5.2 to bold text of B5 to make point that the risk of energy crops is dependent on the pattern of socio-economic development. Alternatively, add the last sentence under mitigation in Fig SPM2 ("In a world with lower land requirements for food production (SSP1), there is greater opportunity for sustainable bioenergy deployment compared to a world in which there is increasing competition for land (SSP3)) to A5. [Netherlands]
7504	18	32	18	35	The final sentence of B5.2 is confusingly worded such that at first read it could be interpreted as 2-6 million square kilometres being a safe range for bioenergy. It could be rephrased as "The amount of area for bioenergy above which would result in high risks to food security, land degradation is between 2 and 6 million km2 resulting in socioeconomic developments. [United Kingdom (of Great Britain and Northern Ireland)]
4594	18	32	18	35	KEY ISSUE [ALIGNMENT/ACTION]: This sentence needs some work: "The amount of area for bioenergy, with low to moderate risks to food security, land degradation and desertification, depends on patterns of socioeconomic developments, reaching limits between 2 and 6 million km2. {4.3, 6.5; Cross-Chapter Box 7: Bioenergy and BECCS in Chapter 6; SPM Fig. 2c}" Chapter 6 gives a very different range. On p. 6-48, lines 30-31, the authors indicate that studies that have looked at bioenergy area factoring in risks to food security etc. have made "estimates of 50-244 EJ of biomass on 0.1-13 million km2". The quantitative range of 2-6 million km2 seems to be derived from the burning embers graph Figure 2c. That figure is based on two of the three socio-economic pathway models and one can see that the 2 million km and 6 million km estimates are from SSP3 and SSP1 and refer to the transition from Yellow to Red on the figure (which is the transition from 'moderate to high' risks). Both of those transition points on the figure, however, are shown to have low confidence. So, the concern is that the wording in the SPM will convey to policymakers that the area for bioenergy with low risk to food security etc is on the order of 2-6m km2 when in fact those numbers are the maximum of the estimates of when risk transitions from moderate to high, and they are made with low confidence. Based on the range cited in Chapter 6, the "upper limit" may in fact be as low as 0.1 million km2. Because this information about how much land could be devoted to bioenergy is both important and controversial, it deserves to be presented in a manner similar to how SPM Fig 2b is presented in paragraph A7.2. Using that formulation, the text would read: "For shared socioeconomic pathways (SSPs) with low population, effective land use regulation, lower meat consumption and lower food waste, the transition from low to moderate risk to food security, land degradation and desertification occurs between 1 and 4 million km2 (medium confidence). By contrast, in pathways with high population, low income and slow rates of technological change, the transition from low to moderate risk occurs between 0.1 and 1 million km2 (medium confidence). The transition from moderate to high risk across the SSPs occurs between 2 and 6 km2 (low confidence)." [United States of America]
1536	18	33	18	35	Patterns of socio-economic developments: do not seem objective. [Belgium]
7506	18	33	18	35	How does this land area relate to land use needs for achieving the long-term goals of the Paris Agreement? Could you be more explicit about whether there are trade-offs here and what they are? [United Kingdom (of Great Britain and Northern Ireland)]
2758	18	34	18	34	How much area is used for bioenergy today? How much might be used for different temperature limits? [Germany]
4986	18	34	18	34	What does "limits" signify? Maximum amounts, depending on SSP? [Sweden]

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5516	18	36	18	37	This first frase of B5.3 item seems to mean that intensification for biomass production is a bad option and that generates land degradation. This correlation is not that direct as the assertation makes to seem. Bad implementation of any crop (probably any land use) can lead to land degradation. On the other hand, intensifyed biomass production, when well conduced, mainly in tropical regions where it is possible to plant all the year long, is both an adaptation practice, as weel as a mitigation one. Can bring regional and local socioeconomical benefits via diversification, and can generate green energy and others biomass uses. [Brazil]
2760	18	36	18	37	"biomass expansion can result to land degradation" is not entirely correct because when realized on degraded land, it can contribute to land restoration, mitigation and rural economy growth. In addition, the observation that "biomass production ... can result in land degradation" is a general phenomenon of agricultural intensification that is not specific to bioenergy or other land-based mitigation measures. Again, biomass based options are described in an unbalanced manner. Please mention also preconditions for positive contributions of biomass / bioenergy. [Germany]
7510	18	36	18	37	fertiliser additions can result in local land degradation, but it does not necessarily. It is true in some circumstances, but not always. Should insert – “depending on local circumstances” [United Kingdom (of Great Britain and Northern Ireland)]
4596	18	36	18	37	This statement is misleading: "Increasing the extent and intensity of biomass production, for example through fertilizer additions, irrigation or monoculture energy plantations, can result in local land degradation." Recommend adding the following: "Increasing the intensity of production can be done in a sustainable manner, reducing land pressure and land competition and resulting in a reduction in land degradation." [United States of America]
4598	18	36	18	37	This sentence lacks a confidence statement. [United States of America]
924	18	36	18	39	These statements do not appear to be specific to large-scale biomass energy deployment. If so, they should be part of a general section on risks associated with intensification strategies, and not of a section dedicated to BECCS. [France]
7508	18	36	18	39	These two sentences seem to saying almost the same things. Can they be merged into one sentence, or are they indeed saying different things, in which case can they be clarified? [United Kingdom (of Great Britain and Northern Ireland)]
4600	18	36	18	43	Text is good, but could be improved. Reads: "Poorly implemented intensification of land management contributes to land degradation, for example through salinization." An improvement would be: "Intensification can also easily lead to expansion and deforestation in the absence of strong governance, often through institutions different than ones involved in supporting intensification. Agricultural expansion owing to intensification may not be apparent for a decade and claims of sustainable intensification often lack robust monitoring data over appropriately large areas and long time scales." [United States of America]
8414	18	37	18	37	Insert at the end of the sentence, after "local land degradation": "and may affect the broader region, e.g. through impact on water availability and quality as well as biodiversity and ecosystem services". [European Union (EU)]

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3004	18	37	18	37	Suggest clarification: monoculture crop does not necessarily cause degradation. Fertiliser addition need not result in land degradation; land degradation may result from excessive or poorly timed fertiliser application, causing eutrophication or soil acidification, or insufficient fertiliser to replace nutrients removed. This is covered in the next sentence. Suggest deleting the first sentence in the paragraph. [Australia]
8416	18	38	18	38	include after ... contributes to land degradation and biodiversity loss [European Union (EU)]
5048	18	40	18	40	If the statement is "is not known", a confidence statement would seem to be unnecessary. [Sweden]
4602	18	40	18	41	This phrase lacks a confidence statement. [United States of America]
4988	18	41	18	41	The meaning of "without due consideration" is very unclear. What would such consideration involve? Has this not been done, or cannot it be done? [Sweden]
926	18	41	18	43	To improve clarity, we suggest to replace "through indirect land-use change" by "an effect called "indirect land-use change". [France]
8420	18	42	18	42	Between "production" and "can", insert the following: "or diverting crops and other land products from other uses to energy". This is important, as dedicated biomass production for energy is not the only cause of ILUC. [European Union (EU)]
8422	18	43	18	43	The existence of indirect land use change and potential negative effects would appear to be well-founded with high confidence, rather than medium. [European Union (EU)]
5628	18	44	18	45	This is equally true for biomass and bioenergy deployment in arid areas. [Algeria]
928	18	44	18	45	Please consider adding the words "land degradation" when describing the consequences of such large-scale afforestation measures. [France]
564	18	44	18	45	The statement 'large scale afforestationexacerbating water scarcity' needs to be balanced by adding: 'However, windbreaks, shelterbelts and sand dune stabilization, using locally adapted tree and shrub species, can reduce land degradation due to wind erosion in arid areas (high confidence).' [India]
8424	18	45	18	45	include after ... water scarcity and biodiversity loss [European Union (EU)]
7482	18	16	19	8	This section (B5) provides useful information on the challenges posed by land based mitigation measures that are designed to maximise removals, particularly when undertaken in a sub-optimal way. However, it is currently unbalanced. It is widely accepted that some land based measures will be required. So what would be helpful to policymakers would be information telling us given that we have to deploy some land-based mitigation measures, how can we go about doing so in a way that minimises negative trade-offs and harmful sustainability impacts? Currently the only suggestion is essentially do less of it, but this (while probably true) is limited in its usefulness. Please provide information on good practice in this area (information on enabling response options is provided in SPM section C, but it doesn't specifically address this issue) [United Kingdom (of Great Britain and Northern Ireland)]

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Comment No	From Page	From Line	To Page	To Line	Comment
7488	18	16	19	8	While B5 makes a number of useful points about the feasibility and sustainability concerns associated with land based mitigation options, it does not set out how we can avoid becoming reliant on pathways that require their use at large scales. There are two relevant quotes from the SR1.5 SPM that could be used as the basis for a paragraph to address this: 1) "Significant near-term emissions reductions and measures to lower energy and land demand can limit CDR deployment to a few hundred GtCO2 without reliance on bioenergy with carbon capture and storage" and 2) "Feasibility and sustainability of CDR use could be enhanced by a portfolio of options deployed at substantial, but lesser scales, rather than a single option at very large scale". Alternative the executive summary of SRCCL chapter 1 states "In the absence of rapid emissions reductions, reliance on large-scale, land-based, climate change mitigation is projected to increase, which would aggravate existing pressures on land (high confidence)." and chapter 2 says "It is possible to achieve climate change targets with low need for land-demanding CDR such as BECCS, but such scenarios rely more on rapidly reduced emissions or CDR from forests, agriculture and other sectors." [United Kingdom (of Great Britain and Northern Ireland)]
4576	18	16	19	8	KEY ISSUE [LAND-COMPETITION]: This section shows the possible negative impacts of Bioenergy and BECCS but does not include some of the caveats from Cross-Chapter Box 7 (starting on p. 6-48) such as "The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specific (high confidence). Large areas of monoculture bioenergy crops that displace other land uses can exacerbate these challenges, while integration into sustainably managed agricultural landscapes can ameliorate them (medium confidence)" (p. 6-50). Recommend including a statement similar to the above in the SPM. In particular, the role of increasing land productivity for food should be highlighted as a way to mitigate competing land use (see p. 6-51). [United States of America]
4578	18	16	19	8	KEY ISSUE [LAND-COMPETITION]: Section B5 should include statements that highlight the relationship between productivity enhancement and reduced land competition. While the land base is fixed, our ability to produce goods and services from the land is not. Enhancing the productivity of lands can allow for application of mitigation and food production. [United States of America]
304	18	44	19	3	We'd hazard a guess that the first sentence of B5.4 is from an example of China in Chapter 3 (3.8.2.1), and the second sentence is from an example of Algeria in Chapter 3 (3.8.2.2). We can understand that the description for confidence of latter sentence is high confidence, while we are not sure why that of first sentence is medium confidence. Chapter 3 (p. 3-66, line 28-30) says "At the beginning of the project, some problems appeared in some places due to lack of enough knowledge and experience (low confidence). For example, some tree species selected were not well suited to local soil and climatic conditions". Considering this statement, we suggest reconsidering the confidence level of first sentence. [Japan]

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2744	18	16	20	23	Section B7 provides information on possible area requirements for different options and pathways which seems more comprehensive and more balanced than sections B5 and B6. Sections B5 and B6 send different messages regarding bioenergy and the competition for land. It seems as if the IPCC does not have a clear understanding of the pressure on land resulting from mitigation options. We strongly suggest to revise these three sections. We propose following a similar logic to the Technical Summary under TS 6, and clarify first the so called "no regret options" (e.g. improved forest management, reduced deforestation and degradation, dietary change, reduced food waste and loss), then introduce the certain conditions under which other options (e.g., bioenergy, reforestation) can bring synergies (sustainable intensification, integrated approaches, etc.) and to finish with circumstances under which such options may increase risks (large scale bioenergy, afforestation, biochar, poorly implemented intensification). [Germany]
4584	18	21	30	24	KEY ISSUE [CONFIDENCE]: Many of the statements in the SPM, especially in Sections B through D, are missing confidence statements. Recommend that the authors review the SPM carefully and assign confidence levels to each statement. [United States of America]
2754	18	30			"Applied over smaller areas, land-based mitigation options ... ": better say: "applied on a limited share of total land". Adverse side-effects depend mainly on the scale of implementation of measures which displace other land-uses. Summing up many small areas can have similar effects as few large-scale projects. [Germany]
8418	18	41			B5.3 conflates increased intensity of biomass production with 'poorly implemented' biomass production. To what extent is better implementation part of the solution? Why is the uncertainty over land tenure arrangements exclusive to degraded land? Why does it prevent estimating the area in a scientific report? How does the concept of degraded land compare to the area concepts shown in Figure SPM.1 (barren, extensive pasture, used grassland etc)? [European Union (EU)]
5382	19	23	1	28	This point has a lot of useful information, e.g. the range of the amount of BECCS from 0.8 to 6.6 million km2 depending on the SSP, the mention that the effects are scale and context specific, and that large-scale monoculture can exacerbate challenges while integration into sustainably managed landscapes can alleviate them. There are some similar points about scale in B5, so it could be helpful to consolidate / reduce any repetition. [Gambia]
5630	19	1	19	3	Please Add with appropriate resilient species (resilient to heat and drought). [Algeria]
930	19	1	19	3	Please consider adding "agroforestry" to this list. [France]
1616	19	1	19	3	The sentence should provide more emphasis on the positive policy actions, thus we suggest to invert the order of the sentences as follows: "In areas where afforestation and reforestation occur on previously degraded lands, opportunities exist to restore and rehabilitate lands with potential significant co-benefits (high confidence). However, large scale afforestation measures in arid areas with tree species which are not suited to local soil and climatic conditions can reduce water availability for other uses, exacerbating water scarcity (medium confidence) [Italy]
8426	19	2	19	2	include after ... restore and rehabilitate lands and ecosystems with ... [European Union (EU)]
8722	19	4	19	5	there is also a potential for increased GHG emissions is mitigation displaces crop or livestock production to areas that have higher emissions per unit product. [Ireland]

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Comment No	From Page	From Line	To Page	To Line	Comment
8428	19	4	19	8	B5.5 needs to be re-drafted since its arguments are not clear. The first sentence could be simplified and generalised as follows: "Food security may be threatened if land-based mitigation displaces crop and livestock production for food to other regions." since it is not clear why mitigation activities would take the most productive land or why it matters globally which land is dedicated to which use (assuming efficient markets, the most competitive marginal land will take over to meet demand for both purposes). "Effects are mediated by increases in food prices and reducing land available for food production". The intended meaning of this sentence is not clear. [European Union (EU)]
7822	19	4	19	8	In this paragraph crops and livestock are considered together. However, would not dietary change from livestock to crops (which is at a lower trophic level) in many cases improve food security as it requires less land and water resources, see line 18 to 20 on page 19? If this is correct, please consider to include information on a distinction between the two when it comes to food security. [Norway]
7512	19	4	19	8	Should this paragraph capture the idea that any displacement of food production poses a risk to food security, whether or not new land is brought into food production? i.e would it be true if re-worded: "Food security may be threatened if land-based mitigation displaces crops and livestock, as even if new land is devoted to crops and livestock, it may have lower productivity, higher climatic risk and higher vulnerability." Please consider whether to reflect this nuance. [United Kingdom (of Great Britain and Northern Ireland)]
4604	19	4	19	8	The potential for productivity increases or substitutions to offset production displaced by "land-based mitigation" should also be referenced here. [United States of America]
4606	19	4	19	8	B5.5 makes potentially important points (though confidence statements are not provided). If accurate, it should be elevated to a Headline statement. [United States of America]
8620	19	5	19	6	It's not clear which 'effects' are being referred to. The current wording could be interpreted to mean that 'threats to food security could be mediated by increases in food prices and reduced land available for food production' [New Zealand]
7514	19	5	19	6	The phrase 'effects are mediated mainly by...' sounds like it is implying that food prices and reduced land available can modulate the threat to food security. This should be rephrased as "This can lead to an increase in food prices..." [United Kingdom (of Great Britain and Northern Ireland)]
4608	19	5	19	6	Suggest clarifying the second sentence in this paragraph to read: "LAND BASED MITIGATION MAY reduce land available for food production WHICH MAY increase food prices." See page 5-86. [United States of America]
7516	19	6	19	6	Is "mediated" the right word here? Do you mean "moderated" or "reduced"?? [United Kingdom (of Great Britain and Northern Ireland)]
4610	19	6	19	6	"Mediated" is not the right verb here. Perhaps "transmitted". [United States of America]
7948	19	6	19	8	Not clear in B.5.5 how climate impacts and/or land-based mitigation (the subject of part B) are assumed to contribute to increasing risks for population at risk of hunger in SubSahara Africa and South Asia; e.g. relative to the contribution of vast and increasing population size in these regions. This should be explained better, or omitted from the report. [Netherlands]
4990	19	7	19	8	If this risk refers to effects of land-based mitigation, please clarify. [Sweden]
8430	19	9	19	9	this statement seems too strong. For example, any mitigation or adaptation action that reduces productivity in the short-term will only reduce competition for land if accompanied by demand reduction of similar magnitude. [European Union (EU)]

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7520	19	9	19	9	Does "response options" mean the same as "mitigation options"? In which case it would be better to use the latter phrase as it's in the glossary. Also row 12 on same page. [United Kingdom (of Great Britain and Northern Ireland)]
4612	19	9	19	10	What about unplanned disturbances, such as flood, drought, fire, pest infestations, ... ? [United States of America]
932	19	9	19	14	We suggest to check if there is no redundancy between section B3 and section B6. [France]
934	19	9	19	14	We suggest to use a more balanced wording, by highlighting that in some cases, increasing intensity in land management is an option that generates trade-offs and presents drawbacks. [France]
4614	19	9	19	14	B6 is too vague and would benefit from more detail. [United States of America]
8432	19	9	19	34	One should consider moving section B.6 before section B.5. This is the more general situation, more specific cases are dealt with thereafter. [European Union (EU)]
1284	19	9	19	34	There is no mention in this section of the potential for long-term carbon storage and product substitution for more GHG-intensive materials from long-lived wood products. The mitigation potential from long-lived wood products is widely recognized (see Smyth et al, 2017: Estimating product and energy substitution benefits in national-scale mitigation analyses for Canada), and a significant number of countries are including this mitigation action in their NDCs. As an action which does not necessarily result in increased pressure on land, but which has the potential to generate multiple benefits, this exclusion is a significant oversight. [Canada]
7824	19	9	19	34	In prior versions of the SPM there was considerations that certain response options may lead to land displacement and increased competition over lands. This is not so apparent in this version, rather paragraphs B.6 indicate that "most response options can be applied without competing for available land". In our view both perspectives are valid, and it is helpful for policy makers that they are spelled out and substantiated for relevant response options. Since land area is a limited resource in terms of surface area, this may lead to competition for available land. On the other hand, lands should also be considered in qualitative terms, and particularly for soils there are win-win options where soil increase does not compromise other interests and could rather expand other options. Likewise, land pressure and displacement is a real concern for other response options such as some bioenergy production, but there could also be advantages related to some types of bioenergy production and soil management. [Norway]
7518	19	9	19	34	By not providing information here (or in B5) on the mitigation potential of the response options, you risk being misleading. This section points to a set of response options that have fewer negative trade-offs than, for example, BECCS. However there is no information on what their actual mitigation potential is (i.e. likely much lower than large scale deployment of BECCS). By not providing a mitigation potential, you are implicitly giving the impression that all of these options are equal in terms of mitigation, they just differ in terms of their respective trade offs. This then therefore essentially creates a divide between the "bad" options of B5 and the "good" options of B6, without considering the full range of risks and benefits. Policymakers need to understand what is possible, so they can they more fully weigh up the different response options and consider their respective benefits and trade-offs, both in terms of mitigation and wider sustainability issues. To some extent (in a qualitative way) this is provided by Figure SPM3, but it needs to be made explicit in the text. Please rectify this issue. [United Kingdom (of Great Britain and Northern Ireland)]

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4616	19	9	19	34	KEY ISSUE [LAND-COMPETITION]: The conclusion in B6 that most response options can be applied without competing for available land seems to be in tension with the conclusion in B5 that some response options lead to land use change and increase pressure on land. Suggest potentially combining these competing points into a single section that provides a clearer synthesis. [United States of America]
7522	19	11	19	13	I'm not sure what is meant by "...thereby enhancing the potential for other response options to deliver across the range of land challenges". Perhaps it means the response options which reduce pressure on land free up land for those which require land? Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]
936	19	13	19	14	<p>Many response options further contribute to biodiversity conservation and ecosystem services. These co-benefits should be mentioned more explicitly.</p> <p>While some Sustainable Development Goals (SDGs) such as life on land (SDG 15) include biodiversity related targets, more explicit mention of co-benefits of some response options for biodiversity and ecosystem services can be made based on Chapter 6. ("Examples of synergies between response options and NCP include positive impacts on habitat maintenance (NCP 1)" 6.5.3.1 "Overall, several response options stand out as having co-benefits across 10 or more NCP with no adverse impacts" 6.5.3.1)</p> <p>We suggest to rephrase it with "Many response options contribute positively to sustainable development and other societal goals, of which several stand out as having also co-benefits for ecosystem services" [France]</p>
5166	19	14	19	14	SPM Fig. 3 → Figure SPM 3 [Republic of Korea]
1610	19	15	19	15	"..improved cropland management, improved forest management.." The word improved doesn't provide a clear meaning of the land management option. It should be clarified in respect to what cropland management and forest management should be improved. In general, we detected in the whole SMP a lack of clarity on terms in use and management options description, we therefore strongly suggest to insert a table with key terms explained (e.g. land degradation neutrality, desertification vs degradation etc.) [Italy]
5518	19	15	19	16	Sentence modified "...such as improved cropland AND FOREST management, and increased soil..." [Brazil]
1672	19	15	19	17	"A number of land management options such as improved cropland management, improved forest management, and increased soil organic carbon content, do not require land use change and so do not increase pressure on land". It is suggested to add the expression of confidence to the sentence. [China]
1802	19	15	19	17	B6 and B6.1 concepts such as 'Improved forest management' and 'improved land management' could be interpreted in several different ways. Please consider giving definitions for such key terms in the SPM, for example, in a separate box for key concepts. This information would be useful not only because it would give a more concrete understanding on the measures to be taken, but because there may be trade-offs between response options within individual categories. The same concern relates to fig. SPM.3. [Finland]
8710	19	15	19	17	soil organic matter content does in some instances require land management change to increase its content [Ireland]
8622	19	15	19	17	Just because something doesn't require land use change doesn't mean it doesn't increase pressure on land? (sentence needs rewording) [New Zealand]

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4618	19	15	19	17	Perhaps the term the authors intend here is land "cover"? Because improving cropland management, forest management, and SOC management are, by definition, changes in land "use." [United States of America]
4620	19	15	19	17	This sentence lacks a confidence statement. [United States of America]
3006	19	15	19	20	Suggest adding "sustainable use of organic residues for bioenergy" as one of the land management options listed here. Sustainable use of existing residues from cropland management and improved forest management for bioenergy applications do not require land use change. [Australia]
8434	19	15	19	22	Land management options are classified as "improved cropland management", "improved forest management", "increased food productivity". These are detailed in the Chapter, but in its present form the statement seems too vague and tautological: "to produce more food we need to increase food productivity; to improve cropland management we need improved cropland management..." [European Union (EU)]
8436	19	15	19	34	B6.1-B6.3 - these statements are important, but there appears to be a lot of duplication (e.g. "options that reduce competition for land" are mentioned three times). Also the section would benefit from more specific examples to illustrate the arguments made. Suggest attempting to reduce the repetition between the three paragraphs and use the space saved to promote the most robust good practice examples from the underlying chapter. [European Union (EU)]
8438	19	16	19	17	replace "and so do not" with "and may not". There is no causality between the first clause and the second, as pressure on land can be increased without land-use change (e.g., by adverse changes to productivity). As there is often a trade-off between short-term production versus long-term productivity and/or carbon stock changes, some of the measures mentioned can increase the pressure on land elsewhere, at least temporarily. For example, moving from unsustainable forest management (overharvesting) to sustainable practices (that are more productive on the long run) often require a transition, during which output must be reduced. [European Union (EU)]
1286	19	17	19	17	The phrase "do not increase pressure on land" could be misleading. What is meant here is that these land management options do not "create a demand for more land conversion". Arguably, any activity aimed at increasing one or more of the natural ecosystem services provided by a piece of land is exerting some "pressure on the land". Done responsibly however, that management activity may not cause any significant harm and could even have co-benefits (e.g., provision of wildlife habitat in an intensively managed forest). Clarification is recommended. [Canada]
7950	19	17	19	18	In B.6.1 increasing land productivity is presented as an option to reduce pressure on land. While this is obvious for land area, other properties may come under more pressure, such as water availability (for irrigation), excess nutrients and GHG emissions (N ₂ O from fertilizers). These caveats should be added. [Netherlands]
1614	19	17	19	19	Not sure that "increased food productivity [...] can reduce pressure on the land", as crop intensification for higher yields can have great impacts on land in terms of, for example, fertilizers use. It should be "sustainable increase of food productivity" [Italy]
2764	19	17	19	20	Revenues of carbon pricing can be redistributed to strengthen the response to climate change (as found in CH7 P137 L38-42). Please add this information to the SPM. [Germany]
1612	19	17	19	20	It is unclear how the increased food productivity can reduce pressure on the land. Additional explanation and references are needed to justify this sentence. [Italy]

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7826	19	17	19	20	This is a very important statement, please consider to lift this to the bold headline statement B6, line 9-14 page 19. [Norway]
5520	19	18	19	18	dietary changes: the world has over 7 billion people, living in 5 continents, with an incredible diverse set of diets , based on local production characteristics, as well as traditions. What should qualify these changes, and further, can we qualify dietary changes considering the existent cultural diversity? Who defines what kind of changes should be done, and what are acceptable impacts on culture, identity, tradition and landscapes? [Brazil]
7524	19	18	19	18	Delete “and value chain responses including”. Most readers won’t know what is meant by “value chain responses” and the sentence makes sense without using the phrase. [United Kingdom (of Great Britain and Northern Ireland)]
8712	19	18	19	19	change in dietary options may put pressure on land management for example through the requirement of different food commodities, vegetables grains etc. a shift in production may put pressure on land [Ireland]
7526	19	19	19	20	Delete “enhanced implementation of” - the sentence makes sense without this phrase. [United Kingdom (of Great Britain and Northern Ireland)]
938	19	20	19	22	This sentence is unclear and should be reformulated. [France]
7528	19	20	19	22	Last sentence is rather long and could be reworded. Suggest instead: “Portfolios of different response options are possible – applicable at different scales, from farm to international - including options that reduce competition for land.” [United Kingdom (of Great Britain and Northern Ireland)]
940	19	23	19	24	A link with nature's contributions to peoples (NCPs) could maybe be made here. [France]
4622	19	23	19	24	The first sentence in B6.2 is very general and seems beyond the scope of the SRCCL. Suggest deletion or rephrasing to focus specifically on Land issues. [United States of America]
8690	19	23	19	28	Useful, please retain [New Zealand]
7828	19	23	19	28	This is a very important paragraph. Please keep this. [Norway]
7530	19	23	19	28	This is an important point but the paragraph could be more clearly worded. Suggest: "A wide range of adaptation and mitigation responses have the potential to make positive contributions to sustainable development and other societal goals (high confidence), eg preserving natural resources such as peatland, coastal and forest restoration, reducing competition for land, fire management, soil management, and most risk management options." [United Kingdom (of Great Britain and Northern Ireland)]
7532	19	23	19	28	The fact that many response options provide almost exclusively positive impacts on sustainable development is a very important finding that should be elevated to the headline B6 message. [United Kingdom (of Great Britain and Northern Ireland)]
942	19	24	19	28	"such as fire management" There is here an inconsistency with the findings line 20 page 15 of the SPM, where it is said that forest management may have several side-effect. We suggest to keep the finding as it is here, and to change the previous sentence line 20 page 15 (see related comment). [France]
4624	19	24	19	28	This is a run-on sentence which is very confusing to follow. Cannot even suggest a fix. [United States of America]
8440	19	25	19	25	replace natural resources with natural ecosystems [European Union (EU)]
7534	19	25	19	28	This is an important point for policymakers in terms of identifying easy wins, could a condensed version be elevated to the chapeau please? [United Kingdom (of Great Britain and Northern Ireland)]

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8442	19	26	19	26	avoid the 'such as', either full list or none as the 'such as' may sound like a preferred choice is made while there is no evidence for this [European Union (EU)]
4626	19	26	19	26	What does "those applied across all ecosystems" mean? [United States of America]
8444	19	28	19	28	this key message kind of describes 'climate resilient development pathway' (see chapter 5 of IPCC 1.5) suggestion to include a box dedicated to climate resilient development pathways. [European Union (EU)]
8642	19	29	19	29	Competition for land - this is not the case for New Zealand where dairy land competes for sheep and beef, and forestry competes for sheep and beef land in hill country. [New Zealand]
4628	19	29	19	33	B6.3 is written in very general terms and not likely to be useful to policymakers. Suggest deletion or rephrasing in more specific terms that are consistent with underlying report. [United States of America]
7536	19	29	19	34	Could you explicitly mention the SDGs here please, for clarity and to highlight the synergies between response options and development? [United Kingdom (of Great Britain and Northern Ireland)]
306	19	30	19	30	Suggest modifying "value change" to "value chain". [Japan]
7538	19	30	19	30	What does "value chain management" mean? Can a more-readily understood phrase be used instead? [United Kingdom (of Great Britain and Northern Ireland)]
4630	19	30	19	30	KEY ISSUE [TERMS]: What is "value change management"? It would be helpful to include a definition the first time this is used. [United States of America]
2766	19	30	19	42	We suggest to move the detailed figures on the land areas to a sub paragraph. It is unclear which models have provided these numbers, which processes have been included in the projections - probably climate change impacts are omitted - and without information about the fraction of today's areas they are of limited use. [Germany]
8446	19	32	19	32	include: ... climate and biodiversity action [European Union (EU)]
5522	19	32	19	34	Add the following text at the end of the last sentence of paragraph B6.3: ", i, while integration into sustainably managed agricultural landscapes can promote synergies and co-benefits". The complete sentence should read as follows: "Eradicating poverty and eliminating hunger can be adversely affected by land management-based options that require land use change (medium confidence), while integration into sustainably managed agricultural landscapes can promote synergies and co-benefits (medium confidence). Justification: proposed changes aims to better reflect what is stated on the full report, e.g. in Chapter 6, Cross-Chapter Box 7, lines 38-42: "The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specific (high confidence). Large areas of monoculture bioenergy crops that displace other land uses can exacerbate these challenges, while integration into sustainably managed agricultural landscapes can ameliorate them (medium confidence)." [Brazil]
2768	19	32	19	34	Please add the fact that problems for poverty and hunger can occur also without land use change if crops are increasingly used for bioenergy. [Germany]
5168	19	32	19	34	That sentence is hard to admit for us. We recommend removal. [Republic of Korea]
7540	19	32	19	34	Sentence would be clearer if re-worded: "Response options that require land use change can make it harder to tackle poverty and hunger." [United Kingdom (of Great Britain and Northern Ireland)]
1552	19	35	19	37	The sentence is probably true but of limited use: What type of measures should be implemented? What should be implemented in order to adapt the measures to local conditions. [Belgium]

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1070	19	35	19	43	We suggest this section should be moved higher in the section B, preferably as a subsection B.1. We suggest to be more informative in the explanations by giving concrete and practical examples of the best portfolios of practices. Given the importance of the range of projections, we suggest to provide detailed information about the main uncertainties and the main drivers behind these projections. [France]
500	19	35	19	43	Simplify and classify, including in underlying text [Ireland]
4992	19	35	19	43	This para does not reflect the underlying paragraphs in a correct way. It should come clearly across that a specific action can either contribute to reaching also other targets (such as other SDGs), or result in a conflict with other goals and international agreements. The conclusion of B7.4 should also be more explicitly stated here. [Sweden]
7542	19	35	19	43	B7 is rather long and clumsy, and I don't understand the concept of a negative area. Suggest instead: "The land area devoted to agriculture and forests in 2100 depends on the desired climate outcome, the portfolio of options chosen and the policies developed to support their implementation. The agricultural area could be between x and y million km2, and the forest area could be between a and b million km2. To address desertification, land degradation and food security, the best response options will vary according to location." [United Kingdom (of Great Britain and Northern Ireland)]
4632	19	35	19	43	This highlight seems to follow on more naturally from B5, whereas B6 does not seem to fit at all. Nobody mentions unplanned unknowns, unless the term 'risk' is all encompassing. If so, then risk should be defined somewhere for the reader to understand the scope of the assessment. [United States of America]
4634	19	35	19	43	The syntax of B7 is difficult to read. It should be revised for clarity. [United States of America]
8452	19	36	19	36	include after ... land degradation, biodiversity loss and enhancing food security [European Union (EU)]
944	19	37	19	37	Please check if "local" is not more suited than "location" here. [France]
1446	19	39	19	39	The concept of "land-use pathways" could be part of a definition box that we suggested. [Luxembourg]
4638	19	39	19	42	"... different land-use pathways can arise with large differences in the projected 2100 agricultural and forest area (high confidence). Projections range from minus 5.2 million km2 to plus 3.4 million km2 in the case of agricultural area, and minus 3.1 million km2 to plus 7.5 million km2) for the forest area." The first sentence here is discussing projected areas, and the second refers to negative projected areas. Presumably this discussion should be about projected changes. [United States of America]
946	19	40	19	42	We suggest to improve the clarity of this sentence by providing more elaborated information on the underlying reasons for such a large range, and to precise if grazing area is included in agricultural area or not. [France]
7546	19	40	19	42	Final sentence - again would recommend acknowledging the implications of these huge ranges. [United Kingdom (of Great Britain and Northern Ireland)]
7544	19	40	19	43	It may be slightly too much detail to put the detailed numbers of land use change in the headline message of B7 - these could be moved down into the underlying paragraphs, and instead replaced with a statement of the key message that the sign and magnitude of agricultural and forest land use area varies depending on the portfolio of response options selected. [United Kingdom (of Great Britain and Northern Ireland)]
4640	19	42	19	42	Remove ")" after km2 [United States of America]

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5170	19	43	19	43	SPM Fig. 4 → Figure SPM 4 [Republic of Korea]
4636	19	35	20	4	This is a key finding with relevance for the B6 headline statement. Suggest that it replace the last sentence of the B7 headline statement, and that that sentence be moved to B7.1. [United States of America]
8448	19	35	20	22	B7 is important since it gives an overall framing to the discussion of benefits & risks to deployment of land-based response options at scale. It should be placed earlier in section, for example after B1. (certainly before sections B5 & B6). It is better to introduce readers to this quantified overall context, before discussing the individual implications (food security, mitigation at scale etc) in greater depth. [European Union (EU)]
8450	19	35	20	22	Section B7 focusses on bioenergy (with or without CCS) and afforestation as the main mitigation options, referring to the pathways modelled. It is, however, unclear whether the models identified these options endogenously, after considering all potentially significant land use options and opportunity costs, or they were exogenously determined (e.g., because they may be easier to parameterise), thus other land options may not have been similarly explored. It would be useful for the SPM to elucidate this issue in some detail. [European Union (EU)]
1812	19	35	20	22	We would kindly suggest adding a note on the adverse impacts of large scale land use change in paragraph B7 to capture the contents of the sub-paragraphs in a more balanced way. That is, only a small number of modelled pathways achieve 1.5°C with limited carbon dioxide removal (land use change), and thereby prevent adverse impacts on land degradation, desertification, and food security. These pathways rely on behavioral and lifestyle changes. [Finland]
7830	19	35	20	22	This section is very important and important to keep. However the nature of this section would imply an earlier placement, e.g. in B.2. [Norway]
2762	19	1			Please include 'forest restoration': "In areas where afforestation, reforestation and FORSEST RESTORATION occur ...". Please also add forest restoration to glossary (it is our understanding this can also occur on existing but degraded forest land). [Germany]
1288	19	32			Please clarify the phase of 'life on land' is it is not clear. Is this referring to ecosystem health? [Canada]
5524	19	36			Include word (concept). "...and food and WATER security... [Brazil]
3008	20	1	20	3	Suggest reconciling differing viewpoints: on one hand it is stated here that large-scale bioenergy is one of the critical pathways to limit warming to 1.5C; on the other hand a lot of the discussion in the preceding sections is highly negative towards large-scale bioenergy, especially in relation to perceived threats associated with land use and food production, without much consideration on how the large scale bioenergy deployment can be achieved sustainably. Is this the message that is intended - i.e. that the choice is between producing enough food and living with a warmer world; or limiting global warming and having insufficient food for the world's population, and a range of other associated environmental problems? That is how the text reads at the moment and may lead to perverse policy outcomes. [Australia]
948	20	1	20	3	"reforestation/afforestation": agroforestry should not be omitted. Trees on croplands and rangelands have a huge potential for both climate change mitigation and adaptation [France]
4642	20	1	20	3	Reducing deforestation and forest degradation are also referenced as necessary components of most 1.5°C pathways. [United States of America]

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5526	20	1	20	4	Paragraph B7.1 reflects relevant information from the full report that somehow contradicts what is stated in paragraph 5.2 of the current draft SPM. To adequately summarize the tradeoffs and potential synergies involved in land-based mitigation measures in a meaningful and useful way for policymakers, paragraphs B5.2 and B7.1 should be merged, as we already proposed in Comment No. 3 (above). [Brazil]
1290	20	1	20	4	it would be helpful to include here the area of land used for these purposes in 1.5C pathways to be able to understand if the land area exceeds (or not) the threshold limits identified on page 18 lines 32-35 for moderate risks to food security, land degradation and desertification. [Canada]
7832	20	1	20	4	Please check this with the 1,5C report, eg how large-scale is used there. Including if it is correct to use "large-scale" in relation to bioenergy or if it is the combination of reforestation/afforestation and bioenergy (some scenarios rely more on afforestation than others). tThe scale of these solutions also depend on how fast other emissions such as from fossil fuels are reduced. Please also check if this sentence also should be related to 2 C (for 2 C there will be net zero emissions from about 2070). It is also a link between what is said in section B 7.1 and B 7.3 about the risks and limitations related to large-scale bioenergy and the amount of land needed for bioenergy and BECCS. Therefore these sections may be combined. [Norway]
7834	20	1	20	4	A recent analysis identifies several Natural climate solutions (NCS) that could be implemented immediately, and suggests that these could provide substantial climate change mitigation. However the role of NCS in contributing to mitigation is not adequately reflected in the current text. Suggest to insert "natural climate solutions" after "with most including": So that it would read: "...with most including natural climate solutions, reforestation/afforestation, large-scale bioenergy...". REF: PNAS: https://www.pnas.org/content/114/44/11645 [Norway]
7548	20	1	20	4	It might be helpful for policymakers if you compare the land area required here with that in B5 (i.e. what is the limit of land area that can be used with limited trade-offs)? The SR1.5 recognises that there are different pathways to 1.5C so important to also capture that not all trade-offs are the same and it depends on policy pathways. [United Kingdom (of Great Britain and Northern Ireland)]
4644	20	1	20	4	Suggest adding text here to be clearer that these activities generally involve high levels of land use change (implicit and understood by technicians, but as this is for policymakers, the point should be made more clearly). [United States of America]
4646	20	1	20	4	B7.1 would benefit from more detail; suggest quantifying what is meant by extensive. [United States of America]
4648	20	1	20	9	These are key findings with relevance for the B6 headline statement and could replace the last sentence of the B7 headline statement. Suggest expanding characterizations of pathways to include at least 'well below 2°C', '2°C', and 'above 2°C'. The last sentence of the B7 headline statement could be moved to a subheading. [United States of America]
4650	20	1	20	9	B7.1 and B7.2 present a binary finding of results below and above 1.5°C, lumping all pathways above 1.5°C together, when both the impacts of and mitigation needed for, say, 'well below 2C' and 'over 3°C' are widely divergent. This is the information that policymakers must weigh, and a binary result is not helpful. This made sense in the unique context of the 1.5°C Special Report, but in this context is arbitrary. Suggest expanding characterizations of pathways to at least 'well below 2°C', '2°C', and 'above 2°C'. [United States of America]

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4652	20	1	20	9	B7.1 and B7.2 should be elevated to bold headings. Either that or combine and move forward in the SPM, perhaps as an A1 insertion. [United States of America]
4654	20	1	20	9	Bioenergy is necessary to meet ambitious GHG reduction goals, according to the authors. Other parts of the summary state that bioenergy is contrary to sustainable development goals. Do the authors intend to imply that GHG reduction goals are therefore contrary to "real" sustainable development goals? Compare to SPM p. 18 lines 27-35 (along with other sections in the chapter), which declare the risks of bioenergy production to be in opposition to goals for sustainability. Additional nuance would more appropriately reflect the state of scientific knowledge at this time. [United States of America]
2770	20	1	20	22	Please consider joining B7.4 and B7.1 since they both address the relevance and extent of land-based mitigation for 1.5C-pathways. [Germany]
1620	20	2	20	2	When writing "large-scale bioenergy" a link with potential threats of this option could be sketched, as reported in B5.2 [Italy]
38	20	4	20	4	Add: "Without the widespread uptake of sustainable land management, such mitigation has the potential to jeopardise sustainable development and the achievement of the sustainable development goals (SDGs) that depend on land-based, ecosystem services (high confidence)". {SR1.5; 1.3.2} "Similarly, efforts to reduce deforestation and forest degradation, conserve and enhance forest carbon stocks, and sustainably managed forests globally can contribute significantly to reducing greenhouse gas (GHG) emissions and to carbon sequestration in living biomass and forest products". Source:UN Environment (2019). Global Environment Outlook – GEO-6. Nairobi. DOI 10.1017/9781108639217, p.208. [Poland]
5172	20	4	20	4	SPM Fig. 4 → Figure SPM 5 [Republic of Korea]
7550	20	4	20	4	It would be worth including this (slightly paraphrased) important statement from Ch.5 (p85 row 46): "There is high agreement that better assessment of BECCS mitigation potential needs to be based on increased regional, bottom-up studies of biomass potentials, socio-economic consequences (including on food security), and environmental impacts in order to develop more realistic estimates (IPCC 2018a)." [United Kingdom (of Great Britain and Northern Ireland)]
950	20	5	20	9	This sentence is not wrong but can be misleading. Please consider an alternative wording for this paragraph as the first part could be perceived as promoting other pathways than the 1,5°C. We suggest: "Pathways ensuring a warming below 1,5°C require more land-based mitigation but the impacts [...] become less severe". [France]
7552	20	5	20	9	B7.2 should read "Pathways in which global warming exceeds..." to clarify that this is referring to a long-term warming trend, rather than a temporary exceedance of 1.5°C for example on a monthly scale. It would also be helpful to clarify if this applied to both overshoot and no-overshoot scenarios. [United Kingdom (of Great Britain and Northern Ireland)]
8454	20	7	20	7	include after ... desertification, biodiversity loss and food insecurity [European Union (EU)]
4994	20	7	20	7	Please explain what in SSP3 is the reason for this. And how does "especially" compare with SSP2 (and SSP1)? Perhaps use the same expression, if appropriate, as on line 13: "depending on the socioeconomic pathway". [Sweden]

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5174	20	9	20	9	SPM Fig. 2 → Figure SPM 2, SPM Fig. 4 → Figure SPM 6 [Republic of Korea]
1550	20	10	20	12	may' result: is a bit weak.....could be a little stronger such as 'will ' [Belgium]
1618	20	10	20	12	Cross-ref with B5.2. The same concept is already reported there. [Italy]
4656	20	10	20	14	These two sentences lack confidence statements. [United States of America]
4658	20	10	20	15	The Integrated Assessment Models shift the burden of carbon dioxide removal activities, CDR, to BECCS partly because of assumptions of how to scale alternative strategies like Direct Air Capture, and how to make DAC economic. These economic assumptions around non-natural climate solutions are highly uncertain and should be mentioned because it would significantly impact the CDR portfolio. [United States of America]
4660	20	10	20	15	KEY ISSUE [LAND-COMPETITION]: This SPM and related text in Chapter 6 present a balanced summary of the potential benefits and tradeoffs associated with bioenergy deployment. Conversely, the biomass/bioenergy discussion in Chapter 2 (page 2-85) does not offer a balanced representation of bioenergy and the related discussion on iLUC is incomplete and biased toward presenting iLUC as a tertiary, non-important element whereas in some scenarios, including those presented in the rest of the report, show that biomass deployment can have significant land use and land use change implications. Recommend revising or removing this bioenergy and related iLUC section in Chapter 2. [United States of America]
2772	20	10	20	17	The first sentence of this paragraph repeats "large increase in area" without qualifying which area(s), and which cultivation systems. Please include this information. Also we suggest moving the last to sentences, beginning with "The effects of bioenergy..." to the beginning of this paragraph and then to follow with the statement on pathways, as it seems the final two sentences are the main message and the pathways are the evidence supporting this message. [Germany]
5528	20	10	20	18	The third sentence of paragraph B7.3 ("The effects of bioenergy production on land degradation (...) are scale and context specific") is a general statement pertaining bioenergy, while the other sentences in this paragraph are themselves scale and context specific. Therefore, this third sentence should open the paragraph and be followed by the other statements. To better organize the argument and reflect what is stated in the full report, Chapter 6, Cross-Chapter Box 7, the following rephrasing and changes are proposed: "The effects of bioenergy production on land degradation, water scarcity, biodiversity loss, and food insecurity are scale and context specific (high confidence). The amount of land needed for bioenergy and BECCS ranges from nearly 0.8 to 6.6 million km ² , depending on the socioeconomic pathway and the warming level. Pathways that include large increases in are for bioenergy crops may result in increased competition for land and can have adverse side-effects for water scarcity, biodiversity, land degradation, desertification, and food insecurity, if adequate and careful management is not implemented. Depending on the scale and regional context, large areas of monoculture bioenergy crops that displace other land uses can exacerbate these challenges, while integration into sustainably managed agricultural landscapes can alleviate them." [Brazil]
5384	20	10	20	18	"achieve 1.5°C" doesn't really make sense. Better would be, e.g., "limit warming to 1.5°C" [Gambia]
566	20	10	20	18	In addition to bioenergy, solar farming and wind energy may also be emphasized which appear to be much more environmentally friendly land uses, including in degraded lands, in arid areas with low /no water consumption. [India]

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4996	20	10	20	18	This section is found under "B. 7 Delivering climate mitigation and adaptation...". Still it just focuses on problems connected to biomass expansion all the way up until the final subordinate clause "..., while integration into sustainably managed agricultural landscapes can alleviate them". This runs the risk of emphasising the problems without emphasis on solutions and possibilities. Suggest some development of the solutions -side. The same applies for the "context-specific", i.e. messages where (regions, governance regimes, lifestyle choices) positive solutions can be possible would be useful. [Sweden]
7836	20	10	20	22	B7.3 and B7.4 is especially important and important to keep. Could there be added some more text on what is included in "behavioral and lifestyle changes" in B7.4? We would like to see illustrated the economical consequences if these pathways with limited carbon dioxide removal is not followed [Norway]
4998	20	12	20	13	How do these areal extents compare to what is mentioned under B5.2? (About the same, but one sort of gets the idea that in B5.2 there areas can be dedicated to bioenergy, but here in B7.2 the same areal extents lead to much more severe impacts.) Could this be clarified? [Sweden]
7554	20	12	20	13	This gives information on the land requirements of bioenergy/beccs but not forests (which are included in B7.1). Again, this gives the misleading impression/focus on the challenges of BECCS/bioenergy when all land response options have strengths, limitations and challenges. [United Kingdom (of Great Britain and Northern Ireland)]
952	20	12	20	14	Does it mean that high risk to food security , land degradation and desertification cannot be avoided, as per max. area for bioenergy given in B.5.2? This is a question that readers are very likely to have by comparing the amount of land for BECCS mentioned in B7.3 and amount of land for BECCS mentioned in B5.2. Answering that question pre-emptively would be helpful. [France]
308	20	12	20	14	The range of the amount of land needed for bioenergy and BECCS ("nearly 0.8 to 6.6 Mkm ² ") seems to be quoted from Cross-Chapter Box 9 in Chapter 6, but 0.8Mkm ² and 6.6Mkm ² are values for different years (0.8M is for 2050 and 6.6M for 2100). Japan suggests quoting values for the same year (2050 or 2100) for accuracy of the information. [Japan]
4662	20	12	20	14	The amount of land needed for bioenergy also depends heavily on the feedstocks and production systems used. This should be made clear. [United States of America]
8456	20	13	20	13	Which pathways does it includes? What is the difference between this range 0.8-6.6 Mkm ² and the range 2-6Mkm ² mentioned page 18 line 34 "with low to moderate risk of food security, land degradation..." [European Union (EU)]
7556	20	13	20	13	Is this land area consistent with the values in B5.2? It's important that policymakers are able to understand the read across different sections and where the big trade-offs are [United Kingdom (of Great Britain and Northern Ireland)]
8924	20	15	20	15	Write: "...are scale and context specific and generally negative (high confidence)." [Liechtenstein]
7838	20	15	20	15	Please consider to elaborate on what you mean by "scale and context specific" [Norway]
8848	20	15	20	15	Write: "...are scale and context specific and generally negative (high confidence)." [Switzerland]
3010	20	15	20	17	Suggest reflecting this balanced statement (that reflects the literature - for example, as presented in the Bioenergy Box in chapter 6) in Figure SPM3, which tells only the negative side. Management of the system will have a substantial effect on potential impact. Figure SPM3 should be modified for consistency with this text. [Australia]

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954	20	15	20	17	Please check the consistency between the text of panel C of the figure SPM-2 page 13 and this statement which is more balanced. [France]
956	20	15	20	17	Usually, landscape include other land categories than agriculture. We suggest to deleted agricultural and to keep "sustianably managed landscapes". [France]
4664	20	17	20	17	perhaps 'partially alleviate them' [United States of America]
5386	20	19	20	19	The figure therefore needs to be extended to reflect the effect of scale of deployment, which could easily be done by e.g. compartmentalizing the filled cells in the current table. [Gambia]
4666	20	19	20	20	This sentence lacks a confidence statement. [United States of America]
1292	20	19	20	22	What is meant by "less resource intensive diets"? This paragraph is critical since there is much interest in understanding how 1.5C might be achieved without relying heavily on BECCS. As written, it is not at all clear how such pathways differ from others that meet 1.5C. All pathways require rapid reductions in GHG emissions from other sectors. If the key difference relates to behavioural and lifestyle changes, the needed changes need to be clearly identified. [Canada]
2774	20	19	20	22	As stated in the FOD of the SPM on P13, para B1.4 actions in the land sector alone will not limit temperature within the Paris Agreement's limits. Therefore, please modify this sentence to "A small number of modelled pathways achieve 1.5°C with limited carbon dioxide removal (CDR) or without BECCS. These pathways rely on rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence) and on behavioural and lifestyle changes, including less resource intensive diets and reduction of food waste, sustainable agricultural intensification, and rapid reduction of GHG emissions in other sectors (high confidence)." The new text is taken from para C.2 of the SR1.5 SPM. The addition of "sustainable" is added for consistency with the description of SSP1 in Fig. SPM.4 under the header "AGRICULTURE". [Germany]
5000	20	19	20	22	This is a very important aspects. It should be stated more explicitly what the "a small number of modelled pathways" implies. Have such options tried out only in a small amount of models and pathways? Are also some other assumptions needed in order to behavioural and lifestyle changes to have an effect? I.e., it the reason model set-up/assumptions, or the conclusion that these measures are not very effective? [Sweden]
7558	20	19	20	22	A lot of time is spent discussing the challenges of land based measures such as BECCS (which is important to do). However, you need to be much clearer throughout these sections about the implications of NOT deploying BECCS at large scale. This is the only reference to the need for rapid reduction in other sections in the absence of BECCS. However, it should be made plain throughout, so that policymakers can be very clear about the implications and trade-offs of not deploying land based mitigation at scale. You need to make it clear that not doing so implies potentially fewer sustainability trade-offs, but potentially also that it makes it harder to meet Paris temperature goals, with the consequent climate impacts that occur. At the moment, you present the case (fairly) that BECCS etc is problematic, but do not place it in an appropriate context. So please make it much clearer in B5 to B7 what the implications of not being able to rely on BECCS are - namely much more challenging emission reduction targets and, quite possibly, a lower chance of meeting temperature goals. [United Kingdom (of Great Britain and Northern Ireland)]
5176	20	20	20	20	Behavioral and lifestayle change should include smart land use (planning). [Republic of Korea]
958	20	20	20	22	We suggest to add "low energy demand" in the features underlying these pathways. [France]

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960	20	20	20	22	It seems worth specifying that the reports recommends "agricultural ecological intensification". [France]
310	20	20	20	22	It seems that these pathways do not rely on behavioral and lifestyle changes only, but also reflect technological changes including information technological innovation etc. according to literature, e.g., A. Grubler et al. (2018, Nature Energy), for example. Therefore, we would suggest revising it to "These pathways assume behavioral and lifestyle changes including less resource intensive diets and reduction of food waste as well as technological changes including information technological innovation." [Japan]
8692	20	1	21	1	Use of biological feedstock/HWPs for material substitution (eg, of fossil fuels, steel and concrete) is also an important mitigation avenue, and could be further explained and the potential quantified. This response option could also be added to the diagram on page 21. [New Zealand]
582	21	0	21	0	Figure - SPM-3: "Increased food productivity" - This can happen with chemical and water intensive practices. May change "Increased food productivity" to "Sustained increased food productivity". [India]
316	21	0	21	0	FigureSPM.3; It shows three coins for "Bioenergy and BECCS". But three coins for "bioenergy " seems to be too high. It might be a good idea to separate Bioenergy and BECCS. [Japan]
318	21	0	21	0	Figure SPM.3 indicates that reduced deforestation and degradation give a positive impact on adaptation. However, it is not clear why the magnitude of its impact is lower than others. Reduced deforestation and degradation significantly contribute to watershed protection, landslide prevention and biodiversity conservation, and these impacts extend over a large area. Difficulty of quantification (mentioned in Chapter 6, Table 6.55) is also true for other impacts. Therefore, recommend reconsidering magnitude of its impact and, if necessary, change its color to deep blue. [Japan]
8644	21	0	21	0	Increased soil organic carbon content is unlikely to be high in many soils particularly those with already high soil carbon as increased temperature will mean greater microbial activity and potential carbon losses [New Zealand]
5530	21	0	21		Delete Figure SPM.3. Justification: there is a fundamental inconsistency in Figure SPM.3 that is very difficult to address. In several excerpts of the current draft SPM, and particularly in figure SPM.3, it is somehow implied that bioenergy feedstock supply systems are considered as a separate type of land use, apart from agriculture and forestry practices that deliver multiple products. However, bioenergy systems can be - and in fact frequently are - part of most of the response options listed for the categories agriculture, forestry, soils, and other ecosystems. This fundamental inconsistency regarding how bioenergy is addressed in figure SPM.3 is misleading and significantly misrepresents the complex dynamics of bioenergy systems as currently implemented (not to mention the disruptive transformation that can result from innovative bioenergy and BECCS technologies). Moreover, bioenergy systems contribution to adaptation, desertification, land degradation, and food security, as well as the implementation costs of bioenergy (characterized as "high cost" in the table) are highly variable, depending on scale, context, regionalization, prior conditions and specific implementation. This extremely negative representation of bioenergy and BECCS in Figure SPM.3 is simply not justified by evidence. Since Figure SPM.3 is not able to adequately represent the complex dynamics of bioenergy systems in its inter-relation with most of the other land-based response options included, there seems to be no other way of addressing this inconsistency other than by deleting Figure SPM.3 from the SPM. Policymakers may misunderstand the role of afforestation in enhancing food security. Analogous concern applies to reforestation and forest restoration. [Brazil]

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1298	21	1	21	1	Graphic acronyms for High, Medium, and Low are easily confused with Large, Moderate, and Small. Suggest using language for magnitude of impact that would not be confused with confidence levels. [Canada]
2776	21	1	21	1	Fig. SPM.3: We do not understand why the adaptation contribution of the response options dietary change and reduced food waste are not qualified in the figure. In the underlying report, there is information on the positive impact on adaptation in various location. For example: (1) Reducing meat consumption is an adaptation measure, "because it reduces pressure on land and water and thus our vulnerability to climate change and inputs limitations." (Ch. 5 p. 55 ll. 35) (2) According to Figure TS.12, dietary change feature high and food loss even very high adaptation potential. Therefore, we request the authors to add a qualifier for the adaptation contribution of dietary changes and reducing food waste. [Germany]
2778	21	1	21	1	Fig. SPM.3: Throughout the report the approach and scale for different options such as bioenergy and biochar are discussed as important factors affecting the different targets as well as other aspects of sustainability. This differentiation is missing in the Fig. SPM3. An important message goes missing, namely that small-scale, decentral, integrated approaches can help achieve all of these targets and this can include bioenergy as a component. Perhaps this potential is less than what is modelled in simplified large scale systems, but scale should be mentioned as a factor and differentiation somehow reflected. [Germany]

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2780	21	1	21	1	<p>Fig. SPM 3. We highly appreciate the effort of the authors to provide an assessment of the effectiveness of the various response options for different policy goals. However, the current presentation of the contributions of the three response options (based on land, value chain and risk management) to the five land challenges is conceptually not convincing and the information is shown in an oversimplified manner that is misleading due to the following reasons:</p> <ul style="list-style-type: none"> - There is a lack of differentiation in the effects of the measures and there is no information on the underlying assumptions (in particular the scale and extent of application of a given option, and the SSP scenario and level of warming). However the effect of options and their costs would be very different for different conditions. - The figure disregards any cross references (synergies, negative feedbacks, co-benefits or trade-offs, and unclear system boundaries) between the individual options, and - as stated in the caption - the options are not additive. However, these specificities are not obvious and the reader gets quite a binary impression of almost all options being positive/blue with a few negative/red effects only for bioenergy and BECCS, biochar and afforestation, which is too negative as the effects heavily depend on scale and way of implementation as shown in this report. In addition, "very red" with low confidence is misleading. - The thresholds for assessing the contributions are not chosen with equal logic, thus the response options can not be compared as intended; for example: for mitigation, the threshold is set to the maximum achievable result, but in all other options the reference is much lower than "max". In addition, levels are set to different quantiles of the range of possible outcomes, what makes comparisons even more difficult. <p>Because of these reasons we suggest either strongly modifying this figure or replacing it by more nuanced presentation in order not to loose this important information from CH6 but avoiding the shortcomings listed above and in our comments on the individual assessments provided in Fig. SPM 3. We have some suggestions which we hope you will find useful:</p> <ul style="list-style-type: none"> - Build upon the text of TS, P24 L 30 - P 35 L 10 clearly indicating the limitations of the assessment mentioned above, and provide contextual and more differentiated information as much as possible as well as confidence statements. - Complement the information on the technological potentials assessments of the economic and sustainable potentials (see e.g. Figure TS.6) or at least clearly indicating that the assessment only considers the technical potentials. - Provide a table merging information from Fig. SPM 3 / TS P34-35, Table TS.1, Figures TS.6 and TS.14 or Figure 6.5 in order to provide a fuller picture of the relevance of the individual options. - Please see also our comments on individual cells of this table. <p>On a side note: We noticed that "enhanced weathering" mentioned in TS P24 is not included in Fig. SPM 3, which we support due to the uncertainties of this approach. [Germany]</p>
2782	21	1	21	1	<p>Fig. SPM.3: According to the information from the underlying report "increased food production" would only have positive contributions to all land challenges if implemented in a sustainable manner. Please modify. [Germany]</p>

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2784	21	1	21	1	Fig. SPM.3: Please clarify that the food system approach presented in CH5 Figure 5 P9 is applied consequently in the assessment of the contribution to food security. Implementing some response options that correspond to land demand might result in lower food production. This does not, however, directly translate into lower food security, since food security is depending on availability, but also on access, utilization and stability. Also the potential land areas affected by certain response options need to be considered. For example, the restoration & reduced conversion of peatlands only affects a rather small land area of less than 5% (see Figure TS.14). We are wondering, if it is possible to link this regional land demand with food insecurity of 1 to 100 million people without considering other dimensions of food security. Also, we are not sure about the very positive contribution to food security of many response options e.g. "increased food productivity" ("3 billion people (high confidence)") or "integrated water management" ("> 1 billion people (high confidence)") (c.f. 6.4.5). We think that the contribution to food security here, is rather a contribution to food production instead, since problems of access, utilization and availability are not considered in this assessment. We request the authors to revise and suggest to substitute 'food security' by 'food production'. [Germany]
312	21	1	21	1	Figure SPM.3 evaluates the effects of the option "Reduced deforestation and degradation" on "Land degradation". It's obvious that reducing degradation contributes to land degradation, and it may confuse the readers. If this degradation in the option doesn't mean "land degradation", please add the information, for example by saying as "and forest degradation". Otherwise, we suggest to delete "and degradation" from the option. [Japan]
314	21	1	21	1	The magnitude of impact of some integrated response options in Figure SPM.3 seems to be inconsistent with the underlying report. Japan suggest modifying cell colors of following options in Fig. SPM.3 to be consistent with the underlying report. 1) mitigation impact of Agro-forestry ("large" in Fig. SPM.3 / "moderate" in Table 6.54) 2) mitigation impact of Fire management ("moderate" in Fig. SPM.3 / "large" in Table 6.54) [Japan]
7840	21	1	21	1	The confidence levels currently absorb very much attention in this figure. Perhaps they could be somewhat toned down. It could also be confusing to interpret high, medium and low potential at first sight. Please consider to change the presentation of confidence. [Norway]
7842	21	1	21	1	The colour shading of the magnitude of potential show very many dark blue boxes. Some of these have for example much larger mitigation potential than 3 and thus "more than 3" is a bit unprecise. Also many of the boxed are the same colour (dark blue) and there is difficult to differentiate between them. Please look to Figure SPM4 in the Special Report on 1,5 degrees, to get inspiration for more options for illustrating data. E.g. use size of the boxes as a potential parameter, and perhaps outline of boxes to show confidence (solid/dashed/dotted). [Norway]
7846	21	1	21	1	It's not clear how afforestation, reforestation and forest restoration in the forest areas (originally NOT crop land) affect food security negatively. Rather, it has a positive implication on FS due to increase the availability of wild food and other non-timber forest products (NTFP). NTFP has multiple socioeconomic benefits. Moreover, the interventions can also improve land productivity by reducing soil erosion and degradation and modifying micro-climate. Please reconsider it! [Norway]

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7848	21	1	21	1	It has shown that application of biochar to soil can improve soil chemical, physical and biological attributes, enhancing productivity and resilience to climate change (Ref. 4.10.5). As indicated in Figure SPM3, it's not clear how biochar addition to soil has a large negative impact (>100 million people) on food security. [Norway]
7850	21	1	21	1	This is a very important figure. Please keep it in the SPM. Important to keep figure showing both negative and positive consequences of response options [Norway]
7852	21	1	21	1	The figure is good and should be retained. However, it is hard to interpret if you look at more options in context. E.g. the mitigation options with more than 3 Gt CO ₂ -eq/yr add up to much more than the total annual emissions from AFOLU? Which is OK, given overlap between the categories. A section outlining the total potential in important sectors would be helpful for allowing this figure to have more meaning for decision-makers. [Norway]
7854	21	1	21	1	In addition to Agriculture, Forests, Soils and other ecosystems, please consider including water (quality, quantity, groundwater, surface-water, etc) as a unit to examine the component of response options based on land management. [Norway]
7856	21	1	21	1	Please clarify the assumptions behind "afforestation" [Norway]
5002	21	1	21	1	This figure is difficult to interpret. For example, while in section B the report says: "Adding biochar to soil sequesters carbon and can improve soil conditions in some locations", the figure implies that "biochar addition to soil" has a large negative impacts on food security. It is not readily clear how this fits together, not the least when positive effects typically occur on tropical and sub-tropical soils - areas where food security can already be an issue. Another example is "Bioenergy and BECCS" that is described as negative for all factors but mitigation. This is a matter of scale and underlying assumptions, for example, risks would reasonably be much less if complemented with more efficient use of fibres and materials (wood). [Sweden]

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5004	21	1	21	1	Figure SPM.3 does not give a fully enough correct description of costs and potentials for different types of measures, it integrates so much over different aspects that important aspects vanish. The caption on page 22 does state (page 22, line 4) that the potentials are for the global scale, but for clarity, it should be mentioned that the outcome can vary a lot between regions, and practices. For example, (i) some bioenergy can be done at a low cost and is generally much cheaper than BECCS. The table should for this reason present bioenergy and BECCS separately. (ii) In the table, it has also been assumed that biochar and BECCS are carried out on a massive scale, which of course can result in negative effects. However, if measures such as biochar, bioenergy are carried out on a smaller scale and are based on waste from agriculture, households and forestry, much of such negative effects could be avoided. After all, studies do show that small-scale biochar use can improve agricultural production on depleted soils in the tropics and thus contribute to increased food safety. (iii) Furthermore, several measures are linked to each other as pointed out on page 25 in the report “A combination of dietary change and other demand-side measures and with waste reduction and other supply-side measures could expand the potential to apply other options...”. Thus, during certain conditions there could be a potential to expand bioenergy, biochar and BECCS without negative effects on food safety. However, there could also be competition for biomass between biochar and BECCS/bioenergy. (iv) The table should also highlight the measures that result in more permanent carbon storage such as biochar and BECCS. The challenges with permanence, reversible flows and carbon saturation that are typical of several of the measures included in the table would also seem to be important to mention. [Sweden]
5006	21	1	21	1	The application of bioenergy integrated in existing value chains in agriculture and forestry is not addressed at all and needs to be included as a separate response option. The response option Bioenergy and BECCS only refers to expanded area of bioenergy crop production, and should thus be renamed to better describe the content. BECCS should be treated as a separate standalone response option since it can be applied also for example together with integrated bioenergy applications. BECCS does not by itself affect Adaption, Desertification, Land Degradation or Food Security. [Sweden]
5008	21	1	21	1	It is not very useful that SPM-3 presents some of options as isolated from each other despite that they can be combined. An obvious example, “Bioenergy and BECCS” is presented as an option that is separate from many other options despite that these can be combined: bioenergy systems can be combined with many (most) of the response options listed for the categories agriculture, forestry, soils, other ecosystems. It appears like response options such as “Forest management”, “Reforestation and forest restoration”, “Afforestation” cannot include a bioenergy component. This is not how it is in real life. This would be need to be clarified in the figure and/or caption. [Sweden]

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5010	21	1	21	1	The SPM-3 technical caption for cost ranges should make clear whether the costs have been derived consistently based on one common method. Is it correct that costs estimates have been gathered from a number of different studies focusing on specific mitigation options and using different methods, base year, etc.? If so, in the SPM-3 technical caption please add clearly the information on where in the report these different cost estimates are presented. Specifically concerning bioenergy and BECCS: this option is stated to be "high cost" (but bottom-up cost estimates indicate a wide cost variation). Griscom et al states a range (~40 USD MgCO ₂ -1 to over 1,000 USD MgCO ₂ -1) without specifying the shape of the cost-supply curve behind that range. It can be confusing to compare costs across "mitigation size" groups, i.e., compare one option providing small amounts of mitigation with another option providing large amounts of mitigation. [Sweden]
5012	21	1	21	1	Comments about the category Bioenergy and BECCS, which is stated to have: 1) Large negative impact on land degradation (medium confidence). This is not necessarily so across the board. Which type of "bioenergy" system? Worldwide application of unsustainable residue harvest rates? Intensive cultivation of annual biofuel crops on all sloping lands with erodible soils? Are these appropriate representations of the generic category "Bioenergy and BECCS"? The proposition that there will likely be large negative impact on land degradation (across geographies) is probably not correct, considering that there exists many decades of publishing on how appropriate location, and management of lignocellulosic biomass cultivations can help address land degradation challenges and make economic use of marginal agriculture lands where cultivation of conventional food/feed crops is difficult and often cause soil degradation. [Sweden]
5014	21	1	21	1	Comments about the category Bioenergy and BECCS: "Small contribution to adaptation (low confidence)". This is somewhat curious as biomass feedstock supply systems commonly combine with other response options and these are stated to make moderate to large contributions to adaptation. If the idea is to refer to some Bioenergy and BECCS systems, but not others, this should be stated more clearly. [Sweden]
5016	21	1	21	1	Comment about Bioenergy and BECCS: "Large negative impact on food security (medium confidence)". In relation to food security it is certainly necessary to specify explicitly what types of bioenergy and BECCS systems are referred to, as this statement probably does not apply to all systems; geography, socioeconomic and governance context matters as well. [Sweden]

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5018	21	1	21	1	<p>Lot of the statements would seem to align with a scenario where many hundred million hectares of monocultural bioenergy plantations displace food crops from prime croplands and/or displace tropical forests and other natural ecosystems. If this indeed is the case, it should be clearly stated so that readers understand that other bioenergy scenarios have not been considered (and/or have other attributes/consequences). Now one option (bioenergy and BECCS) stands out as a very negative option. The scientific literature is not so straightforward on this. During the earlier review round of the Land report, the following text was included: The consequences of bioenergy expansion vary due to the wide range of specific geographic, technical and institutional contexts (high agreement). Bioenergy deployment can cause both positive and negative effects so integrated responses, policy coherence and good governance will be needed to prevent large-scale expansion of bioenergy from exacerbating land degradation, water scarcity, biodiversity loss and food insecurity (high confidence)." Figure SPM-3 is very far from providing such a nuanced message, rather, it gives a much more one-sided and misleading representation of bioenergy (now in combination with and CCS) which is not justified by evidence. A more balanced picture could be composed by including two cases, for bioenergy and BECCS, respectively. One case can represent a scenario where residues are extracted at unsustainable rates and the deployment of bioenergy crops cause far-reaching deforestation and displacement of poor farmers from their lands. The other case can represent a scenario where residue extraction rates are limited to support biodiversity, maintain soil quality, etc. and where lignocellulosic bioenergy crops (commonly perennials) are integrated into agriculture landscapes as part of sustainable intensification strategies helping to avoid/mitigate some of the current land use impacts such as soil erosion, eutrophication, and soil C losses, help reduce the need for pesticides and support a higher level of biodiversity. [Sweden]</p>
5020	21	1	21	1	<p>The negative assessment of biochar effect on food security is inconsistent with research showing that biochar can enhance productivity, as described in Chapter 4 of the land report. This should be checked and adjusted. [Sweden]</p>
5022	21	1	21	1	<p>Why is "sustainable sourcing" stated to have negligible mitigation potential? What is the basis for this conclusion? Have the authors concluded that sustainability requirements such as the EU-RED, or market based sustainability certification will never ever make a difference? [Sweden]</p>
7560	21	1	21	1	<p>Figure SPM3 is very useful in demonstrating the synergies of response options for the 5 different land challenges; however, it does not demonstrate the trade-offs very well – or more specifically the balance between synergies and trade-offs. Presumably, any one response measure will have both synergies and trade-offs for any given land challenge, depending on the context, scale, location, and other factors, and the balance across all of these has been used to determine the overall positive or negative rating. However, given most of these are positive (with some exceptions in Bioenergy & Beccs and a few others with food security), it may give the impression that these can all be implemented without any problems and consideration given to those trade-offs. A suggestion to ensure that this doesn't happen would be to model this figure on the SR1.5 SPM4 figure – where both synergies and trade-offs are shown. Perhaps each block in the current figure could be split up into two – one positive and one negative, with the relative sizes and confidences shown for each? [United Kingdom (of Great Britain and Northern Ireland)]</p>

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4668	21	1	21	44	Avoided conversion of grasslands to croplands can be costly in order to make up for the opportunity costs associated with not switching to crops (i.e., need to make it worth it to the landowners). [United States of America]
3018	21		21		Suggest restructuring SPM.3 - This table incorrectly mixes land use (e.g., agro-forestry) with product use (e.g., Bioenergy and BECCS). The judicious use of products (e.g. for bioenergy) from a land use (e.g., agro-forestry) could have the agreed beneficial outcomes listed in the Figure in relation to agro-forestry. [Australia]
1538	21		21		fig. SPM3: seems difficult for a policymakers to conclude. This section is about the response for the 5 challenges. The figure makes a good synthesis but can be misleading. Lines cannot be added, nor completed. There is a need for some explanation. [Belgium]
1294	21		21		Figure SPM.3. This is quite a graphic with a lot of info. I find myself questioning some of the rankings put on particular response options. It would be really good if references could be provided for each box somehow. Or possibly just a list of all the sources used, if there are relatively few covering many of the options and/or criteria. [Canada]
1296	21		21		Figure SPM.3. The key for the criteria is a bit confusing. E.g., "Desertification" and "Land Degradation" are both negative phenomena, so a large "positive" value (dark blue) suggests more desert or more land degradation... which is presumably not the story. I think you should choose these headings (criteria names) carefully and make sure they are replaced throughout the figure text and perhaps elsewhere in the report so that the interpretation is consistent. E.g., "Anti-Desertification" or "Dryland Restoration" instead of "Desertification" and "Land Conservation" instead of "Land Degradation". But there may be better terminology. [Canada]
1304	21		21		The text about "Confidence level" shown at lower left of the graphic is also confusing. It reads "Levels of confidence indicate confidence in the estimate of potential..." followed by the list of "High", "Medium" and "Low" "confidence". Hence it reads as "Levels of confidence indicate confidence in the estimate of potential () confidence". Which basically sounds like meaningless bureaucratic mumbo-jumbo!! Perhaps there are some words missing after "potential"? [Canada]
1674	21		21		In Figure SPM.3, "Fire management" does not belong to "Other ecosystems", but instead to risk management. It is suggested that 'fire management' be moved from other ecosystems to risk management. In addition, it is inappropriate to classify agriculture, forestry, soil and other ecosystems side by side in Figure SPM.3. It is suggested that the author team redesign the figure. [China]
1808	21		21		It's not obvious, what for example "fire management" or "forest management" refers to more specifically. The response options should be better explained in the text. In the current form, it is not possible to understand, which measures such concepts refer to. [Finland]

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7952	21	1	22	35	Fig SPM3 summarizes and (semi-) quantifies impacts from the long list of land-based mitigation options in part B. As in earlier drafts, SPM3 is not properly balanced in its representation of most notably the option 'Bio-energy and BECCS'. Apart from its mitigation (and negative emissions) prospects, all impacts/risks are shown a negative with varying degrees of likelihood; and costs are estimated in the highest category of >100\$/CO ₂ eq or 200\$/ha. This signals that it would constitute the most undesirable and risk-prone option of all. This assessment does not do justice to the very rich and diverging literature, and seems biased towards the -potential- negative aspects. In addition, SPM3 is not even consistent with the more properly balanced paragraphs in the SPM itself. These include: B.5.1 (p.18/II.21-23) stating that 'afforestation, reforestation, bio-energy and biochar' ALL lead to pressure on land. B.5.2 (p.18/II.32-35) estimates that bio-energy can be used at 'low to moderate risks' for 'food-security, land degradation and desertification' on areas up to 2-6 million km ² , depending on socio-economic conditions. It is worthwhile to note that paragraph B.7.3 (p.20/I.13) observes bio-energy crop areas of 0.8 - 6.6 million km ² are projected in the scenarios, largely (well) within the limits given in B.5.2. In B.5.4 (p.18/II.44-45) large-scale afforestation, as required to make sizeable contributions towards 2C targets, is associated with increases in water stress; but not visible in SPM3. B.7.3 concludes that effects of bio-energy are 'scale and context' specific; and its 'integration into sustainably managed landscapes' can alleviate negative impacts. During the review of the SOD of SRCCL many additional references were provided by the Dutch delegation and others to underpin that further warrant a nuanced assessment of bio-energy and BECCS, certainly in light of its key role in meeting the Paris Agreement; see also IPCC-SR1.5C. The current SPM3 should be adjusted in accordance with the literature, as well as many underpinning paragraphs in SRCCL, so as to avoid an insufficiently supported, overly negative presentation of bio-energy and BECCS. Rightfully acknowledging that rushing towards large-scale, careless and inappropriate practices can and will have negative impacts is of course important, but outright discarding bio-energy and BECCS regardless of scale, sourcing and supply chains including cascading should be avoided in an IPCC report. [Netherlands]
7844	21	1	22	35	Ch. 2, 3, 4 and 5 of the main report brings up a number of factors and feedbacks that are involved in climate forcings, including water retention, albedo and methane decomposers in upland soils. For instance, some of these are summarized in section 2.6.2.1. Thus, we also know that these cycles can be managed for mitigation. However, considerations of mitigation in figure SPM.3 mostly falls down to GHG emissions. While focus on GHG is reasonable as potentials are more substantiated, we propose that you consider to include some language about other biogeophysical factors to be aware of, such as methane sinks, albedo, hydrological cycles etc. [Norway]
4670	21	1	22	35	The symbol for no data is misleading, and could be interpreted as no cost. Suggest representing no data as "nd." [United States of America]
4672	21	1	22	35	KEY ISSUE [GRAPHICS]: This chart is useful and could potentially inform global priorities. However the impact of these response option may vary by geography. That caveat should be provided in the header. It would also be helpful to provide information that would help policymakers determine what the impact of the response options might be in their specific geography, particularly for areas that may not be data-rich. If there is not space in the SPM, this should be provided in the supporting chapter, for example by describing the types of geographies that benefit more or less from certain response options. [United States of America]

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4674	21	1	22	35	KEY ISSUE [GRAPHICS]: As noted in the caption, the cost estimates in this figure derive from Griscom et al. (2017). That paper contains a figure that provides much more granularity about the relationship between cost and magnitude of potential emissions reductions than Figure SPM.3, yet is in many ways easier for readers to digest. Recommend that the authors consider substituting or adapting the Griscom et al. (2017) figure for all or part of Figure SPM.3. [United States of America]
4676	21	1	22	35	KEY ISSUE [GRAPHICS]: The structure of Figure SPM.3 is very helpful in many ways. The comprehensive list of options in the left-hand column, especially including demand-side options with equal weight as supply-side options, is welcome and could influence the broad dialogue about land use and land management in the context of climate change and food security. Recommend the following: 1) Authors should consider restructuring the graphic to take advantage of the approach used in Figure 1 from Griscom et al. 2017: https://www.pnas.org/content/114/44/11645 2) Reconsider strength of evidence about biochar as a mitigation strategy. The figure seems to overstate its promise. 3) Recommend reviewing the legend and associated text to make sure the reader can see clearly the assumptions underlying these assessments. For example, agricultural diversification could lead to significant reduction in emissions depending on which supply chains are impacted and how that influences land use change. Does the assessment of agricultural diversification consider supply chain impacts or does it assume no change in the amount and location of cultivated land? 4) Clarify cells that appear empty (e.g., reduced food waste / adaptation). Does this mean no impact? No evidence to evaluate? 5) Add examples in text (maybe a call-out box) of how a few response options contribute to the different objectives (mitigation, adaptation, etc.). 6) Clarify how restoration of peatlands leads to reduced food security. Is the idea that restoring peatlands takes land out of agricultural production (but isn't that mostly palm oil) and therefore leads to less caloric production and/or less nutritional food available? Perhaps reconsider assumptions that lead to this conclusion. 7) Similarly, how does biochar addition lead to decreased food security? Is the idea that dedicated land is needed to produce biochar at sufficient scale, taking land away from food production? And how does bioenergy/BECCS lead to more land degradation? A more in-depth discussion of how much land is actually available, choices we could make about how to allocate it, and what the implications of those choices are would be a big contribution. 8) Make sure the scale of the response in each of the options listed in the left-hand column is clear to the reader. It seems like the figure is addressing the global scale in all cases, but that should be very clear (some idea of \$s of ha if possible). 9) The number of rows/response options is overwhelming for the reader. Consider reducing either by combining or including in this figure – in the SPM, not necessarily in the main body of the report – those options that are most likely actionable – that readers really need to know about, those for which evidence is most robust or that offer the most promise even if with lower probability. [United States of America]

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8458	21	1	22	36	<p>Figure SPM 3. The qualification of bioenergy as something that is only negative seems to avoid answering the question on how climate change would be tackled without the use of bioenergy. This representation needs to be more balanced and take into account the science of mitigation. The figure presently is confusing and seems to indicate that the 'remaining options' can do all the work. E.g. adding up for GHG emission reductions all the 12 boxes with large potential would add up to $3 \times 12 = 36$ Gt CO₂ eq, which is (unrealistically) large and seems to ignore that some options might require more land than bioenergy and BECCS. For instance how does the figure relate to Figure SPM.2 that seems only to show such negative impacts of bioenergy in case of SSP3 (and raises the question: how much food insecurity would increase in the SSP3 scenario if climate change is not tackled). Similarly the figure seems not to reflect on the fact that the deployment of bioenergy, just like any other type of crop will be site and context specific, and may actually replace a worse crop from the perspective of soil erosion and soil carbon depletion (for instance woody biomass). Some textual guidance for interpretation would be useful, e.g. if the various options overlap and are not necessarily additive please make it clear and provide some information on the likelihood of achieving these kind of mitigation levels without the application of biomass and BECCS. The meaning of 'positive' or 'negative' for the adaptation/desertification/land degradation/food security boxes needs to be clarified. For adaptation a threshold of 25 Million lives saved is defined, but what is the meaning of positive in this context. Also for adaptation the amount of lives saved by the technical potential seems to be large- unless it is an integrated amount over 2010-2030.</p> <p>The authors should give some thought to the presentation of negative impacts with & without compensating or adaptive measures. Section B includes much discussion of how the positive/negative impacts of land-based response options depend on site-specific and contextual factors. Is it possible to reflect this in the diagram? For example, Fujimori et al (https://doi.org/10.1038/s41893-019-0286-2), in their estimate of adverse food security effects of mitigation, find that compensating measures could be pursued at a cost of <1% of global GDP. This implies that the strong negative effects shown in the picture may be an oversimplification of a more complex (and highly policy-relevant) picture. [European Union (EU)]</p>

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1078	21	1	22	36	<p>Figure SPM 3 pages 21-22</p> <p>This figure is policy-relevant with a good readability and understandability. We suggest to introduce the following improvements in the figure SPM 3 pages 21-22.</p> <p>In general:</p> <ul style="list-style-type: none"> • When printed in black and white, the dark blue and dark red zones appear the same. It could be other than colours (small dots for blue?). • The notion of costs should be precised : to which extent does it include costs and benefits analyses? How are considered the social costs? <p>Concerning the response options based on land management:</p> <ul style="list-style-type: none"> • Add “agroecology”, as it is a sustainable land management system, and encompasses among others diversification, agroforestry, ecosystem based adaptation. Diversification of agriculture, agroforestry, ecosystem based adaptation and others are quite often mentioned, but agroecology no, so we propose to add a box in the SPM to clarify that agroecology encompasses all this, so it's present even when not mentioned. • Concerning “Increased food productivity”, consider adding “ecologically” before “increased food productivity” and check the assessment about desertification and land degradation, as this response option has sometimes negative impacts (see B5.3). • Concerning “Agroforestry”, Référence au commentaire de Rémy Cardinael. • Concerning “Improved cropland management” and “Improved grazing land management”, check the assessment about mitigation, that is surprisingly identical (moderate value). Soil carbon sequestration in grazing land represents a more significant mitigation potential. If deep soil carbon is considered (eg 1m depth), permanent grazing area potential is even higher. • Concerning “Bioenergy and BECCS”, provide in the caption the meaning of BECCS; • Concerning “Increased soil organic carbon content”, check the level of confidence for adaptation assessment (currently “low”). <p>Increasing soil organic matter content or reducing losses of organic matter from soils will also contribute to adaptation of agriculture to climate change (e.g. reducing erosion, increasing water storage/content in soils...).</p> <ul style="list-style-type: none"> • Concerning “Biochar addition to soil”, check to assessment as the mitigation component appears to be very positive, which is contrary to some of the findings in the report: "evidence is limited and impacts of large scale application of biochar on the full greenhouse gas balance of soils, or human health are yet to be explored" (Chap 1 lign 36-37 page 36). Biochar has a high mitigation potential locally but as it requires a lot of biomass / land to be produced this means that the global/world potential is to be reduced: moderate to small... See B 5.1. on page 18. <p>Concerning the response options based on value chain management,</p> <ul style="list-style-type: none"> • Move “Reduced post harvest losses” as it should be in the supply side and not in the demand side. • Add, in “demand” category, “organic waste recycling” (e.g. manure, composts) that is mentioned in chapter 2 and 4. Recycling of organic waste is able to improve soil fertility and soil organic matter and to generate strong cobenefits in mitigation, adaptation, land degradation and food security.
5388	21	1	22	36	Where does biodiversity come into this figure? To have such a figure without any clear link to biodiversity would be missing an important element. [Gambia]
5390	21	1	22	36	The existence of policies alone is insufficient. Implementation and enforcement of such policies is critical. [Gambia]

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1720	21	1	22	36	There is a very problematic lack of consistency between the message sent by Figure SPM3 and the corresponding text in the SPM and the chapters. The figure clearly suggests that a few land-based mitigation options, especially biochar, afforestation and BECCS, have detrimental effects on other challenges and particularly food security. However this is a very incomplete view. The Cross-Chapter box 7 in Chapter 6 states for example that "synergistic outcomes with bioenergy are possible". The dependency of the trade-offs/synergies on the strategy and scale of deployment of these options is not at all reflected in SPM3, since it only considers the maximum potential of each option. In its current stage, the figure sends a biased message to policymakers. It should therefore be modified to better reflect how the impact these options would have is dependent on the scale and strategy of their deployment. [Saint Kitts and Nevis]
4678	21	1	22	36	Forest restoration, reforestation, and afforestation might be considered a negative for food security; however, there are many examples globally of compatible forest/agriculture systems, and forests contribute to soil quality, water retention, and other values that benefit agriculture. More interpretation and nuance are needed here. [United States of America]
2786	21	1			Fig. SPM.3: Please find the following comments and suggestions for changes: - "Improved food processing and retailing" is per definition improving the status quo and prescribing the outcome. However, processing and retailing can increase the consumption of ultra-processed foods with negative consequences for food security. The same is true for "improved cropland management". Many intensification measures have multiple and sometimes contradictory outcomes. Please revise. - "Sustainable sourcing" should have positive impact on mitigation, while adaptation is not so clear to us. Food security impacts should be positive for public procurement, but overlap with dietary change. Please revise. [Germany]
2788	21	1			Fig. SPM.3: Row "reforestation", column food security: the underlying chapter (Table 6.46) doesn't provide a clear assessment: the table does not specify values for reforestation, and in the accompanying text it clearly states that negative effects are lower for reforestation than for afforestation. Please revise Table 6.46 to be complete and consistent with the entry in Figure SPM.3. [Germany]
8460	21				colours in table for 'negligible' and 'no data' are the same (only a light line indicates the difference). Give one of both a different colour. [European Union (EU)]

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8462	21				<p>Figure SPM.3 The description of the response options should be clearer (qualified). Notably:</p> <ul style="list-style-type: none"> - "Increased food productivity" can have all the positive impacts indicated, but they cannot be generalised to all measures used to increase productivity, as some can have adverse effects on one or more of the land challenges listed. E.g., increasing inputs can involve significant GHG emissions (direct and indirect) or contribute to desertification/degradation. Increased irrigation, depending on the method and the source of water, can compromise adaptation, desertification and land degradation objectives in the areas affected by the abstraction of water. - "forest management" should be qualified, as it can have both negative and positive effects on all dimensions, depending how it is done and, in particular, what it is compared to (pristine forest or forest abandonment or an assumed, poorer form of forest management, like high-grading). Business-as-usual forest management where it is already established cannot be considered a "response option", as it represents the baseline. Changes to an already efficient forest management regime may well involve trade-offs among multiple management objectives. Chapter 6 refers to "improved" forest management. - It may be worth separating reduced deforestation from reduced degradation, as they can have different response profiles, in particular regarding the food nexus. - Reforestation and afforestation, as presented, could be merged, as there is no clear distinction between them. However, a useful distinction could be made between the creation of plantations (typically simple, artificial, production-oriented systems) versus more natural forests (typically aimed at restoring natural vegetation or similar, diverse and potentially self-sustaining forest types). They are likely to have different profiles for at least adaptation, desertification and land degradation. - under the category 'other ecosystems', it is unclear how 'reduced landslides and natural hazards' constitutes an action - The benefit of dividing the value chain management options into supply and demand side (and only those) is unclear. - Some indication of what kind of "dietary change" is assumed could be informative. Whilst many environmentally-oriented choices can also have health benefits, the opposite is often not the case. [European Union (EU)]

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8464	21				<p>Figure SPM.3 Should be reviewed for internal consistency. For example:</p> <ul style="list-style-type: none"> - Negative food security impacts are indicated for reduced grassland conversion, afforestation, biochar and bioenergy. These arise, at least partly, from reducing (directly or indirectly) the land available for food production, in particular cropland, and/or the expansion of such land. In that case, however reduced deforestation (but not reduced forest degradation) could also be expected to have such an impact, given that the biggest driver of deforestation is agricultural expansion. - Which option listed covers the change of agriculture practice of extensive grazing on (degraded) grassland into more productive agriculture practices? Can't this shift free up land as well as restore soil carbon and reduce erosion? - Is not clear why 'Reduced grassland conversion to cropland' would have lower benefits for adaptation, desertification or degradation than some of the other measures mentioned. It is also unclear why it would have a more negative impact on food security than reducing deforestation, when both processes reduce cropland expansion, and grasslands themselves are at least as likely to provide food as forests. - It is unclear to what extent the large mitigation impact attributed to bioenergy (with high confidence) in the left column takes into account the climate impacts of the undesirable side effects indicated for land pressure and degradation. - The indicated impact of biochar on food security most likely results from taking into account the land pressure resulting from feedstock production for biochar. But it is unclear why it would then not have similar effects on adaptation and desertification, as indicated for bioenergy production. Why are the impacts of bioamss production not similar? - "Management of urban sprawl" presumably refers mainly to reducing land take for settlements and infrastructure. As such, it would seem to fit better under "land management" with other land-use change options. [European Union (EU)]
3012	21				Suggest amending the figure to convey the message in the text (for example, P20 lines 15-17) that bioenergy may have a positive or negative effect on land degradation, food security, desertification and adaptation. These cells should be coloured grey to show that it can be positive or negative, or an alternative colour to represent "site-specific effects". [Australia]
3014	21				Suggest coding these cells Blue: it is very strange to see biochar shown as having a strong negative impact on food security, and no effect on adaptation. Biochar often enhances plant growth, and it increases SOC and water holding capacity, which contributes to adaptation (4.10.5.2). [Australia]
3016	21				Suggest consistency: the best implementation is assumed for "increased food productivity" whereas apparently the worst case is assumed for bioenergy and biochar. Achieving 'increased food productivity' through sustainable intensification (without additional external inputs such as mineral fertilizers and other agrochemicals) is very unrealistic. [Australia]
1854	22	1	22	1	Should it be 'Global contribution...? [Russian Federation]
320	22	3	22	18	Suggest adding , for example, the sentence "The potentials for response options are not all additive, and a total potential from the land is currently unknown" (we can see this information in chapter 6, page 6-5, line 6-8 or page 6-89, FOOTNOTE 6) for a better understanding of Fig. SPM.3. [Japan]

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1830	22	3	22	35	There are several direct references to particular papers (page 22 lines 7, 9, 11, 13, 27, 28). Why? Usually the direct references appear only in the chapters, but not in the SPM. Please, explain and justify the use of direct references. [Finland]
322	22	5	22	5	Figure SPM.3 caption; it is stated that "magnitudes are set relative to a marker level". Additional explanation of "a marker level" is necessary. [Japan]
1300	22	5	22	9	These sentences can be written better to reduce confusion. The two short sentences which both begin with 'The threshold for the "large" category...' each should be combined with their respective preceding sentences. I don't really understand what is meant by "the threshold", in either case, however, so it is hard for me to suggest an actual wording. [Canada]
5178	22	6	22	6	Gt CO ₂ [Republic of Korea]
8466	22	7	22	9	Important finding: DARA 2012 seems to be misquoted (text in the SMP is "For adaptation, magnitudes are set relative to the 100 million lives predicted to be lost due to climate change between 2010 and 2030 (DARA 2012)") The original text (https://daraint.org/wp-content/uploads/2012/10/CVM2-Low.pdf) is "This report estimates that 5 million lives are lost each year today as a result of climate change and a carbon-based economy", "This report estimates that climate change causes 400,000 deaths on average each year today mainly due to hunger and communicable diseases that affect above all children in developing countries. Our present carbon-intensive energy system and related activities cause an estimated 4.5 million deaths each year linked to air pollution, hazardous occupations and cancer." . Therefore, what seems directly relevant to climate change is 0.4 Million people (about 0.6 millions predicted in 2030), NOT 5 millions. Therefore, about 10 millions for the period 2010 to 2030, NOT 100 Millions. Authors should assess the implications of this, including, at least, a more transparent description of the threshold used [European Union (EU)]
4680	22	7	22	9	The reference to the DARA 2012 report in this figure caption – and the 25% index value – seems arbitrary. Recommend removing the reference. It is also unclear whether the adaptation impact in Figure SPM.3 refers to people affected (which would be a reasonable metric) or lives lost (which would be highly speculative, and therefore not a good metric). [United States of America]
2792	22	14	22	16	Fig. SPM 3, caption: The text indicates that the "large scale" is an assumption – but this ignores that additional assumptions for a more decentralized, integrated approach for bioenergy feedstocks can be made which - as a sum - could also add to a "large total" that can be substantiated as well. [Germany]
7562	22	16	22	18	Sustainable intensification may sometimes include well managed application of agro-chemicals rather than a complete non-use. Please clarify [United Kingdom (of Great Britain and Northern Ireland)]
1302	22	19	22	19	Please fix "Levels of confidence: Levels of confidence indicate confidence in..." How about something like: Levels of confidence: Confidence in the estimated magnitude (or relative importance?) of the contribution of each response option is shown as high, medium or low, for each land management challenge." But even after struggling with this for several minutes, it is still rather convoluted and I cannot help thinking it must be possible to show/explain this more simply. [Canada]
324	22	25	22	27	Figure SPM.3 caption; the cost range from \$100 ha ⁻¹ to \$200 ha ⁻¹ is missing. [Japan]
5024	22	26	22	27	Why is there a gap between \$20-100 (two coins) and \$200 (three coins) for the areal extent? In the other cases, both areal extent and in all cases for CO ₂ e, there are no such gaps between classes/ranges. [Sweden]

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5026	22	29	22	35	Suggest using the normal provision of references here, i.e. mere chapter-section numbers, etc., for brevity. [Sweden]
40	22	36	22	36	The figure from the previous SPM version should be added :Table SPM 1: Summary of co-benefits, adverse side effects, per 1 manence/saturation issues, costs and barriers of A) land management, B) value chain management, and C) risk management response options. {6.5.1}. [Poland]
5028	22	2	23	9	Could consider also mentioning that coherent policies will contribute also to the achievement of the SDGs, and other goals in international agreements and conventions such as CBD and UNFCCC. [Sweden]
2790	22	8			Fig. SPM 3, caption: "predicted" is not an appropriate expression for a scientific assessment, please revise. [Germany]
8468	23	2	23	2	Replace "The" with "Appropriate". [European Union (EU)]
4840	23	2	23	2	Delete the entire first sentence of the paragraph: "The design of policies,low-carbon development." [Iran]
3020	23	2	23	3	Suggest rephrasing to read: "...Governance systems can lead to opportunities in the land sector for adaptation and mitigation..." [Australia]
2796	23	2	23	3	The information of sentences like "The design of policies.... can enable..." is limited (and not new). Concrete information on the nature of the design of policies (or the suggested figure showing enabling framework for response options) would be more helpful. [Germany]
5392	23	2	23	4	'Enhanced' food security is a somewhat strange concept. Should be only 'food security'. [Gambia]
7978	23	2	23	4	The C.1. statement, particularly the first sentence, is too general and does not state more than that policies etc can enable opportunities; To be meaningful it needs to be more specific or it could be left out altogether [Netherlands]
8624	23	2	23	4	Sentence doesn't quite make sense - perhaps change word 'enable' to enhance? [New Zealand]
8470	23	3	23	3	"available" seems redundant and could be deleted. [European Union (EU)]
8926	23	4	23	4	Mutually supportive climate and land policy ..." [Liechtenstein]
8850	23	4	23	4	Mutually supportive climate and land policy ..." [Switzerland]
964	23	6	23	7	Please consider indicating that the reverse is also true and that stakeholder engagement contributes to coherent climate and land policy portfolios [France]
5180	23	7	23	7	SPM Fig. 1 → Figure SPM 1, SPM Fig. 2 → Figure SPM 2, SPM Fig. 3 → Figure SPM 3 [Republic of Korea]
1448	23	10	23	10	Please specify if climate variability includes natural variability and/or changes due to anthropogenic climate change. [Luxembourg]
7954	23	10	23	10	In C.1.1 it is unclear if climate variability concerns the current state and not the future, as anthropogenic is applied to climatic change specifically. Rephrase to clarify that anthropogenic CC is projected to alter future climate variability. [Netherlands]
4684	23	10	23	12	A sentence could be added to address non-poor communities. [United States of America]

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4686	23	10	23	17	The second to fourth sentences of C1.1 contain normative statements about what some policies can do, but some of their aims are also in conflict. To make these sentences less policy-prescriptive and more useful for policymakers, suggest rephrasing as follows: "Within specific contexts, institutions and policymakers may consider a variety of issues, including protecting people and land while creating revenue; promoting land degradation neutrality to support food security, human wellbeing, and mitigation; managing the trade-offs in a just transition; reducing vulnerability to instability; and investing in rehabilitation of degraded lands and net-zero-carbon energy." Also note that reviewers were not able to find a use of the term "dignified livelihoods" in the underlying report. [United States of America]
4688	23	10	23	17	C1.1 contains several very general statements that may be true in many cases but not in others. The policy references skate close to the line of policy-prescriptiveness. [United States of America]
8472	23	11	23	11	Change "risks to those" to "risks, particularly to those". [European Union (EU)]
3022	23	11	23	11	Suggest rephrasing to read: ".....sustained risks to those living in poverty, including food security and....." [Australia]
8928	23	12	23	12	Write: "Regulations and incentives can protect ..." because not only regulations, but also incentives, can have a positive impact [Liechtenstein]
8852	23	12	23	12	Write: "Regulations and incentives can protect ..." because not only regulations, but also incentives, can have a positive impact [Switzerland]
966	23	12	23	14	We suggest to provide more elaborated information on the kind of regulations that is here referred to [France]
7564	23	12	23	14	The sentence "Regulations can protect... net-zero carbon energy sources" sounds unnecessarily policy-prescriptive as surely this revenue and investment can be used to fund any number of policies, not just the two policies listed. If so, this should be removed. [United Kingdom (of Great Britain and Northern Ireland)]
7566	23	13	23	14	What are "net zero C energy sources"? Can we say "renewables" instead? [United Kingdom (of Great Britain and Northern Ireland)]
7568	23	14	23	14	I wonder if "shore people up" will translate well into other languages. Suggest instead "protect". [United Kingdom (of Great Britain and Northern Ireland)]
4690	23	14	23	14	What is meant by "dignified livelihoods"? Suggest re-wording. [United States of America]
968	23	14	23	15	With the use of the word "can", this phrase conveys very little information. Consider revising. [France]
2798	23	14	23	15	To a non-native speaker at least, the expression "shore up" seems not appropriate in this context. Please consider to use more formally appropriate language. [Germany]
4692	23	14	23	15	This sentence should be removed. There are significant differentiations in the subjective determination of "dignified livelihoods", making this term and concept non-operationalizable in a policy context. Additionally, the term "just transition" has implications on policy approaches depending on the definition used. Recommend using another phrase: "trade-offs in economic and social transitions." [United States of America]
8476	23	15	23	15	Replace "in" with "towards". [European Union (EU)]

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7570	23	15	23	16	The final sentence of C1.1 seems to focus unnecessarily on land degradation as if this was the main aim rather than any of the other 4 land challenges. Surely the better point is that action on any one of the five land challenges can also support action on the other four. [United Kingdom (of Great Britain and Northern Ireland)]
134	23	16	23	17	Consider changing "land degradation neutrality" to "halt and reverse land degradation" as the concept of land degradation neutrality should be further developed. [Spain]
5182	23	17	23	17	SPM Fig. 2 → Figure SPM 2 [Republic of Korea]
7572	23	18	23	22	This paragraph is phrased in an unnecessarily complicated way. It would be simpler to include a phrase such, "Land-ownership rights affect the ability of people/communities/organisations to make changes to the land that can address challenges to that land." - Phrases such as land tenure systems and tenure security are not understandable to a non-expert. [United Kingdom (of Great Britain and Northern Ireland)]
1450	23	20	23	20	The concept of "land-use policies" could be part of a definition box that we suggested. [Luxembourg]
1306	23	20	23	21	Perhaps a sentence could be added here to provide some specific examples of how land management policies affect the "options and incentives" that are particularly problematic for people living in poverty? [Canada]
7956	23	20	23	22	In C.1.2. the phrase: 'land policies affect tenure security' leaves open if this effect is positive or negative or can go both ways. In the latter case it does not provide much insight without further elaboration and/or examples. [Netherlands]
4694	23	20	23	22	This sentence lacks a confidence statement. [United States of America]
8478	23	21	23	21	Stop the sentence after "adaptation". Reference to the poor seems unnecessary in this context. Land policies are important for all land-related decisions. [European Union (EU)]
4696	23	21	23	21	Recommend greater specificity: "especially for communities with unclear tenure status." [United States of America]
970	23	23	23	23	"Policy packages": Please check internal consistency of the SPM as the wording "policy mixes" is used line 28, page 25. [France]
7858	23	23	23	23	Section C1.3 is quite vague (provides little justification and few examples). Consider adding "Because of the complexity of challenges and the diversity of actors involved in addressing the challenges,..." (from chapter 1.5.) before line 23. [Norway]
4698	23	23	23	24	Are there examples of success to support high confidence of this statement? Or what is the probability of a policy package actually getting through any given legislature versus single policy approaches? [United States of America]
2800	23	23	23	29	This paragraph contains hardly any novel information (e.g. "purposefully designed policy can provide stability...") Concrete suggestion / guidance and/or enabling framework conditions would be more helpful. [Germany]
8930	23	23	23	29	The concept of holistic "food policies" should be introduced and explained here [Liechtenstein]
8694	23	23	23	29	Useful, please retain [New Zealand]
8854	23	23	23	29	The concept of holistic "food policies" should be introduced and explained here [Switzerland]
7574	23	25	23	25	What is meant by "purposefully designed policy"? Surely all policy is purposefully designed. Do you mean carefully designed? Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]

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7958	23	26	23	29	In C.1.3 the term 'sustainable land management' is used, as in numerous other instances throughout the report, without clarity about what is meant by it. The list of co-benefits (lines 27-28) could as well be seen as elements of sustainable land management and is therefore more confusing than helpful. [Netherlands]
8480	23	27	23	27	insert after "conserve": and restore biodiversity and ecosystem services [European Union (EU)]
1308	23	30	23	30	It is not clear what is meant by "financial inclusion" or flexible carbon credits". Suggest these concepts require further explanation. [Canada]
1804	23	30	23	30	C1.4 has term 'flexible carbon credits'. This 'flexible' is not defined here and is not clear what actually means. Could you please consider to modify to the form 'carbon credits'. [Finland]
972	23	30	23	30	"financial inclusion": can this notion be explained? [France]
2804	23	30	23	30	We strongly advise against the use of the term "flexible carbon credits" in this context. We assume that the intention here is to underline the importance of potential/future carbon market mechanisms to be inclusive and accessible also for the poor or small-scale stakeholders (from developing countries); however as the design of flexible mechanisms under Art.6 of the Paris Agreement is a very sensitive subject and still not resolved for the Paris rulebook, language must be chosen carefully in order to avoid misinterpretation and protect environmental integrity. [Germany]
4700	23	30	23	30	"Flexible carbon credits" is not a term of art, and seems to be combining the idea of the "flexibility mechanism" from the Kyoto Protocol to carbon credits outside of the context. Redraft as "carbon credits". [United States of America]
4702	23	30	23	30	"Financial inclusion" is not a policy but a policy aim. Suggest removing or providing a specific policy that speaks to "financial inclusion". [United States of America]
4704	23	30	23	30	The reference to 'flexible carbon credits' requires further explanation. [United States of America]
8482	23	30	23	34	Does the "high confidence" apply to each individual item listed? Or does it assume a simultaneous deployment of all the options listed? Is there sufficient evidence supporting all? Why are carbon credits limited to "flexible" ones? [European Union (EU)]
4706	23	30	23	34	This paragraph should more fully include the critical role that specific (i) domestic policies and regulatory environments play and (ii) barriers to sustainable land management. Both of these are featured in Section 7.5, which is dedicated to policy instruments, with 7.5.1 and 7.5.2 as well as 7.5.8 being most relevant to these specific points, respectively. Suggest including the following policies in the list: - Preventive adaptation measures, public-private partnerships, insurance (lines 11-13 page 7-61) - Long-term strategic planning, iterative risk management (lines 42-44 of 7-61). [United States of America]
4708	23	30	23	34	Suggest adding the statement "If poorly designed, these measures can lead to maladaptive responses such as taking on too much risk." (see pages 7-63, 7-91) [United States of America]
4710	23	30	23	34	C1.4 could be streamlined. Suggest dropping flexible carbon credits, sustainable development principles, and natural systems to get a succinct first sentence: "Policies such as financial inclusion, flexible carbon credits, disaster risk and health insurance, social protection and adaptive safety nets, contingent finance and reserve funds, and universal access to early warning systems can reduce the vulnerability and exposure of human systems to climate change, and ameliorate risks of desertification, land degradation and food insecurity (high confidence)." [United States of America]

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7860	23	30	23	37	This paragraph might benefit from some clarification and explanation of what is meant. Please also consider the phrase "adoption of sustainable development principles" vs implementation of such principles. [Norway]
7576	23	30	23	37	Once again, this is just a long list of possible options. Lists like this aren't very informative to policymakers. They did context e.g. strengths and weaknesses, tradeoffs, priorities etc. Please rectify this. [United Kingdom (of Great Britain and Northern Ireland)]
7578	23	31	23	32	Absolutely agree with need to highlight "universal access to early warning systems", but it is important to link this to the need for the mechanisms that enable resultant early action - particularly finance. Early warning is no use if you can't then take action, and often this requires funding to be released, so relevant financial mechanisms are also badly needed. [United Kingdom (of Great Britain and Northern Ireland)]
5538	23	32	23	32	... Early warning systems AND EFFECTIVE CONTINGENCY PLANS can enable... Comment: early warning systems should be always considered with contingency plans in order to direct actions , organize information on alternative decisions, in that way supporting the population in adequate answers and preparation for extreme and negative impacts. [Brazil]
974	23	32	23	32	It is unclear what sustainable development "principle" refer to. [France]
7580	23	32	23	32	The reader won't necessarily know what is meant by "sustainable development principles" and I can't see them defined in the glossary. If this phrase must be used, please define it. [United Kingdom (of Great Britain and Northern Ireland)]
976	23	34	23	34	Please check the adequacy of "ameliorate" here. We suggest "alleviate" or "decrease". [France]
1452	23	34	23	34	The point "ameliorate risks" does not really make sense, change to "reduce risks". [Luxembourg]
1310	23	34	23	35	Define "adaptive climate governance" -- or change wording here. This term is not used anywhere else. [Canada]
4842	23	34	23	35	Delete "Adaptive climate governance," [Iran]
7582	23	34	23	35	The reader won't necessarily know what is meant by "adaptive climate governance" and "adaptive management". If these phrases must be used, please add them to the glossary. [United Kingdom (of Great Britain and Northern Ireland)]
978	23	34	23	36	Please consider adding the continuity over time of governance in this list of principles. [France]
4712	23	34	23	37	"Land use" should be inserted after "adaptive climate" to read "Adaptive climate AND LAND USE governance..." [United States of America]

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7862	23	38	23	38	The benefits of early action are not mentioned in Section C. They should be. Suggest adding a new and separate point (C1.5) to cover this. E.g.: "There is high confidence that acting early will avert or minimise risks, reduce losses and generate returns on investment" (Ch.7 Executive Summary, lines 48-49). "Delayed action will result in an increased need for response to land challenges and a decreased potential for land-based response options due to climate change and other pressures" (Ch.6 Executive Summary, lines 37-38). From Cross-Chapter Box 10:"Evidence suggests that the cost of inaction in mitigation and adaptation, and land use, exceeds the cost of interventions in both individual countries, regions, and worldwide. (...) Preventing land degradation from occurring is considered more cost-effective in the long term compared to the magnitude of resources required to restore already degraded land. (...) Across other areas such as food security, disaster mitigation and risk reduction, humanitarian response, and healthy diet (malnutrition as well as disease), early action generates economic benefits greater than costs. [Norway]
42	23	38	23	38	The figure from the previous SPM version should be added, as it is one of the most important figures: Figure SPM 6: Technical potential of land-based climate mitigation response options. [Poland]
962	23	1	26	33	Section C is often written in a style which gives a policy-prescriptive character to many messages. A general effort should be made to edit these messages in a "policy-relevant" style. [France]
4682	23	1	28	22	Section C does not accurately or adequately summarize the impacts of privatization of water rights and ownership around the world. The report mentions land tenure repeatedly, but actually, whoever owns and controls the freshwater sources in any area has (more) enormous influence on local food production, service economies, and livelihoods. [United States of America]
2794	23	1	28	24	Section C clearly outlines the factors of an enabling environment for achieving adaptation/mitigation in the land sector. Outlining not only technical responses (section B) but also strategies and instruments for implementation strengthens the policy relevance of the SPM. However, some of the statements are so general that they become almost trivial. Therefore please use more precise formulations and less general descriptions. The narrative of sections C1 to C2 is not clear, they do not seem to have a clear focus. In addition, it would be really helpful to create a figure showing enabling framework for (policy) response options possibly building on figures of CH7. [Germany]
2802	23	24	29	36	Please clarify how the "complex challenges of SLM" (C1.3, P23, L24), the "limits to near-term adoption of SLM" (C3.2, P25, L36) and the "barriers to SLM" (D1.5, P29, L36) compare to each other. [Germany]
5532	23	1	31	5	The land use regulation is a key factor for achieving the SSP1, but overall, in the "Enabling Response Options" and d"Action in the Near Term" topics, this frame of measure was not explored or enfasized properly, including monitoring, command and control approaches, which are necessary in a permanent basis in many countries. [Brazil]
8474	23	14			To 'shore people up' is colloquial: reword [European Union (EU)]
5534	23	16			Include words. "human wellbeing and GHG EMISSIONS mitigation." [Brazil]
5536	23	28			Include words. "land degradation, CLIMATE CHANGE mitigation and adaptation..." [Brazil]
7980	24	2	23	3	Add into first sentence, after 'food production' : "the pricing of environmental costs and payment for ecosystem services' [Netherlands]

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5394	24	1	24	1	Reorder sentence to improve readability and put 'Overcome barriers to implementation' at the beginning. Barriers to implementation is a key obstacle for sustainable land management. Furthermore, questions of finance and other means of implementation such as technology transfer are of key relevance to overcome such barriers which should be reflected here. [Gambia]
7864	24	1	24	1	A missing point in Section C 2 relates to effective governance of the food system. Suggest adding the following point from 5.7, either to the bold text or as a separate point (C2.6): "Effective governance of food systems and climate change requires the establishment of institutions responsible for coordinating among multiple sectors (education, agriculture, environment, welfare, consumption, economic, health), levels (local, regional, national, global) and actors (governments, CSO, public sector, private sector, international bodies). Positive outcomes will be engendered by participation, learning, flexibility, and cooperation." [Norway]
1312	24	1	24	7	The key message in this paragraph is not clear, please try to simplify. Also not sure what is meant by "enabling policies," and are the policies mentioned in line 3 and 5 the same policies? [Canada]
7584	24	1	24	37	Many of the paragraphs under C2 contain long lists of policies and enabling conditions which do not add much to the discussion and could therefore be removed or shortened. [United Kingdom (of Great Britain and Northern Ireland)]
4714	24	1	24	37	Most of the sentences in this section are lacking confidence statements. [United States of America]
502	24	2	24	2	remove "incentivising" from this sentence [Ireland]
4716	24	2	24	2	"Healthy diets" should be deleted as a driver here since there is no automatic linkage between healthy diets and sustainable land management. There is no guarantee, for example, that every tomato, kale, fish, almond or tofu-grade soybean is grown, processed, transported and prepared sustainably. It is more accurate to keep the focus on sustainable diets, a term that encompasses food security and nutrition as well as environmental sustainability. [United States of America]
980	24	3	24	5	Please consider adding "transformative changes" in this sentence. [France]
7982	24	4	24	5	add after 'markets': "empowering women farmers" [Netherlands]
7586	24	4	24	5	"improving access to markets" - improving access for who? And how does this increase adoption of sustainable land management? This won't necessarily be intuitive to many readers. Please clarify. [United Kingdom (of Great Britain and Northern Ireland)]
982	24	5	24	7	Please consider adding behaviour changes such as sustainable and healthy diets. [France]
2806	24	5	24	7	Healthy and sustainable diets cannot only contribute to mitigation and adaptation and improve public health, but also increase food security, free significant land areas, which will be very beneficial to combat desertification and reduce land degradation (see 6.4.3 and 6.4.4), ease economic burdens (see SPM D2.3) and have synergies with other sustainable development goals (5.4.6 p. 66 ll. 6-9). We request to include these further co-benefits also in the headline statement. [Germany]
7866	24	5	24	7	Please consider to explain somewhere in the SPM what is meant by healthy and sustainable diet in this report. Eg. It would be useful to know how and to what extent fish and fisheries are reflected in these findings and in the overall report in relation to that the primary focus is the land sector. [Norway]
7868	24	8	24	11	Please consider to also include empowering indigenous people, as well as women farmers [Norway]

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Comment No	From Page	From Line	To Page	To Line	Comment
4718	24	8	24	11	Does the high confidence rating apply to all policies listed? [United States of America]
984	24	9	24	9	Please check if "farmer" is not too restrictive. [France]
136	24	11	24	13	Consider adding a confidence qualifier to this statement. [Spain]
4720	24	11	24	13	This sentence lacks a confidence statement. [United States of America]
4844	24	12	24	12	Delete "at different levels of governance" [Iran]
8484	24	14	24	14	The third "land" (before practices) is redundant. [European Union (EU)]
986	24	14	24	16	This sentence is unclear (with not less than 4 occurrences of "land") and should be reformulated. [France]
8576	24	14	24	16	This sentence is hard to understand - suggest it is redrafted more clearly [New Zealand]
4722	24	14	24	16	"... land of land-degradation land practices in markets..." This sentence is confusing. Consider rephrasing to say, "Ensuring that markets incorporate the environmental costs to land and climate due to land-degrading practices can enable more sustainable land management through the reduction of incentives for unsustainable practices." [United States of America]
3026	24	14	24	17	Suggest rephrasing to read: "Reflecting the environmental costs to the natural environment of land-degrading food agricultural practices can lead to more sustainable land management by reducing incentives for unsustainable practices (high confidence). Examples of relevant policies are emissions pricing mechanisms and the growing supporting market for sustainable food, low emissions food production." [Australia]
2808	24	14	24	18	Please consider to include a direct reference to abandoning harmful subsidies in the examples listed here. [Germany]
2810	24	14	24	18	Please add also that revenues of carbon pricing can be redistributed to strengthen the response to climate change and resolve trade-offs for a range of SDGs, particularly hunger, poverty and energy access. (c.f. Ch. 7 p. 137 ll. 38-42 and SR1.5 SPM D4.5), [Germany]
7960	24	14	24	18	In C.2.2 the concept of environmental pricing is introduced, but fails to mention the potential technical and barriers in land use sectors, such as emissions measurement incl. uncertainty, evaluation, monitoring and administrative burdens as typically dealing with very large and inhomogenous numbers of actors and stakeholders. [Netherlands]
8574	24	14	24	18	There is no confidence evaluation for the the last sentence in C2.2 [New Zealand]
7870	24	14	24	18	Section C2.2 is vague, and critical detail/exemplification should be added. Suggest the following from Ch.7 Executive Summary (lines 37-44): "The full mitigation potential assessed in this report will only be realised if agricultural emissions are included in mainstream climate policy. Carbon markets are theoretically more cost-effective than taxation but challenging to implement in the land-sector. Carbon pricing (through carbon markets or carbon taxes) has the potential to be an effective mechanism to reduce GHG emissions, although it remains relatively untested in agriculture and food systems. Equity considerations can be balanced by a mix of both market and non-market mechanisms. Emissions leakage could be reduced by multi-lateral action." [Norway]
5184	24	14	24	18	We have to describe about 'distorting market' at this paragraph. No problem or some problem or overcome proposal or etc. [Republic of Korea]

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7588	24	14	24	18	This point is highly salient, though it could be phrased more strongly. The underlying chapter 7 executive summary states "The full mitigation potential assessed in this report will only be realised if agricultural emissions are included in mainstream climate policy (high agreement, high evidence). Carbon markets are theoretically more cost-effective than taxation but challenging to implement in the land-sector (high confidence) Carbon pricing (through carbon markets or carbon taxes) has the potential to be an effective mechanism to reduce GHG emissions." - this is clearer language that would be helpful to include in the SPM. [United Kingdom (of Great Britain and Northern Ireland)]
504	24	16	24	17	Should use a better example than the ones given [Ireland]
8932	24	16	24	18	Write: "Examples of relevant policies are emissions pricing, supporting markets for sustainable food and consumer education and awareness raising." [Liechtenstein]
138	24	16	24	18	Consider adding a confidence qualifier to this statement. [Spain]
8856	24	16	24	18	Write: "Examples of relevant policies are emissions pricing, supporting markets for sustainable food and consumer education and awareness raising." [Switzerland]
4724	24	17	24	18	The last sentence lacks a confidence statement. [United States of America]
8578	24	19	24	24	There is no confidence evaluation for the the last sentence in C2.3 [New Zealand]
140	24	21	24	23	Consider adding a confidence qualifier to this statement. [Spain]
8646	24	22	24	22	Need to stress pest resistance throughout the report mor as biosecurity will become even more important with climate change [New Zealand]
5544	24	25	24	25	supply side? Unclear meaning. Is this related with supplying emissions? Supplying food? Supplying inputs? Supplying what to whom? [Brazil]
7590	24	25	24	29	Mitigation options for co2 vs non-co2 emissions are somewhat different. Please consider whether it is worth making a distinction here between the two. For example, non-co2 specific innovations (e.g. methane inhibitors or vaccines for livestock) or more general options that differ from (or are required in addition to) those targeted at co2 (e.g. improved water management in rice production for methane emissions). [United Kingdom (of Great Britain and Northern Ireland)]
8580	24	25	24	30	There is no confidence evaluation for the the last sentence in C2.4 [New Zealand]
988	24	26	24	27	"to close yield gaps": could "in a sustainable manner" be added? [France]
2812	24	26	24	27	As long as research findings are not transferred into practice they will hardly help to narrow yield gaps. Therefore, please modify the sentence to "... research, development AND DEPLOYMENT...". In addition, formulation "are needed to close yield gaps" is policy prescriptive and it is not practical goal to close yield gaps as this would counteract sustainability. Therefore, please change to "CAN PROVIDE STRATEGIES to NARROW yield gaps". [Germany]
142	24	26	24	29	Consider adding a confidence qualifier to this statement. [Spain]
506	24	27	24	27	after "close yield gaps", include "to optimise yield" [Ireland]
990	24	27	24	29	"and awareness that increases in total production can lead to rebound effects.": This sentence is very unclear. Consider revising. [France]
8934	24	28	24	28	Write: "to increase productivity while preserving animal health and welfare standards, and awareness ..." [Liechtenstein]

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8858	24	28	24	28	Write: "to increase productivity while preserving animal health and welfare standards, and awareness ..." [Switzerland]
7872	24	28	24	29	Please consider to explain or give some examples of the "rebound effects" that are mentioned here. [Norway]
7592	24	28	24	29	Please clarify precisely what you mean by rebound effects [United Kingdom (of Great Britain and Northern Ireland)]
4726	24	28	24	29	Animal health and welfare standards are not intrinsically tied to increasing mitigation or closing the yield-gap from livestock. Suggest removing. [United States of America]
8490	24	29	24	29	Change "increases in" to "increases" [European Union (EU)]
8492	24	29	24	29	The "rebound effect" is highly relevant to many parts to the report, and would be useful to consistently note it where appropriate. Having said that, it is not clear what it refers to in the given context, and why it would be more relevant here than in other sections. [European Union (EU)]
3028	24	29	24	29	Suggest clarification of "rebound effect". Do we mean rebound effect from increasing production efficiency as in buy a more fuel-efficient car, and drive more? Or are we simply referring to total emissions? [Australia]
5546	24	29	24	29	what does the text mean with rebound effects? Rebound of what effects? Rebound from what to what? [Brazil]
508	24	29	24	29	Clarify point being made about rebound effects. Point may need to be reworded [Ireland]
8648	24	29	24	29	increase in total production can lead to rebound effects - what does this actually mean?? [New Zealand]
7594	24	29	24	29	An awareness of rebound effects is not a policy. Does this belong here? Please consider whether to delete. [United Kingdom (of Great Britain and Northern Ireland)]
4728	24	29	24	29	The use of rebound effect in this context is confusing, and inconsistent with its use in the underlying chapter primarily in relation to increases in efficiency. Suggest more closely reflecting the corresponding section of the Chapter 5 Executive Summary: "... , and awareness that increases in total production MAY LEAD TO INCREASES IN EMISSIONS." [United States of America]
4730	24	30	24	30	Consider adding: "Effective risk management and social safety nets can also help foster innovation and the reduction of yield gaps by enabling the adoption of improved practices." [United States of America]
7596	24	31	24	31	It should be explained what is meant by 'healthy and sustainable diets' more specifically - for example, it is possible to eat a healthy diet that includes red meat and dairy, yet these would not contribute to climate change mitigation. [United Kingdom (of Great Britain and Northern Ireland)]
4732	24	31	24	31	"Healthy" diets should be deleted here as well. [United States of America]
4734	24	31	24	31	Consider mentioning that improved weather and climate monitoring systems can also assist in risk management and yield optimization. [United States of America]

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2814	24	31	24	37	Firstly, this paragraph could be perceived as if public health policies can reduce health-care costs already on their own. However, the cost reduction in health-care are caused by dietary changes, which can be facilitated by corresponding public health policies. Please clarify this cause and effect cascade. Secondly, the adoption of healthier diets with less meat consumption in the US alone could reduce relative risk of coronary heart disease, colorectal cancer, and type 2 diabetes and therewith reduce the "health care cost by 77-93 billion per year" (Ch. 5.6.3 p. 88 ll. 34-43). In the US, 23 million people are affected by diabetes with direct healthcare costs of USD 9600 per person. Globally by 2025, there will be "over 700 million people with diabetes" (Ch. 5, p. 107, ll. 18-25), resulting in global health care cost concerning diabetes in the range of global agricultural GDP. We would like to strongly encourage the authors to raise concrete figures of potentials for such significant cost reductions (including uncertainty ranges and confidence statements) to the SPM, since they are highly policy relevant and should be considered when evaluating response options comprehensively. Lastly, we suggest to include the key diseases which risks are significantly reduced through shifting to plant-based diets: type 2 diabetes, cancer and coronary mortality (c.f. 5.6.3). [Germany]
7962	24	31	24	37	In C2.5 financial and tax incentives are not mentioned, contrary to the (probably much more complicated land use in C2.2). Suggest to add ' financial and tax incentives' to the list of policy options in lines 32-33. [Netherlands]
2816	24	32	24	35	Limiting public health policies to the diversity in "school" procurement is not consistent with the underlying chapters. There, such measures should be also adopt in "public" procurement or even "general" procurement (c.f. CH1 P33 L15; CH5 P100 L 13, CH5 P105-106, CH7 P100). Therefore, we request to change the wording to "general" procurement to also refer to e.g. universities, hospitals, institutions and private entities. Also, we feel that an important policy aspect would be building capacity e.g. by cooking knowledge as well as shaping food environments (e.g. marketing, living conditions, public spaces). Please include these aspects accordingly. [Germany]
4736	24	32	24	35	Nutrition policy is not well targeted to improving land management and reducing climate change. The evidence of a linkage between nutrition and land management is rightly judged as "limited" because there is no necessary association. This weak science should not be highlighted in the SPM. Unless a connection with sustainable production and land management is made, this sentence should be deleted. [United States of America]
1856	24	35	24	35	The uncertainty qualifiers should be converted to ' confidence '. [Russian Federation]
5030	24	35	24	35	Could this be stated in confidence level instead? "Limited evidence" would not seem to point to a strong scientific base. The topic is, however, important, and a finding that has a stronger basis could perhaps be provided here instead. [Sweden]
7598	24	35	24	36	Does encouraging the adoption of healthy diets necessarily enable more sustainable land management? Could you please clarify exactly how and why this is the case. It is perfectly possible to imagine healthy food being produced in an unsustainable way. [United Kingdom (of Great Britain and Northern Ireland)]
8494	24	36	24	36	include after "sustainable development goals": and biodiversity targets. [European Union (EU)]
326	24	37	24	37	Reference {4} is too obscure. We suggest more detail reference of section(s) be noted. In the first place, Chapter 4 doesn't mention about diets that C2.5 focuses on, and we also suggest to reconsider the reference. [Japan]

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Comment No	From Page	From Line	To Page	To Line	Comment
7874	24	37	24	37	A missing point from Section C 2 (also related to comment X on governance) relates to the importance of trade. Suggest adding the following from 5.7: "Estimates of the proportion of people relying on trade for basic food security vary from ~16% to ~22%, with this figure rising to between 1.5 and 6 billion people by 2050, depending on dietary shifts, agricultural gains, and climate impacts. Global trade is therefore essential for achieving food and nutrition security under climate change because it provides a mechanism for enhancing the efficiency of supply chains, reducing the vulnerability of food availability to changes in local weather, and moving production from areas of surplus to areas of deficit. However, the benefits of trade will only be realised if trade is managed in ways that maximise broadened access to new markets while minimising the risks of increased exposure to international competition and market volatility." [Norway]
5540	24	1			Include words. "...security and GHG low-emissions..." [Brazil]
3024	24	9			Suggest clarifying what is encompassed in 'climate services'? [Australia]
5542	24	9			Modified concept. "...expanding access to ECOSYSTEM SERVICES..." [Brazil]
8486	24	16			is this really high confidence? [European Union (EU)]
3030	24	22			Suggest consideration of other characteristics besides 'heat and drought tolerance' that might be of value in breeding programs (water logging? salinity?....). [Australia]
8488	24	23			"advance preparation for supply chain disruption" is unclear. [European Union (EU)]
4846	25	1	25	1	Delete "Adopting governance" [Iran]
7876	25	1	25	1	Please consider adding detail/exemplification to the first sentence of C3: "Adopting governance approaches, SUCH AS POLYCENTRIC OR CROSS-SECTORAL GOVERNANCE, that acknowledge....". [Norway]
992	25	1	25	3	This sentence is very general and it provides very little information. Consider revising. [France]
584	25	1	25	3	Not clear how just acknowledging and balancing benefits and trade-off will deliver co-benefits, Combating land degradation - will deliver food security, etc. Why a bold statement on acknowledgement of benefits and trade-off. This is an obvious thing done routinely in any project. [India]
8012	25	1	25	3	replace first sentence by: "To enhance synergies and minimize trade-offs in climate mitigation and adaptation policies requires adopting governance approaches that acknowledge and balance benefits and trade-offs and work to overcome barriers to integrated approaches". [Netherlands]
5396	25	1	25	6	The approach of co-development has proven itself very useful in the context of policy instruments discussed here. It should be reflected here. [Gambia]
8696	25	1	25	6	Useful, please retain [New Zealand]
4738	25	1	25	6	Assessing and analyzing options and tradeoffs prior to adopting seems an important missing step here. There are no silver bullets and the important point would be to provide information on options for decisionmaking, including pros AND cons. [United States of America]
5632	25	4	25	4	for sake of consistency, start by desertification and then land degradation, to respect the same order throughout the document. [Algeria]
8014	25	5	25	5	add after "options": ", such as afforestation and bio-energy crops, " [Netherlands]

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7600	25	5	25	5	The terms 'climate change mitigation and adaptation' should be used in the final sentence of C3 as opposed to 'increase the resilience to the impacts of climate change' as resiliency is a new term that has not been used so far and so will only serve to confuse the reader. [United Kingdom (of Great Britain and Northern Ireland)]
5186	25	6	25	6	SPM Fig. 3 → Figure SPM 3 [Republic of Korea]
994	25	7	25	9	The elements presented in paragraph C3.1 have been already presented in other terms in section B. Please consider rephrasing C3.1 to put more emphasis on what it means from a policy and governance perspective [France]
4742	25	7	25	10	This sentence lacks a confidence statement. [United States of America]
7878	25	7	25	16	Polycentric governance is not mentioned in Section C when it should be (as this is covered extensively in the main report and is an important governance approach for climate change). It is related to Sections C3.1-C3.2, so suggest integrating it with these section, or adding a separate point. E.g.: "Polycentric governance is multi-scale and allows the interaction between actors at different levels (local, regional, national, and global)" (1.5.1). "Advancing governance of climate change across all levels of government and relevant stakeholders is crucial to avoid policy gaps between local action plans and national/subnational policy frameworks" (7.5.1.) AND/OR "The expansion and diversification of land use and biomass systems and markets requires hybrid governance: public-private partnerships, transnational, polycentric, and state governance to insure opportunities are maximised, trade-offs are managed equitably and negative impacts are minimised." (Chapter 7 Executive summary). [Norway]
7602	25	7	25	16	The way this paragraph is currently phrased (i.e. "Addressing desertification, land degradation and food security... provides many potential cobenefits including lower GHG emissions" is out of step with the rest of the report which is trying to make the point that all of these issues should be addressed together in a coherent manner, as opposed to considering GHG emissions as merely a beneficial side effect. It would be better to say "Addressing the five land challenges in a coordinated manner...provides many potential cobenefits including poverty reduction, increased biodiversity conservation, less water and air pollution, and benefits to human health." This sentence should then be elevated to the headline C3 message as it is an important message. [United Kingdom (of Great Britain and Northern Ireland)]
8496	25	10	25	10	"increased biodiversity conservation" should be replaced with "reduced biodiversity loss". "conservation" is not a "benefit", but an activity. The benefit would be more biodiversity. [European Union (EU)]
996	25	10	25	13	After "such as", could you add "agroecology*", and"? [France]

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2818	25	13	25	16	<p>The stated potential of 5.8 million km² of freed land is not consistent with the underlying chapters. Already the effects only on desertification are in the same range: 0.8-5 Mkm² for dietary change, ~2 Mkm² for reduced post-harvest losses and 1.4 Mkm² for reduced food waste (Table 6.34 Ch. 6 p. 73 l. 17). Supposedly, the figures of the effect on desertification were raised to the SPM and the TS instead of the aggregated potentials addressing the freeing of all land types due to demand-side and supply side measures. Actually, higher potentials are reported in various locations of the underlying report:</p> <p>1) "By avoiding meat from producers with above-median GHG emissions and halving animal-product intake, consumption change could free as much as 21 million km²" (Ch. 1.4.3.2 p.33 ll. 8-12)</p> <p>2) The effects on land degradation (which should contain the effect on desertification) are found to have the following potentials to freeing land: Dietary change 4-28 Mkm² (high confidence), reduced post-harvest 1.88 Mkm² (medium confidence) and reduced food waste 7 Mkm² (medium confidence). (Table 6.42 Ch. 6. p. 79 l.16)</p> <p>3) "Dietary change and waste reduction expand the potential to apply other options by freeing as much as 25 Mkm² (4-25 Mkm² for dietary change [...] and 7 Mkm² for reduced food waste [...])" (Ch. 6 p. 91 ll. 19-22)</p> <p>4) Figures for the potential of supply management options can be found for sustainable sourcing: > 4 Mkm² effect on land degradation (Table 6.43 Ch. 6 p. 79 l. 33)</p> <p>Please revise the stated potential of freed land to assure consistency with the underlying report. We suggest to provide the aggregated range (ca. 15-35 Mkm²) as well as the individual figures of each demand-side and supply-side option to provide policy relevant information on the individual options discussed in chapter 6. [Germany]</p>
2820	25	13	25	16	<p>Demand-side measures such as dietary changes and reducing food waste cannot only free land but also relieve pressure on land in other dimensions as discussed in the underlying chapters:</p> <p>1) "food losses account for 215 km³ yr⁻¹ of freshwater sources" (about 12-15% global consumptive water use). Hence, reducing food losses would reduce the pressure on the water system significantly being beneficial for "320-400 million people (12-15% of the 2681 million people affected by water stress / shortage)" (Ch. 6.4.2.2.1 p.66 ll. 1-6)</p> <p>2) "In addition to direct mitigation gains, decreasing meat consumption, primarily of ruminants, and reducing waste further reduces water use, soil degradation, pressure on forests, [...]" (Chapter 2.7.1.7 p. 86 ll. 41-43)</p> <p>3) "By decreasing pressure on land, demand reduction through dietary change could also allow for decreased production intensity, which could reduce soil erosion and provide benefits to a range of other environmental indicators such as deforestation and decreased use of fertiliser (N and P), pesticides, water and energy, [...]" (Table 6.10 p. 40 l. "dietary change")</p> <p>4) "[...] dietary changes would lead to conservation of natural areas, which would then led to increased water quality." (Ch. 6.5.3 p. 118 ll. 8-9)</p> <p>These various co-benefits are very relevant to policymakers. For instance, reducing water usage or improving water quality might be very crucial in arid regions; reducing deforestation is a mitigation measure in itself. We therefore kindly ask the authors to broaden the focus of this statement and suggest the inclusion of co-benefits of demand-side measures beyond freeing land, in particular, the inclusion of co-benefits regarding water security and reduction of deforestation. [Germany]</p>

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2822	25	13	25	16	The way the measures are grouped ("dietary change and other demand-side measures and with waste reduction and other supply-side measures") is misleading and inconsistent with categories used elsewhere in the SPM. Both, dietary change and waste reduction are referred to as demand-side measures and supply-side measure are e.g. sustainable sourcing or improved food processing and retailing (see: SPM.3 or Chapter 5.5.2). We kindly ask the authors to revise the sentence and assure consistency. [Germany]
7880	25	13	25	16	This is a very important statement and a useful piece of information. Please do not remove this from the SPM. [Norway]
7604	25	13	25	16	Could you be explicit about the "other options" you mean here - do you mean mitigation response options such as afforestation or bioenergy? Please provide examples [United Kingdom (of Great Britain and Northern Ireland)]
7606	25	13	25	16	The sentence "A combination of dietary change....5.8 million km2 of land" is a very important message but would be better placed in section B6. [United Kingdom (of Great Britain and Northern Ireland)]
4744	25	13	25	16	This sentence is syntactically challenged and assigned low confidence. Delete it. [United States of America]
8498	25	14	25	14	It is unclear why "waste reduction" appears as a "supply-side" measure. The reduction of waste can have benefits wherever they occur along the value chain, and the benefits are higher closer to the consumer. In general, the differentiation between "supply-side" and "demand side" measures appears inconsistent and unnecessary. [European Union (EU)]
5550	25	14	25	14	dietary changes: the world has over 7 billion people, living in 5 continents, with an incredible diverse set of diets , based on local production characteristics, as well as traditions. What should qualify these changes, and further, can we qualify dietary changes considering the existent cultural diversity? Who defines what kind of changes should be done, and what are acceptable impacts on culture, identity, tradition and landscapes? [Brazil]
1000	25	14	25	16	It is important to note that the "low confidence" indice here refers to the number of 5.8 millions km2 but not on the fact that dietary changes and demand-side measure, waste reduction and supply-side measure may free land that might be managed using other options or in other aims. [France]
998	25	15	25	16	It is surprising to see a single number (with two significative digits) and not a range. This is unlike section B52, for example. [France]
7964	25	17	25	17	Suggest to add 'financial' or 'socio-economic' to the factors listed in line 17. [Netherlands]
586	25	17	25	18	"Technologies response options". Long-term options apart from recent-term option would also be very important. [India]
4746	25	17	25	18	This sentence lacks a confidence statement. [United States of America]
4748	25	17	25	22	The benefits of operational adaptation are also currently often impossible to quantify. Additional work in this area would be beneficial to adoption rates. Recommend emphasizing this as an important area for future research. [United States of America]
2824	25	17	25	23	One important reason is missing in this paragraph: the market does (currently) not pay for climate protection, i.e. the farmer has the burden of the investment / production cost increase, but he/she does not gain the revenues of climate protection. Please add this important aspect, drawing on information in e.g. CH4, P73 L1-3 and CH6 [Germany]

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8936	25	18	25	20	Write: "Many sustainable land management practices are not widely adopted due to insecure property rights, lack of access to credit and agricultural advisory services, insufficient private incentives, lack of knowledge and subsequent lack of practitioners' engagement in such practices (high confidence)" [Liechtenstein]
8860	25	18	25	20	Write: "Many sustainable land management practices are not widely adopted due to insecure property rights, lack of access to credit and agricultural advisory services, insufficient private incentives, lack of knowledge and subsequent lack of practitioners' engagement in such practices (high confidence)" [Switzerland]
36	25	19	25	19	Add: forests in "such as peatland, forests, costal..." [Poland]
8500	25	20	25	23	Is it possible to be more specific than citing institutional fragmentation and lack of engagement between stakeholders as drivers? [European Union (EU)]
7882	25	20	25	23	These lines re. institutional fragmentation, although related to barriers, should be added to a seperate point re. polycentrism (see above comment). Alternatively, move to line 25 and integrate with the point re. cross-sectoral working (p.25 lines 25-30), as it is more related to this point. [Norway]
8700	25	20	25	26	Useful, please retain [New Zealand]
7884	25	24	25	25	Please consider to move the lines 24-25 from Section C3.3. to Section 3.2 on barriers (as these lines also relate to barriers). [Norway]
8502	25	24	25	30	C3.3 seems to contain essentially the same statements that are elaborated in C4 at greater length. Consider deleting this paragraph and incorporating its unique contribution into C4 somewhere. [European Union (EU)]
1676	25	24	25	30	A mistaken reference. The mineral dust in Chapter 2.5.1 of the underlying report is not relevant to this paragraph (C3.3). It is not appropriate to place it in the quotation column. It is suggested to give the reference a check and revision. [China]
54	25	24	25	30	To this chapter should be added that public policies may also be counterproductive if they are to narrowly designed with specific objectives such as production support. [Denmark]
7608	25	25	25	27	It is not really clear how linking sustainable land management with all these other things increases effectiveness. Please make it transparent exactly how/why this occurs. [United Kingdom (of Great Britain and Northern Ireland)]
4750	25	25	25	27	This sentence lacks a confidence statement. [United States of America]
1002	25	28	25	28	"policy mixes": Please check internal consistency of the SPM as the wording "policy packages" is used line 22, page 23. [France]
7886	25	31	25	33	Please consider to give some examples of such response options and policies or alternatively consider to delete the sentence. [Norway]
4752	25	31	25	33	These sentences are lacking confidence statements. [United States of America]
7610	25	31	25	35	This is an important paragraph but please be explicit about which response options and policies it applies to [United Kingdom (of Great Britain and Northern Ireland)]
8504	25	31	25	36	Paragraph C3.4 points to issues that are key for policy makers. In particular, trade-offs should be presented in Section B1., complementing the language on synergistic relations. [European Union (EU)]

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Comment No	From Page	From Line	To Page	To Line	Comment
2828	25	31	25	36	This para is at the same time very strong in asserting that response options exist where trade-offs cannot be avoided even through careful planning or best-practice, however very vague as it does not provide any indication of which response options it is referring to. In its generality, the paragraph contains hardly any novel information and we do not really see the added value provided by such a statement. Please revise to be more specific, or consider to remove. The concrete interactions and trade-offs may be too complex to be summarised in the SPM. We suggest giving information on where more detailed information can be found in the CH6, e.g. Table 6.54, 6.55, 6.13 - 6.19. [Germany]
1004	25	33	25	35	Please check the formulation of this sentence and consider deleting "explicit" or using alternative wording to "explicit acknowledgement" such as "assessment" or "evaluation". [France]
7888	25	33	25	35	When discussing knowledge gaps in C3.4., the point "Interdisciplinary research is needed on the impacts of policies and measures in land sectors" (Chapter 7, Executive Summary) should be made (as this is not made elsewhere). [Norway]
7892	25	37	25	37	Please consider to include involvement of indigenous people and local people. The sentence could then read: "involvement of Indigenous people, local people and the most vulnerable in decision-making..." [Norway]
7612	25	37	25	37	The headline message should elaborate on what it means by 'people', as all policymaking is done by people. Does it for example, mean local communities? [United Kingdom (of Great Britain and Northern Ireland)]
1006	25	37	25	39	No example of the most vulnerable people is provided despite examples in Chapter 7 and Cross-Chapter box. Further in the section, authors explicit "vulnerable people" categories (e.g. local people, women and indigenous people). Including examples of these categories would strengthen the text. ("In rural areas women generally experience greater vulnerability than men, albeit through different pathways. (Djoudi et al., 2016; Goh, 2012; Jost et al., 2016; Kakota, Nyariki, Mkwambisi, & Kogi-Makau, 2011)." Cross-chapter box "Recognition and use of indigenous and local knowledge (ILK) is an important element of participatory approaches of various kinds. ILK can be used in decision-making on climate change adaptation, Sustainable Land Management and food security at various scales and levels and is important for long-term sustainability (high confidence). " 7.7.4 (37-40) We suggest to rephrase it with "Involvement of people, particularly from the most vulnerable categories (e.g. women and indigenous people) in decision making and the selection, evaluation, implementation and monitoring of policy instruments surrounding land-based response options, trade-offs and synergies, improves decision-making and governance" [France]
588	25	37	25	40	"Involvement of communities" - The whole section of C-4 has been mentioned in every assessment. [India]
4754	25	37	25	40	Suggest redrafting to not imply certainty of this approach to decisionmaking: "... may improve decisionmaking and governance" [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
5398	25	37	25	41	This figure SPM4 contains a lot of useful information and is a big improvement on the previous figure. However, it is not clear what the purpose is to show pathways that achieve the goals of the Paris Agreement compared to some that fail to achieve them by a wide margin. Rather than doing such a rather irrelevant comparison, this figure should provide more information on the trade-offs in land availability for achieving the goals of the Paris Agreement discussed elsewhere in the report and SPM between different land options, e.g. how is forest land area related to changes in cropland area? Do pathways with more bioenergy cropland have less forestland or does the land come from elsewhere (e.g. pastureland)? [Gambia]
8698	25	37	25	41	The involvement of indigenous peoples and their knowledge is discussed in [C4.4], and could be reflected in heading paragraph [C4] [New Zealand]
7890	25	37	25	41	The bold text mentions 'vulnerable people' without examples. Please consider to add or replace with: "such as local and indigenous groups and women". [Norway]
1008	25	40	25	41	Please check if these elements are not already presented in C3.3 [France]
328	25	41	25	41	Suggest correction of reference: "1.3.1, 1.4.1, 1.4.2" → "1.5" [Japan]
5556	25	42	25	42	...advanced by involving ALL RELATED STAKEHOLDERS, INCLUDING local people... Comment: as important as it is to involve local communities, considering the various elements as presented in the text, it is central to have a balanced and multipersepective approach, as the different actors can have complementary persepectives, inputs and information. [Brazil]
1010	25	42	25	44	Indigenous and local knowlegde role for local long-term sustainability is not apparent in this statement despite being underlined in Chapter 7. Including the role of indigenous and local knowledge for long -term sustainability will strengthen this statement ("Recognition and use of indigenous and local knowledge (ILK) is an important element of participatory approaches of various kinds. ILK can be used in decision-making on climate change adaptation, Sustainable Land Management and food security at various scales and levels and is important for long-term sustainability (high confidence). " 7.7.4 (37-40)) We suggest to rephrase it as: ""Sustainable land management is advanced by involving local and indigenous people with their knowledge in identifying land use pressures, including species decline, habitat loss, land use change in agriculture, food production and forestry, as well as decisions preventing, reducing and restoring degraded land." [France]
4848	25	44	25	44	Delete "decisions" [Iran]
4740	25	1	26	34	It's not clear that this point made it into the SPM but it should: assessing barriers to adoption of response options. Support from Chapter 6 (p. 6-9, lines 19-20): "Vulnerabilities create barriers to adoption of even low-cost high-return response options such as soil carbon management, that may seem obviously beneficial to implement (Mutoko et al. 2014; Cavanagh et al. 2017)." [United States of America]
1678	25	42	26	4	A mistaken reference. It is pointed out in this paragraph that C4.1 is quoted from Chapter 7.7.2 of the underlying report, which is not relevant to the conclusion in C4.1. It is suggested to give the reference a check and revision. [China]
5548	25	7			Include word (concept). "...and food and WATER security... [Brazil]

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2826	25	17			Sections C3 and C4 and their subparagraphs provide information on governance structures and various ways of involvement of people to respond to the challenges of climate change and land/food. It lacks however information on one of the most important barrier implementing good governance and peoples' participation, that is the existing power dynamics and market systems, including large industrial producers and the global food market. Information on power dynamics and market systems is scattered across chapters (e.g. 6.5.4.3, 7.5.9.4). Please add this highly relevant information to the SPM. [Germany]
5552	25	33			Modified concept. "for certain land MANAGEMENT options..." [Brazil]
5554	25	37			Include word "...the most vulnerable to CLIMATE CHANGE..." [Brazil]
8506	25	39			Consider changing "improves decision-making" to " can improve decision-making" [European Union (EU)]
8508	25	42			Add "typically" to advanced [European Union (EU)]
2830	25	43			Please include the important issues of soil loss and over-extraction of groundwater to this paragraph. The modified sentence would read: "... including species decline, SOIL LOSS, OVER-EXTRACTION OF GROUNDWATER, habitat loss," [Germany]
2832	26	16	2	16	The meaning of the expression "providing legally secure mechanisms for the exclusion of others" is unclear, please revise. [Germany]
5568	26	20	20	26	Modified paragraph. C4.4. The consideration of indigenous practices AND INNOVATIVE COMBINATIONS WITH LOCAL AND SCIENTIFIC KNOWLEDGE in choosing response options and policies for land challenges, contributes to enhancing resilience against climate change and combatting desertification (medium confidence). Agroecological traditional, local practices such as forest, water, soil, and fertility management, local seed use, improved grazing, and ecological restoration are often based on locally appropriate, non-quantifiable, indigenous knowledge.{3.7.1, 3.7.2, 5.6, 5.7.1, 6.3, 7.4, 7.7.4} [Brazil]
5558	26	1	26	1	people-centered planning: all planning and decisions are made by people, and considering people needs. Considering what has been said earlier in the text, we are assuming that there is the proposal for a more participatory approach. Hence, the suggestion: Multi-stakeholder instead of people-centered [Brazil]
1012	26	1	26	2	This sentence is unclear and should be reformulated. [France]
5560	26	2	26	2	involving people in decisions... All decisions are made by people. Considering what has been said earlier in the text, we are assuming that there is a proposal for a more participatory approach, hence the suggestion: involving A DIVERSE SET OF STAKEHOLDERS in decisions [Brazil]
4850	26	2	26	2	Delete "and governance" [Iran]
7894	26	2	26	4	The findings related to potential conflicts is very relevant and should be kept in the SPM. However in our view the importance of deliberation (esp. for trust) should be added to this section as it features in the main report - see chapter 1.5.1. also the term "encroachment" may be a bit imprecise. Please consider to add: "Involving people in DELIBERATION, decisions and governance...conservation, THE NEED FOR LAND RELATED TO NEW settlements and agricultural expansion ... can BUILD TRUST and reduce conflict." (New proposed text in capital letters). [Norway]
7614	26	5	26	5	The IPCC and UNFCCC tend to use MRV to refer to 'measurement, reporting and verification' rather than monitoring, reporting and verification. [United Kingdom (of Great Britain and Northern Ireland)]
4852	26	5	26	6	Delete the entire first sentence of the paragraph that starts with "Inclusiveness..." [Iran]

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5564	26	6	26	6	what is understood by "citizen science"? [Brazil]
5562	26	6	26	7	engaging people in citizen science.... As said in earlier coments, we suggest: engaging multiple stakeholders [Brazil]
60	26	6	26	7	Please avoid jargon like "citizen science" or explain the term. [Denmark]
8510	26	8	26	8	What does "involving people" mean here. Which people and involved in which way. As it reads now this is broad and vague. [European Union (EU)]
5566	26	8	26	8	involving people in the selection.... All decisions are made by people. Considering what has been said earlier in the text, we are assuming that there is a proposal for a more participatory approach, hence the suggestion: involving A DIVERSE SET OF STAKEHOLDERS in the selection... [Brazil]
4854	26	8	26	10	Delete the entire sentence that starts with "Involving people" and ends by "becomes available." [Iran]
4756	26	8	26	10	This sentence lacks a confidence statement. [United States of America]
8512	26	11	26	12	Rephrase to: "When social learning is combined with collective action, eg around tenure issues, transformative change can occur toward practices that provide higher levels of sustainability." [European Union (EU)]
8514	26	14	26	14	this sentence needs to be rephrased as it does not do justice to the fact that respecting communal tenure is not the same as 'land titling'. There is wide evidence of the problems of land titling programmes. Efforts to increase land tenure security have long been limited to the granting of individual land titles. Funding agencies have transitioned towards more general strengthening of land governance. Interventions that address the sources of tenure insecurity are more effective than a single focus on titling (high science evidence). Capacity building of land administrations (customary or statutory), legal and regulatory reform, information campaigns and improved land use planning are ways to address tenure insecurity. Also, is there a reason why the sentence is applied only to forests? Do the benefits not apply more broadly? [European Union (EU)]
4856	26	14	26	15	Delete "particularly those that authorize and respect indigenous and communal tenure," [Iran]
8516	26	14	26	16	this example on forest management is rather eclectic in one local context by one group of authors. Highlighting this with 'medium confidence' may be misleading as examples have shown that privatization of forest management can raise issues. [European Union (EU)]
1806	26	14	26	16	C4.3. This sentence is very difficult and ambiguous. Could you please consider removing the term 'exclusion of others' and illuminating more the need of good governance and general land tenure. [Finland]
7618	26	14	26	16	Communal tenure should also include tenure and communal usage rights of grazing lands. [United Kingdom (of Great Britain and Northern Ireland)]
4758	26	14	26	16	Exclusion of what others (other programs or other people)? The sentence is taken directly from page 7-137, lines 4-7, which is unclear as well. Suggest removal. [United States of America]
7616	26	14	26	19	Some of the language in C4.3 should be clarified - specifically, what is meant by land access (ownership? Physical access?) and legally secure mechanisms for the excluision of other what? [United Kingdom (of Great Britain and Northern Ireland)]
1014	26	15	26	15	Please check if "lands" would not be better here, instead of "forests" as the sentence seems valid also for other land categories than forest lands. [France]

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1016	26	16	26	16	Please consider a new formulation of this sentence, as currently it could be perceived as contradictory with the findings in line 37 page 25, about "the involvement of people". [France]
7620	26	16	26	16	Who are the "others" that are being excluded? Could you clarify the language here a little? [United Kingdom (of Great Britain and Northern Ireland)]
330	26	18	26	18	Suggest adding 7.7 as the reference referring to chapter 7 page 137 Line 4. [Japan]
1020	26	20	26	20	Please rephrase as "indigenous and local practices" (see in chapter 3 executive summary) [France]
1018	26	20	26	26	Agroecology is not restricted to traditional and local practices, as advocated by FAO definition. We suggest that a paragraph be devoted to the potential of agroecology, without limiting it to traditional practices alone. In C4.4 we propose to rephrase the second and third sentences as following: "Agroecology*, with innovative combinations of indigenous and local knowledge and modern agronomic practices, by relying on biochemical cycles and by a sustainable use of biodiversity, can contribute to overcoming combined challenges of climate change and desertification. Local practices such as water, soil, and fertility management, local seed use, improved grazing, and ecological restoration are often based on locally appropriate, non-quantifiable, indigenous knowledge." [France]
2834	26	20	26	26	This paragraph is very helpful for some parts of the world and should be kept in the SPM. In addition, we suggest adding a paragraph stressing the opportunities of circularity, novel technologies, precision farming and sustainable intensification, see CH6. This would then result in a full picture of a range of options in different parts of the world. [Germany]
7622	26	20	26	26	Could you please explain/place into context how indigenous practices relate to the scale of land response options being discussed elsewhere in the report. Many of these are very large scale (e.g. afforestation) or are inherently related to technological innovation (e.g. intensified or more efficient means of production). Can indigenous knowledge support or contribute to these? Or are we dealing with different issues on different scales? Including this information will enable policy makers to better understand and support the role of indigenous knowledge. [United Kingdom (of Great Britain and Northern Ireland)]
4760	26	21	26	21	"The consideration of indigenous ... contributes to" should be changed to "The consideration of indigenous ... CAN contribute to" since is it not a necessary outcome. [United States of America]
1022	26	22	26	24	Please consider deleting "forest," [France]
4762	26	22	26	24	This sentence lacks a confidence statement. [United States of America]
8518	26	24	26	24	Delete ", non-quantifiable,". The relevance of it is unclear, and much of that knowledge is most likely quantifiable. [European Union (EU)]
1024	26	24	26	24	Please rephrase as "Indigenous and local knowledge" (see in chapter 3 executive summary, "ILK") [France]
2836	26	24	26	24	Why would the valuable local knowledge be "unquantifiable" per definitionem? Please consider to remove the term "unquantifiable" here, as it does not seem to apply universally, and does not add value to the finding. [Germany]
4764	26	24	26	24	Remove "non-quantifiable" as it does not enhance understanding of the sentence and may introduce confusion. [United States of America]

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332	26	26	26	26	There is inconsistency in the confident levels between "Innovative combinations of indigenous, local and scientific knowledge can contribute to overcoming combined challenges of climate change and desertification (medium confidence)" of SPM and "Combined use of indigenous and local knowledge and new SLM technologies can contribute to raising resilience to challenges of climate change and desertification (high confidence)" shown in Chapter 3 (p. 3-50, line 40). [Japan]
2838	26	27	26	33	We suggest integrating more concrete information from the underlying chapters here as this would give the paragraph more clarity and relevance for policy makers. Information to be included refer to barriers to adaptation due to participation in decision-making and politics, division of labour, resource access and control, and knowledge and skills; empowerment of women to increase their capacity to contribution well-being, including food and nutrition security, and to change gender norms, enabling land and climate response options; addressing barriers to participation and decision-making; integrating, or mainstreaming, gender into land and climate change policy; gender indicators for monitoring and assessment of policy, please see Cross Chapter Box 11. [Germany]
7896	26	27	26	33	The points re. land tenure rights for women should be strengthened by a description of the current situation and barriers. We suggest adding: "In 59% of 161 surveyed countries, customary, traditional and religious practices hinder women land rights." (1.5.1) [Norway]
7624	26	27	26	33	It is not clear specifically what women being empowered to do results in synergies and cobenefits. [United Kingdom (of Great Britain and Northern Ireland)]
1314	26	28	26	28	Please rephrase the sentence "overwhelming presence of women" here? It sounds rather gender-biased and inflammatory. Could say "major contributions from women" or "crucial involvement of women" [Canada]
7626	26	28	26	28	Suggest replacing the word "overwhelming" with "disproportionate" [United Kingdom (of Great Britain and Northern Ireland)]
4766	26	28	26	28	Suggest using alternative term to "overwhelming" which has unclear connotations and meaning. Suggest restating this sentence to make the point more clearly. [United States of America]
3032	26	30	26	30	Suggest noting that this point applies equally to the way we implement programmes and the need to access womens views and employ women in leadership positions. Suggest change wording to ".....security through policy instruments and programme implemetation that account for gender....." [Australia]
5400	27	1	27	1	The underlying chapters include important information on the importance of international cooperation to achieve sustainable land futures. This includes technology transfer, but also finance and other means of support. This should be reflected in this section. [Gambia]
334	27	1	27	1	Number or name of each panel in Fig. SPM4 is missing, although the name (panel A, panel B, panel C) is referred in page 28 [Japan]
7898	27	1	27	1	The text parts and corresponding two graphs on each of the topics, agriculture, bioenergy and forest, should be read top down in coloumns. Perhaps two vertical lines could separate the three topics could clarify the reading direction. [Norway]
5032	27	1	27	1	As composed now, Figure SPM.4 strengthen the idea that all expansion of bioenergy leads to land-use change whereas much of bioenergy today is produced in integrated systems producing both biomass for energy together with food or fibre. This will happen also in the future, although the 1.5 degree target is likely to require dedicated energy crops as well. The integrated production of biomass for energy in agriculture and forestry needs to be highlighted better for a full account. [Sweden]

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5034	27	1	27	1	As the SSPs and the temperature changes/climate policy targets are not necessarily directly comparable and coherent, it might be informative to note on this, i.e. that mitigation action on top of the socioeconomic development in question, would be needed. [Sweden]
5036	27	1	27	1	The fuller context and clarity is important here, i.e. the total energy demand in the different SSPs, that decreasing agricultural area is due to decreasing demand, which in turn is due to population growth and consumption characteristics, not less food security. [Sweden]
5038	27	1	27	1	It is not readily clear what the reference "policy" encompasses in this figure. Climate policy that results in the different amounts of warming? Please clarify. [Sweden]
7630	27	1	27	1	Please consider changing the colours contained within figure SPM4 - red and green in the same graph, especially when overlapping may be problematic for people with colourblindness. Consider using green, yellow and blue instead. [United Kingdom (of Great Britain and Northern Ireland)]
4768	27	1	27	1	Recommend color coding all references to the SSPs in this figure for ease of reference. [United States of America]
7628	27	1	27	44	Figure SPM4: title 'illustrative pathways linking policy, land use allocation and climate change' - important distinction because this is reliant upon human intervention. It may be worth mentioning that these are not projected changes to land RESULTING FROM climate change but the land use allocation of models that achieve these long-term temperature goals. Otherwise many could be confused. Under 'agriculture' - does this refer to arable and pasture? In agri text: 'changes start later and are less effective' - is this due to higher population food needs? Changes in agril land 1.5 graph: so we'd need to feed 3-4 billion more people with 10% less agricultural land? This needs mentioning somewhere [preferably towards the beginning of the report] [United Kingdom (of Great Britain and Northern Ireland)]
4774	27	3	27	3	The lines SHOW the range across models..." Not "shows" [United States of America]
8520	27		27		Figure SPM.4 - general comment on modelled food price changes. The 6.5 fold increase in prices for SSP2 1.5°C seems very high. Can the SPM clarify (here, or elsewhere) whether these prices include the carbon price assumed in the modelling studies (which, if implemented in reality might be achieved by means other than as a tax or other form of direct pass-through to consumer prices). [European Union (EU)]
8522	27		27		Figure SPM 4. It would be useful to explain why the outcomes differ between temperature outcomes but within an SSP. For example, why do the 2.5-3°C scenarios show more agricultural land and less forest than the 1.5°C scenarios? Is this because greater ambition in 1.5°C is assumed to drive more intensification, diet change etc? [European Union (EU)]
8524	27		27		Not clear why Figure SPM.4 is placed at this point in the SPM. Could it be placed earlier? [European Union (EU)]
1554	27		27		It is very limiting only looking at 3 scenarios. Given the attention devoted to the scenarios mentioned in SR 1,5°C , is would be useful to clarify the differences and relationships between those scenario's and the SSPs as mentioned here. [Belgium]
1316	27		27		Figure SPM.4. BIOENERGY paragraph. Recommend edits to the last sentence read: "and, in the case of SSP3, to produce less effective mitigation overall." Or something similar. [Canada]
1318	27		27		Figure SPM.4. Question: How is it possible for "Natural Land" area to increase under any scenario? (e.g., SSP1, 2050). Perhaps the definition of "natural land" can be discussed briefly in the caption on P 28? [Canada]

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1832	27		27		Eliminate the table at the bottom of the page and make reference to the Chapter in text where this information can be found. The table is difficult to read and understand (no explanation is given) and it doesn't add to the understanding of the graphs above. [Finland]
1622	27		27		The categories reported in the table "Quantitative indicators for the SSPs" refer to "Change in Non-Energy Cropland" and "Change in Bioenergy Cropland", while the text and the captions of the figures reported above refer to "Agriculture Land" and "Bioenergy Cropland". To be consistent, please modify the text and the captions of the figures reported above coherently with the reported categories. [Italy]
144	27		27		This comment is related to the quantitative indicators for the SSPs in figure SPM.4. This information can be misleading for policy makers as much more background is needed to understand some of the results presented, as they are not self-evident. Probably it would be best to remove or define it better. [Spain]
510	27	1	28	23	There is too much information in this diagram and it loses clarity [Ireland]

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1080	27	1	28	24	<p>Figure SPM 4 pages 27-28</p> <p>Although a figure for illustrating how SSPs deal with land and climate challenges could be policy-relevant, the current Figure SPM-4 is problematic and should be greatly revised.</p> <p>As it stands, the figure does not make it possible to show the sustainability issues as they are taken into account in SSP, which leads to a low level of information and in some cases even the risk of being a source of harmful confusion like questioning the necessity and feasibility of achieving a global warming of 1.5°C. For example, the graph relating to agriculture in SSP 1 suggests a decrease in food production, which could be perceived as fundamentally far from the objectives of sustainability, while SSP 1 presents, through its changes in diet and production systems, a high level of food security.</p> <p>As a general comment, we welcome that information for the 1,5°C is provided. However, we also request to provide similar information for the 2°C scenario which is also part of the LTG of the Paris Agreement. Some additional elements on what could occurred above 3°C would also be worth to be provided. Quantitative indicators could be sent to the next page in order to provide enough space for these extra figures.</p> <p>SSPs are not choices that policymakers can actually make (SSPs consist mostly exogenous trends beyond the reach of any single policy-maker on e.g., population and growth). This Figure only appears to illustrate the point that "the baseline matters". It is unclear why so much information is necessary to make that point.</p> <p>Concerning the title of the Figure:</p> <ul style="list-style-type: none"> • Consider using "socio-economic development" instead of "policy".as the title of the Figure could be perceived as poliy-prescriptive and is misleading considering the nature of SSPs. <p>Concerning the text below the title of the Figure:</p> <ul style="list-style-type: none"> • Include a reference to Box A7 page 9 about SSPs. <p>Concerning the column "Agriculture"</p> <ul style="list-style-type: none"> • consider "low population decline" instead of "low population growth";=> A intégrer dans l'encadré A7. • provide explanation on type of replacement of agriculture land area that are declining, as the replacement has great feedback impact on climate and on land-use management; <p>Concerning the column "Bioenergy"</p> <ul style="list-style-type: none"> • in the bottom figure, insert scenarios after 1.5°C; <p>Concerning the quantitative indicators for the SSPs:</p> <ul style="list-style-type: none"> • provide explanation of their nature and their unit; <p>Concerning the general caption:</p> <ul style="list-style-type: none"> • consider the suppression of the 1st sentence as it is a repetition of the title. [France]

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4770	27	1	28	24	KEY ISSUE [GRAPHICS]: Figure SPM.4 is difficult to parse, and the authors need to decide what key messages policymakers should take away from this set of integrated assessment model runs, and craft the figure in a way that cleanly delivers those key messages. As currently drafted, it is too easy for readers to miss the integrated nature of these results and simply take away that limiting warming to 1.5°C requires reducing agricultural land area. These readers would miss the essential trade-offs between land used for bioenergy and afforestation and land used for agriculture and other purposes. One way to more cleanly arrange this information to convey the essential trade-offs is for each plot to present data from a single scenario (1.5°C SSP1; 1.5°C SSP2; 2.5-3°C SSP1; 2.5-3°C SSP2; 2.5-3°C SSP3), with different colored lines representing the changes in agricultural land, bioenergy cropland, and forest land. Within a single plot it will then be easier to see the trade-offs involved, and readers can compare across plots to see how different targets and socioeconomic pathways affect those tradeoffs. Also, the results are shown for 1.5°C scenarios and 2.5 to 3°C scenarios. Presumably these scenarios correspond to particular RCPs that constrain the models to meet a particular radiative forcing that can then result in a distribution of temperature outcomes. The figure and caption should be clear about which RCPs are represented in these model runs. [United States of America]
4772	27	1	28	24	KEY ISSUE [GRAPHICS]: These graphs are difficult to understand. These attempt to convey information about multiple variables, but that doesn't seem possible in a two-dimensional graph. The two-dimensional graph also seems to imply correlation, causation, or requirements, but the interplay with SSP1 vs 2 or 1.5°C vs 3°C may be more important than the interplay between these two variables. One thing to consider might be the effect of changing key variables most directly related to climate change holding the rest of the SSP steady, if that is possible. More narrative describing the implications of the charts is needed. In fact, it may be helpful to write the implications in narrative form and then to decide how best to visually convey that information. [United States of America]

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2840	27	1			<p>Fig. SPM.4: We have strong reservations about Figure SPM.4 in its current form. Most importantly, the graphic representation of changes in agricultural, bioenergy and forest land creates the wrong impression that 1.5C mitigation pathways reduce the amount of land available for food production, and therefore represent a high risk to food security. It also could create the wrong impression that the higher agriculture land area under increased warming is caused by yield losses which is however not the case because SSPs just consider mitigation, not impacts.</p> <p>If there was a graphic representation of land use patterns in BAU scenarios, one could see that the reality is at least partly reverse: the socioeconomic assumptions (population, dietary shifts) in SSP1 and SSP2 free up land that can then be used for mitigation purposes. We strongly object to showing this figure in the current form, as we feel that the graph can be misinterpreted and taken out of context to demonize ambitious mitigation scenarios by pitching them against food production and biodiversity conservation. Similarly, we do not find the table below the diagrams helpful for policymakers, as ranges are very large and individual categories ill-defined outside the IAM-modelling world. We would caution against the inclusion of such large amounts of quantitative technical information that will invite cherry-picking and misinterpretations of individual numbers without adding actual value for policymaking. On a side note, what is the rationale for including the range ("2.5-3°C") for the second pathway instead of a clear median line as in the first? Why not simply take the median T-line for RCP4.5 and say so? As said in our comment to SPM.2 panel 2 and 3, we generally support the inclusion of information differentiated by assumptions about socioeconomic futures. For the revision of SPM.4, we suggest the following: i) if possible, include some sort of kaya-decomposition that shows which part of the overall land use change comes from what driver; ii) else at least include the BAU - land development and very clear language that clarifies the direction of cause and effect, iii) include the LED-scenario to show the full SR1.5 scenario range, in particular highlighting the potential of immediate steep emissions reductions, demand side measures and technical innovation (step change) and reduced reliance on NETs and BECCS in particular. As said in our comment to Box A7, it is not clear why SSP1, 2 and 3 are chosen and SSP4 and 5 not represented. This should be justified; iv) consider to amend this graph with the information that is currently depicted Fig. SPM.2 panel c, incorporating risk from climate change impacts at 1.5 vs 2C and a higher value (e.g. ~3C by 2100, which would be the likely range for unconditional NDCs, and a BAU warming) depending on SSP and land area dedicated to CDR measures and/or bioenergy. In addition, please clarify how Fig.SPM.4 compares to Fig. SPM.2 (e.g., regarding the consideration of impacts). [Germany]</p>
1730	27	1			<p>This figure SPM4 is not very informative in its current form for several reasons. Comparison of a 1.5 pathway with a non-Paris pathway is not useful or policy relevant - it is already clear that less land-based mitigation is needed in a scenario that fails the Paris Agreement. This figure would be significantly improved if it could convey the following very policy-relevant pieces of information: 1) What are the interdependencies between the different quantities shown? E.g. what are the trade-offs between agricultural land, bioenergy and agricultural cropland? How much expansion can be done in each before constraining the other, etc. ? 2) Policy makers need to understand the differences between pathways that achieve the Paris Agreement. It seems that e.g. change in forest land differs by one order of magnitude even in SSP1 scenarios. Providing greater detail on land use change under different scenarios that achieve 1.5 would be very important and more policy relevant than what is currently displayed. Using the "archetype" scenarios concept as in the SR1.5 might be a useful way to address this. [Saint Kitts and Nevis]</p>

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1818	27				Figure SPM 4. The table below the figure is not easily readable. It is suggested to remove the table and, instead, insert reference to the relevant part of the text where the information can be found. [Finland]
1454	27				Figure SPM.4: Please specify in the title "changes to agricultural land" that it includes non-energy and pasture land [Luxembourg]
1456	27				Figure SPM.4: We do not understand the choice of the temperature ranges used in this Figures. Whereas we want to maintain the 1.5°C scenarios, we would prefer to see them compared to 2°C scenarios, as this comparison would be much more policy-relevant. [Luxembourg]
1458	27				Figure SPM.4: We do not see the added value in the table at the bottom of the Figure as is contains a lot of figures that are very difficult to interpret. If it is to be kept, it would be better to express the figures as percentage changes to the base-line SSP scenarios) [Luxembourg]
8582	27				At the bottom of the page there is a list of quatitative indicators for the SSPs. It is not helpful to the policy-maker to talk about CH4 and N2O emissions from AFOLU (should be Agriculture) - using AFOLU obscures the origin of the emissions. Similarly "Cumulative AFOLU CO2 emissions" is equally unhelpful when these emissions are really from forestry and land use change, for example, deforestation etc. [New Zealand]
1858	28	1	28	1	Some parts of Figure SPM.4 are confusing. For example, what do figures in parentheses mean? It is unclear, at least at the first glance. [Russian Federation]
1790	28	16	28	28	shaded areas along lines in figure are presumable confidence intervals. The is no need for exact figures in legend. [Denmark]
7632	28	17	28	18	The sentence stating that "Temperature rise in 2100 is 1.3C in the 1.5°C pathways and 2.6C in the 2.5 to 3C pathways" is highly likely to confude a reader. It would be much better not to specify this, and instead just talk about 'Pathways with an X% chance of remaining below YoC of warming by 2100'. [United Kingdom (of Great Britain and Northern Ireland)]
336	28	20	28	20	Please delete 3.8.5 from the reference. The information on Integrated Watershed Management in section 3.8.5 seems little relevance to ssp information presented in Fig. SPM.4. [Japan]
8016	29	1	29	1	avoid using "enable "twice: suggestion to replace first one by "support" [Netherlands]
8526	29	1	29	33	the first mentioned actions are all related to early warning systems for adaptation etc. Only later the need for early action towards mitigation is needed. This order does not reflect the report very well where the need for action towards mitigation and sustainable land management is highlighted throughout. It is much better to turn around the order of points here by first highlighting the sustainable land management needs and only then mentioning the benefits of early warning for disaster measures [European Union (EU)]

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Comment No	From Page	From Line	To Page	To Line	Comment
1680	29	1	29	37	<p>1. Lines 4-6 on page 29 are too broad in terms of institutional mechanisms for decision-making for climate change adaptation, risk management and sustainable development, lacking the description of specific means of implementation. In order to enhance the report in terms of science and consistency, it is suggested that “These include actions to fill knowledge gaps, accelerate knowledge transfer, implement early warning systems and build capacity (high confidence). {3.7, 5.5, 5.6, 5.7, 6.3, 6.5, 7.4, 7.5, 7.7}” be revised to read: “These include actions to fill knowledge gaps, innovation on methodology to accelerate knowledge transfer, and build technological and institutional capacity to implement early warning systems and risk management, (high confidence). {3.7, 5.3, 5.5, 5.6, 5.7, 6.3, 6.5, 7.4, 7.5, 7.7}” against Chapter 5 of the underlying report and D1.3 and D1.4 of the SPM” (high confidence).</p> <p>2. Adaptation is also an important measure for the food system. It is suggested that “Knowledge is needed on both supply-side and demand-side mitigation..... urban agriculture. {5.5.1, 5.5.2, 5.6.1, 5.6.5, 5.7.5, 6.3, 6.5}” in lines 11-14 on page 29 be revised to read: “Knowledge is needed on both supply-side and demand-side mitigation/adaptation urban agriculture. {5.3.6, 5.5.1, 5.5.2, 5.6.1, 5.6.5, 5.7.5, 6.3, 6.5}”.</p> <p>3. As the expression of "risk management" has been added in the first comment, the relevant words in D1.6 on risk management should also appear in D1 accordingly: “D1.6 Risk management could play an important role in adaptation, which could be accomplished with multifunctional and agro-ecological landscape approaches, biological control of outbreak of pest and diseases, completing risk sharing and transfer mechanisms such as development of insurance markets and improve index-based weather insurance programs (high confidence).{5.3.2, 5.3.5, 5.6.2, 5.6.3, Cross-Chapter Box 6, 5.6.5, 5.7.1, 5.7.2}”. [China]</p>
7634	29	1	29	37	<p>Overall, section D1 is helpful and contains some important messages. However, it would also be helpful to include that many response options can and have been implemented and therefore the barriers to doing so are not a lack of knowledge of understanding. The underlying report states that "A number of response options (e.g., most agriculture-based land management options, forest management, reforestation and restoration) have already been implemented widely to date. There is robust evidence that many other response options can deliver cobenefits across the range of land challenges, yet these are not being implemented." This could be elevated into the SPM, along with the evidence (such as from Table 6.63 from the underlying report) that many options are low cost, and some are even cost-negative (such as biochar and reduced soil compaction). [United Kingdom (of Great Britain and Northern Ireland)]</p>
3036	29	2	29	2	Suggest rephrasing to read: "Actions taken in the near-term can lead to longer-term....." [Australia]
1320	29	2	29	2	Recommended edits for clarity: Opening sentence says "Actions taken...can ENABLE longer term responses that ENABLE mitigation and adaptation...etc.". That's a tenuous series of enabling actions! Suggested text: "Actions taken in the near-term can open up pathways to build more effective longer-term approaches for mitigation and adaptation to climate change..." [Canada]
1460	29	2	29	2	Please specify what period "near-term" covers [Luxembourg]
7966	29	2	29	2	Modify text to avoid using 'enable' twice in one line. [Netherlands]

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7636	29	2	29	3	"...can enable longer-term responses that enable mitigation and adpation". This sentence could do with a restructure to clarify how responses are diferrent from mitigation and adaptation actions. [United Kingdom (of Great Britain and Northern Ireland)]
2846	29	2	29	6	Assuming this paragraph is placed first in section D to highlight how vital near term measures such as knowledge transfer and capacity building measures are to enable effective long term responses, the headline statement D1 should be reversed to express this conditionality and urgency more clearly. Please consider to reorder and phrase along the following lines: "Immediate action to address knowledge gaps, ... and build capacity is vital to enable effective long term responses. Delaying such early action increases costs and reduces sustainable development benefits for land based mitigation and adaptation, measures to address desertification, land degradation and food security." [Germany]
7904	29	2	29	6	surprised that knowledge is emphasised as the key early action. One would expect mitigation actions that acutally reduce emissions to be highlighted in the first para of this section. Suggest change the emphasis from knowledge to mitigation action and the benefits of this, eg. para D1.5 og D3 [Norway]
148	29	2	29	6	"Early action in implementing land-based response options" should be mentioned in the D1 section, and should appear in the first place as it is the most urgent action of those highlighted in section D. [Spain]
5040	29	2	29	6	Early action reasonably encompasses investments (to avoid prohibitive lock-ins and to pave the way to long-term mitigation and adaptation) could also be mentioned here (alluded to, in some sense, in D1.5, if "responses" and physical or economic ones). [Sweden]
7638	29	2	29	6	What are the longer term responses that are enabled by short term actions that enable mitigation and adaptation etc.? It would be great if this main paragraph could be combined with D1.5, which is and extremely important point to make (especially the part on reducing cost) that should be brought out more. [United Kingdom (of Great Britain and Northern Ireland)]
4780	29	2	29	6	The authors may want to clearly call out research. Knowledge gaps may be too vague for some. [United States of America]
4782	29	2	29	6	KEY ISSUE [ALIGNMENT/ACTION]: The end of this sentence 'build capacity' needs to be more specific and nuanced. Capacity of many countries is arguably the key barrier to achieving outcomes – capacity for policy enforcement, capacity for infrastructure development, capacity for governance at local, regional, and national levels. Capacity for economic development. As written, it sounds like knowledge will solve 75% of the problem; that is inaccurate. Similarly, from Chapter 6 (p. 6-5, lines 24-26): "Coordinated action is required across a range of actors, including business, consumers, land managers, indigenou and local communities and policymaker to create enabling conditions for adoption of response options (high confidence)." This text should be included explicitly in the SPM, perhaps here. [United States of America]
8938	29	5	29	5	Write: "... implement early warning systems, build capacity and replicate good practices (high confidence)." [Liechtenstein]
8862	29	5	29	5	Write: "... implement early warning systems, build capacity and replicate good practices (high confidence)." [Switzerland]
8532	29	7	29	9	the sentence could be rephrased to clarify whether 'those' is referring to the knowledge gaps or the response options. [European Union (EU)]
8534	29	7	29	9	following the above comment, the reference to limits to adaptation should be rephrased and refer to pushing back the frontiers of adaptation. [European Union (EU)]

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1028	29	7	29	9	Please provide more elaborated information about the knowledge transfer here referred to in, and consider how to avoid redundancy with C4.4. [France]
2848	29	7	29	9	Please add after "particularly those involving CO2 removal" "and those increasing efficiency (i.e. sustainable intensification)" because its relevance has been shown in the underlying chapters, e.g. CH5, Box 5.4 on P68; Table 5.3 on P94, P46, P91. [Germany]
7908	29	7	29	9	Issues of "CO2 removal" and "those reaching or surpassing limits to adaptation" seem to be very different and should be discussed separately. "CO2 removal" is a response option that raise certain considerations. "Surpassing limits" is not an option, but a potential consequence. [Norway]
1724	29	7	29	9	The word "surpassing" is confusing here. A response option can be a limit to adaptation, but it is not clear what would be meant by "surpassing" a limit to adaptation. Adaptation options reach limits, beyond which further adaptation is not possible and residual impacts occur. For an adaptation option to "surpass" a limit might imply that it enabled adaptation beyond the limit (to surpass something means to exceed it / to do better than it). A suggestion for this wording would be to write "... and those hitting limits to adaptation". [Saint Kitts and Nevis]
7640	29	7	29	9	Do you mean limits to incremental adaptation? It would be clearer if it could be specified across the report whether we are talking about incremental or transformational adaptation/types of limits. e.g. here you could say 'transformative options' or 'options relating to transformational adaptation'. [United Kingdom (of Great Britain and Northern Ireland)]
8584	29	7	29	14	There is no confidence evaluation for the last sentence in D1.1 [New Zealand]
7906	29	7	29	14	This paragraph is of less importance than the other paragraphs in this section. Please consider to move this to the end. [Norway]
594	29	8	29	8	involving CO2 and other major GHGs removal' could be more appropriate instead of 'involving CO2 removal'. [India]
2850	29	8	29	9	What is meant here by "response options....reaching or surpassing limits of adaptation"? The problematic concept of "limits to adaptation" aside, you'd expect climate change impacts to reach those limits, not response options - please revise the wording to clarify what is meant here and avoid mixing sensitive concepts. [Germany]
7968	29	8	29	9	In D.1.1 the phrase 'those reaching or surpassing limits to adaptation' is confusing and puzzling, what is meant here? Possibly 'options' that prevent 'reaching and surpassing etc.'? Rephrase accordingly. [Netherlands]
8536	29	9	29	11	D1.1: is it possible to provide examples of the response options that have only been implemented at small scale so far? Among the many possible options, it is not clear which are being referred to here. [European Union (EU)]
1030	29	9	29	11	It is also required to check if a "good" practice applied on the "wrong" place might not result in opposite results. It is a pre-requisite to evaluate ecosystem state and to take into account its history before considering any new practice to be applied on. It is not only a question of upscaling but also a question of widespreading. [France]

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4784	29	10	29	11	Suggest including examples of challenges from the Chapter 7 Executive Summary – for example, "... challenges with upscaling these options INCLUDE ECONOMIC AND INSTITUTIONAL BARRIERS." [United States of America]
7642	29	11	29	11	challenges exist with upscaling these options' - this is very vague. Please be more specific about these challenges. What actually are they? [United Kingdom (of Great Britain and Northern Ireland)]
5574	29	11	29	12	supply and demand side mitigation... Not clear what is understood by that. [Brazil]
1032	29	11	29	13	Add "preserving biodiversity and ecological services eg. polinization" [France]
4858	29	15	29	15	Delete "both" [Iran]
4860	29	15	29	15	Delete "and governance" [Iran]
1034	29	15	29	16	"technology transfer": Please consider also other kind of transfer such as expertise and knowledge transfers. [France]
4786	29	15	29	16	This sentence lacks a confidence statement. [United States of America]
1322	29	17	29	18	What is meant by "Reciprocal knowledge transfer can help optimise the use of natural resources..." Reciprocity implies there are partners in the knowledge transfer but they are not identified in this sentence. Please expand. [Canada]
1326	29	19	29	21	Recommend highlighting the highly favourable cost benefit ratio of hydro-meteorological services. World Bank reference: http://documents.worldbank.org/curated/en/711881495514241685/Valuing-weather-and-climate-economic-assessment-of-meteorological-and-hydrological-services . Excerpt: "Considering 140 studies of the benefits of met/hydro services: "BCRs [ratios of benefits to costs] range from 2 to 1, to 36 to 1, and in one study, in which the value of lives was quantified, a BCR of 2 000 to 1 was estimated." [Canada]
1036	29	19	29	21	Please consider other sources of information such as field observation, inventory and survey, in particular for biodiversity. [France]
5406	29	19	29	21	This point on the returns on investments is important from a policy perspective and we thank the authors for including it. [Gambia]
1324	29	19	29	25	Recommend adding a reference to 'services': "There are high returns on investments in human institutional capacities, including access to early warning and other services derived from in-situ hydro-meteorological and remote sensing-based earth monitoring systems and data, and expanded use of digital technologies (medium confidence)." [Canada]
24	29	19	29	33	success stories and best practices for climate action in agriculture and forestry. [Sri Lanka]
338	29	20	29	20	SPM D1.3. mentions hydro-meteorological and remote sensing-based earth monitoring systems and data, in the context of measuring progress in addressing such issues as desertification and land degradation in the context of climate change. We would suggest adding "as well as in-situ based" after "remote sensing-based", so that all forms of earth observation would be included. [Japan]
4788	29	20	29	20	Earth is a proper noun. Capitalize it. [United States of America]

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340	29	21	29	21	There is inconsistency in the confident levels between "high returns on investments in human and institutional capacities, including access to early warning, hydro-meteorological and remote sensing-based earth monitoring systems and data, and expanded use of digital technologies (medium confidence)" of SPM and "...are high return investments for enabling effective adaptation and mitigation responses that help address desertification (high confidence)" in Chapter 3 (p. 3-6, line 7). [Japan]
1038	29	21	29	24	"citizen science": Please provide some elements of explanation and check if collaborative science is not more adequate. [France]
62	29	22	29	22	Please avoid jargon like "citizen science" or explain the term. [Denmark]
8940	29	22	29	22	Write: "... and communication technologies, use of climate services, remotely sensed ..." [Liechtenstein]
8864	29	22	29	22	Write: "... and communication technologies, use of climate services, remotely sensed ..." [Switzerland]
342	29	24	29	25	Please modify the references. 1, Replace 3.7.3 with Cross-Chapter Box5: Policy Responses to Drought in Chapter 3. 2, Delete 3.8.6 that doesn't exist in Chapter 3. [Japan]
4790	29	25	29	25	Consider adding, "At present there are still numerous barriers to the effective use of early warning information." [United States of America]
8538	29	26	29	26	The first sentence should begin: "Seasonal forecasts, and early warning systems for weather, crop yields, as well as fast and slow [...]" [European Union (EU)]
1040	29	26	29	26	Please consider adding "biodiversity" to this list. [France]
596	29	26	29	26	Rather than 'crop, yields', 'crop yields' could be more appropriate. [India]
5190	29	26	29	26	This statement does not need to have a comma between 'crop' and 'yields'. [Republic of Korea]
1328	29	26	29	31	This sentence needs clarification: "Their [Early warning systems] performance improves with involvement of people, for example through the selection of indicators of sustainable land management, such as soil erosion, soil salinization, desertification, water quality and water supply and demand (medium confidence).". How does increased participation early warning systems improve performance? Is this sentence trying to convey that "The performance of early warning systems is improved when more people are involved in data collection and the selection of indicators"? Or, is it saying that the performance of early warning systems improve when linked to sectoral indicators? [Canada]
8540	29	26	29	33	It is not obvious why the performance of early warning systems would improve through the selection of indicators. The meaning of the whole paragraph is not easily accessible to the lay reader. [European Union (EU)]
5578	29	27	29	27	climate change events are critical, as are related contingency plans, for protecting... [Brazil]
1462	29	28	29	28	This should read "affecting adaptive". [Luxembourg]
8626	29	28	29	32	These two sentences need further substantiation --> from line 31 - what does 'this' refer to? And how and why does 'this' help? [New Zealand]

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146	29	28	29	32	Consider including " Although it is important not to simplify and first analyse how the inherent complexity of indicators translates into the process of assessment and monitoring supporting decision making" at the end of the sentence. Some countries already working with indicators have encountered difficulties that should be taken into account when dealing with complex ecological and socio-economic systems, long-term scenarios, lack of a systematic approach and difficulties in assigning specific causes and effects. [Spain]
5580	29	29	29	29	involvement of people ... Suggestion: involvement of multiple stakeholders [Brazil]
8018	29	29	29	29	replace "people" by "stakeholders"; the term people seems to general and unfocused [Netherlands]
1042	29	30	29	31	The suggested indicators of sustainable land management (i.e. soil erosion, salinization, desertification, water quality, water supply and demand) are not always easy to measure, this could be acknowledged in the text. [France]
1044	29	30	29	31	Please consider adding "biodiversity" to this list. [France]
344	29	32	29	32	Please delete 3.8.6 that doesn't exist in Chapter 3. [Japan]
512	29	34	29	34	Replace "early" with "near-term" [Ireland]
8542	29	34	29	35	The sentence should also refer to the loss of productive land. It could begin as follows: "Early action in implementing land-based response options to avoid, reduce and reverse land degradation, desertification, and the loss of productive land to urban sprawl and other uses, have multiple[...]" [European Union (EU)]
346	29	34	29	35	Suggest replacing 'action' to 'actions' in line with Chapter 4 (p.4-6, line 21). [Japan]
1046	29	34	29	37	This paragraph (D1.5), which is very policy-relevant, is of particular importance for climate action and should be better highlighted in this section, including through a moving to D1.1. [France]
2854	29	34	29	37	The monitoring of e.g. farm nitrogen budgets and standard agronomic indicators are crucial for implementing policy schemes later on that address e.g. the regulation of nitrogen in agriculture. As part of capacity building, the early implementation of such monitoring systems is reasonable. Therefore, we request to include them either in statement D1.5 or somewhere else in D1. [Germany]
7910	29	34	29	37	This is a very important and clear statement. Please consider to lift this up to right below the bold headline statement D1. [Norway]
1726	29	34	29	37	A reference to cross chapter box 10 is needed [Saint Kitts and Nevis]
150	29	34	29	37	Following the previous comment, section D1.5 should be renamed as section D1.1 and reallocated in the first place. [Spain]
4792	29	34	29	37	How can this single sentence be attributed to eight different sections in three different chapters? It makes it difficult to trace the information from the underlying report to the SPM, and might imply a degree of synthesis that is not appropriate for an SPM. [United States of America]
8544	29	35	29	35	Insert: ... desertification and to maintain and restore ecosystems, have multiple benefits [European Union (EU)]
8628	29	35	29	36	should expand - would reduce the cost compared to what? [New Zealand]
7644	29	35	29	36	This point about early action reducing costs is very important - could you elevate it to the chapeau please? [United Kingdom (of Great Britain and Northern Ireland)]

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2856	29	36	29	36	Please add information on the characteristics of the barriers mentioned and how these could be overcome available in CH7. The current statement is trivial. [Germany]
620	29	36	29	36	Remove one barriers and should read "If barriers to implementation and sustainable land management are overcome" [United Republic of Tanzania]
4794	29	36	29	37	Suggest more specificity here, reflecting the underlying report (page 3-51). Suggest rephrasing to "... reduce the cost of mitigation and adaptation IN THE LONG TERM, if barriers to implementation and ECONOMIC AND INSTITUTIONAL barriers to sustainable land management are overcome." [United States of America]
348	29	37	29	37	Please delete 5.2.6 that doesn't exist in Chapter 5. [Japan]
514	29	38	29	38	Has the non-food use of livestock and other animals been considered in the context of indigenous knowledge here and throughout the Report? [Ireland]
4796	29	38	29	40	This sentence lacks a confidence statement. [United States of America]
8702	29	38	29	41	Useful, please retain [New Zealand]
4798	29	38	29	41	Sections 5.1, 5.3, and 5.6 focus on food security, not early action versus later action. Suggest replacing the word "early" with "coordinated" and expanding the list of referenced sections to include Chapters 3 and 4. [United States of America]
8546	29	39	29	39	include after ... social, economic, ecological and development benefits [European Union (EU)]
8548	29	39	29	39	Suggested to replace the term "near-term" with another term, such as readily effective. As it is the term seems to include also short-term, which is probably not what is meant here. [European Union (EU)]
4800	29	40	29	40	Suggest replacing "benefits" with "co-benefits" for clarity. [United States of America]
8020	29	41	29	41	add to D2: Every dollar invested in sustainable land management yields from three to six dollar of returns in terms of ecosystem services, benefiting the entire global community". [Netherlands]
8550	29	41	29	42	"among poor and marginalised social groups" seems redundant, it could be deleted. [European Union (EU)]

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2842	29	1	30	21	<p>There has to be added a paragraph on near-term conservation of carbon-rich ecosystems and soils, such as forests, peatlands and coastal wetlands, in order to stop emissions from conversion and destruction. We suggest something based on the following statements in the Technical Summary:</p> <ul style="list-style-type: none"> - "Despite accelerating trends of land degradation, reversing these trends is attainable through restoration efforts and improved land management, which is expected to improve resilience to climate change, mitigate climate change, and ensure food security for generations to come." TS, P4, L13-16. - "Urgent action to stop and reverse the over-exploitation of land resources would buffer the negative impacts of multiple pressures, including climate change, on ecosystems and society (high confidence). TS, P8, L10-12. - "In high carbon lands such as forests and peatlands, the carbon benefits of land protection are greater in the short-term than converting land to bioenergy crops for BECCS, which can take several harvest cycles to 'pay-back' the carbon emitted during conversion (carbon-debt), from decades to over a century (medium confidence)" TS P16, L46- P17, L4. - The sentence "Preserving natural resources such as peatland, coastal and forest restoration, options that reduce competition for land, those applied across all ecosystems, such as fire management and soil management options, and most risk management options, provide almost exclusively positive impacts on sustainable development (medium confidence). from P119 L 24-28 should be added to the new paragraph, and potentially be included in the headline statement. <p>Please add a sentence on the relevance of conserving carbon-rich ecosystems and soils for both climate mitigation, avoiding land degradation as shown in CH4 to a headline statement in section B or D. [Germany]</p>
5410	29	38	30	21	<p>Can anything about benefits for biodiversity be added to this section? Limiting deforestation is not mentioned in this section on near-term action, despite its role in mitigation, adaptation, biodiversity and raising resilience. [Gambia]</p>
5188	29	1	31	4	<p>It is hard to see the difference between options in earlier and the actions (actions in near-term) suggested here. Urgent actions should be highlighted. [Republic of Korea]</p>
8528	29	1	31	5	<p>suggestion to reorder the sections D3 becomes D1 and D1 becomes D3 [European Union (EU)]</p>
1026	29	1	31	5	<p>This entire section has undergone major changes compared to the version, leading to much more attenuated messages about the importance of immediate action, the cost of inaction and the fact that "enough is known to take action now" (first message from section D in the Second Order Draft). We suggest to take up the Second Order Draft plan for section D, and keep in mind the spirit and key messages for immediate climate action. [France]</p>
1336	29	1	31	5	<p>We suggest to add a time line in this title to precise what is meant by near term (before 2030). [France]</p>
5404	29	1	31	5	<p>This point on the returns on investments is important from a policy perspective and we thank the authors for including it. [Gambia]</p>
2844	29	1	31	5	<p>We welcome the statement on the unprecedented exploitation in the beginning of the SPM (P3 L35-36). However, we miss a clear statement in the beginning of the subchapter D on the importance to deal with this exploitation. We particularly suggest to add the lines from the Technical Summary in one of the headline statements of D: "Urgent action to stop and reverse the over-exploitation of land resources would buffer the negative impacts of multiple pressures, including climate change, on ecosystems and society (high confidence)" (TS P8 L10-12) [Germany]</p>

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Comment No	From Page	From Line	To Page	To Line	Comment
7902	29	1	31	5	Please include actions to reduce SLCF as a near-term option. This is both to reduce the rate of warming and to secure food supply. We think it is important to highlight how climate mitigation might happen relatively fast. It is also vital that policy makers understand the role that methane emissions play for tropospheric ozone formation and crop loss. This is highlighted in Table 6.8 Integrated response options based on land management 1 of all/other ecosystems, and also noted e.g. in chapter 5.2.2.1 in the report. [Norway]
1722	29	1	31	5	This section lacks information on synergies and potential risks for sustainable development. In particular, the SPM already includes some references to co-benefits for sustainable development in sections B and C, but there is nothing on the adverse impacts of climate change on sustainable development, and in particular on achieving the SDGs. This section on near-term action should mention the SDGs, the risks posed by climate change, land degradation and food insecurity for achievement of the SDGs, and the potential synergies with near-term mitigation options. [Saint Kitts and Nevis]
4776	29	1	31	5	Part D tends to drift to CO2-centric language and ignore opportunities for non-CO2 greenhouse gases such as CH4 and N2O. An additional summary point highlighting the importance of considering a multi-GHG strategy to open up opportunities but also to minimize conflicting goals is recommended (e.g., wetland restoration could sequester carbon but lead to increased CH4 if not carried out strategically). [United States of America]
4778	29	1	31	5	Authors should consider bringing the actionable findings up front, where readers are most likely to see them, and providing the context and background later. As drafted, there are broad similarities between Sections C ("Enabling Response Options") and D ("Action in the Near-Term"). In fact, D1 begins by discussing enabling response options: "Actions taken in the near-term can enable longer-term responses ..." Specifically, recommend condensing Section D into a single paragraph of key findings, or developing a single bold chapeau with the D1/D2/D3 headline statements as sub-paragraphs; merging this with Section C as a new C5 (with supporting text); and moving the entire C/D amalgam to the start of the summary. This reinforces urgency and opportunities for co-benefit, and allows policymakers to identify actionable items right up front. [United States of America]
7900	29	1	31	31	The chapter is a general argument for early action and sets out consequences of delaying action. However, there seems to be a basis for highlighting that some options for early action are more readily available than others. E.g. avoiding deforestation is easier to address in the short run than to reduce emissions from livestock. [Norway]
8772	29	2	31	5	It would be important to give recommendations in the context of joint climate action, proposing modalities such as North-South, South-South or triangular cooperation. [Chile]
3034	29		31		Suggest reconsidering Part D) 'Action in the near term' whether it adds any value to the response options already presented. It seems obvious from the Parts A) to C) that responses need to be taken as soon as ever possible. Deleting Part D) could help to shorten the SPM. [Australia]
8736	29		31		It would be important to give recommendations in the context of joint climate action, proposing modalities such as North-South, South-South or triangular cooperation. [Chile]
5570	29	1			Title modified "EARLY AND NEAR-TERM ACTIONS" [Brazil]

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Comment No	From Page	From Line	To Page	To Line	Comment
5402	29	1			This paragraph is potentially important for policymakers who are often looking at what can be done in the near-term. However it could be reinforced by including concrete mentions of the reponse options that could be implemented quickly with ensured benefits. "Avoiding deforestation and forest degradation" appear as strong candidates for such no-regret options, as their portential to "help to meet short-term goals" is mentioned in B3.3. [Gambia]
8530	29	2			change "enable mitigation" to "enhance mitigation". [European Union (EU)]
5572	29	4			Include word (...food and WATER insecurity." [Brazil]
5576	29	15			Concept modified. "D1.2. NEAR-term capacity-building..." [Brazil]
2852	29	17			Please specify "Reciprocal knowledge transfer". [Germany]
5582	29	39			Include word (concept). "...and food and WATER security..." [Brazil]
8586	30	1	30	9	There is no confidence evaluation for the last sentence in D2.1 [New Zealand]
7646	30	1	30	9	This paragraph needs some redrafting and refocussing/shortening. Some of the sentences seem to be missing words and do not connect well. Could you also give examples of land and food-related vulnerabilities? The section 'For example...' also doesn't seem to follow on from the beginning - is this a section about synergies/co-benefits or about [United Kingdom (of Great Britain and Northern Ireland)]
3038	30	1	30	16	Suggest defining co-benefits vs multiple benefits - this comment applies to many cases where the "benefit" terms are used in the SPM. [Australia]
598	30	1	30	44	Countries with transforming economies with high population density require some more attention for near-term as well as long-term economic and ecological benefits of the society [India]
2858	30	2	30	2	Proposal to replace the term "marginalised" with "vulnerable": It would read: "... poor and VULNERABLE social groups". Rationale: The term "vulnerable groups" highlights the condition that needs to be addressed rather than the complex causalities that are referred to in the term "marginalized groups". [Germany]
8552	30	4	30	6	This sentence is not complete (even though it is already quite long) [European Union (EU)]
5042	30	4	30	6	Not a full sentence, unclear meaning. [Sweden]
4802	30	4	30	6	This sentence is incomplete. [United States of America]
4804	30	4	30	6	In D2.1 there is a reference to synergies between poverty reduction efforts, such as increasing access to markets, and the elimination of land-intensive low-productivity practices, such as slash and burn agriculture, overharvesting of fuelwood. First of all, this sentence appears to be a fragment. Second, social science literature has questioned many of the assumptions embedded in this sentence, such as the efficacy of increasing access to markets for poverty reduction, and the villainization of slash and burn agriculture, which in many cases has maintained more agrobiodiversity and ecosystem resilience than large-scale commercial agriculture. Suggest deleting sentence. [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
8790	30	4	30	6	The report does not use the term slash and burn agriculture as a land-intensive practice neither asset this practice. Therefore I consider the example unnecessary. Additionally, the use of uncertainty language is abused because is not needed in case of this example. At the same time an important body of literature support that slash and burn agriculture or shifting cultivation is practice extended along the tropics as an integral part of the livelihood and culture of large part of the inhabitants of this region, therefore suggest the elimination of this is a contentious issue, that is supported by the report neither by the literature. please delete the example it is not needed. [Venezuela]
1330	30	4	30	7	These two sentences should probably be combined, something like: "For example, synergies between poverty reduction efforts, such as increasing access to markets, and the elimination of land-intensive low-productivity practices, such as slash and burn agriculture, and overharvesting of fuelwood, can reduce air pollution and emissions of short-lived climate forcers (medium confidence). [Canada]
8554	30	4	30	8	<p>The three sentences need significant improvements (grammatical and structural). They could be combined, whilst mentioning also some framework conditions necessary for achieving the desired outcomes. It could read:</p> <p>"Under the right conditions (such as secure tenure), synergies can emerge between poverty reduction efforts, increasing access to markets, and the elimination of land-intensive low-productivity practices, such as slash and burn agriculture. With proper land policies, these can lead to mitigation, adaptation and development benefits through reduced air pollution and emissions of short-lived climate forcers whilst preserving ecosystem services."</p> <p>The mentioned conditions are pertinent to reducing the risk of perverse outcomes. E.g., in the absence of secure tenure rights, providing access to markets can lead to the displacement of poor land dependent people. Land policies are needed to reduce the risk of large scale land conversion. [European Union (EU)]</p>
2860	30	4	30	8	The first sentence is missing a verb, the second has a wrong causal structure (It's not the synergies that reduce air pollution). The last is self-referencing (benefits provide benefits) and is also missing a clear causal link. Please revise to clarify what is meant here. [Germany]
7970	30	5	30	6	In D.2.1 the specific detrimental practices slash and burn agriculture and overharvesting of fuelwood are mentioned for the first and only time in the report; this is at least remarkable for such well-known concrete problem areas. It is suggested decreasing them has many synergies and that is probably correct, but a sentence should be added to clarify that reducing them is subject to overcoming many institutional, technical, financial and cultural factors. [Netherlands]
622	30	5	30	6	Not clear what is meant by" Slash and Burn agriculture" [United Republic of Tanzania]
8588	30	6	30	6	Insert "and" before "overharvesting" [New Zealand]
7912	30	6	30	7	"Synergies can reduce air pollution and emissions of short-lived climate forcers". Please consider rephrasing to make clear what are the proposed actions, and what are the effects/synergies [Norway]
7648	30	6	30	7	Could this point about synergies reducing air pollution be elevated to the chapeau? It's a key message about co-benefits that would be really helpful for policymakers to know. [United Kingdom (of Great Britain and Northern Ireland)]

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Comment No	From Page	From Line	To Page	To Line	Comment
4806	30	6	30	7	This sentence lacks a confidence statement. [United States of America]
350	30	7	30	7	Section 2.5 of the underlying chapter describes the emissions and impacts of short-lived climate forcers (SLCF), but the SLCF does not seem to be mentioned in the SPM. Since the SLCF seems to be attracting attention in relation to the implementation of the Paris Agreement and was also one of the agenda topics discussed at the IPCC49 Session, we would suggest adding a bullet in the SPM that summarizes the Section 2.5 of the underlying chapter. [Japan]
152	30	7	30	8	Consider adding a confidence qualifier to this statement. [Spain]
1048	30	7	30	9	We suggest to use "cobenefits", as it is done previously in the SPM. [France]
26	30	8	30	18	Management of non-climatic factors as an important strategy to enhance farmers' adaptation, particularly in a resource-constrained smallholder farming context (Esham, M. and Garforth, C., 2013. Agricultural adaptation to climate change: insights from a farming community in Sri Lanka. Mitigation and Adaptation Strategies for Global Change, 18(5), pp.535-549.) [Sri Lanka]
28	30	8	30	18	Management of non-climatic factors as an important strategy to enhance farmers' adaptation, particularly in a resource-constrained smallholder farming context (Esham, M. and Garforth, C., 2013. Agricultural adaptation to climate change: insights from a farming community in Sri Lanka. Mitigation and Adaptation Strategies for Global Change, 18(5), pp.535-549.) [Sri Lanka]
352	30	9	30	9	Please replace the section number of 3.7 with 4.7 because of incorrect reference. [Japan]
1556	30	10	30	10	Return on investments seems very high. Please verify sources. [Belgium]
5192	30	10	30	10	yields from three to six dollars → yields from 3 to 6 dollars [Republic of Korea]
4808	30	10	30	10	Dollar is generic. Change to US\$? [United States of America]
1332	30	10	30	11	Question: Does this first sentence not require a confidence statement? [Canada]
1814	30	10	30	11	Please consider indicating the level of confidence for the first statement in paragraph D 2.2: "Every dollar invested in sustainable land management yields from three to six dollars of returns in terms of ecosystem services, benefiting the entire global community (XX confidence)". [Finland]
1050	30	10	30	11	This sentence, which is very policy relevant, is also very significant and it would be useful to highlight it better, including in D2. Please consider an alternative formulation avoiding mentioning a particular currency, using for example "initial investment" and provide the level of confidence. [France]
5408	30	10	30	11	This is a really important point on the importance of early warning systems [Gambia]
2862	30	10	30	11	"every dollar invested... yields 3 to 6 dollars...": This is very true. However, the problem is, that the yield goes to the society and the burden of the investment lies with the farmer. This dilemma should be mentioned and suggestions for solutions should be offered. Please add this information, see e.g. , see e.g. CH4, P73 L1-3 and CH6. [Germany]
602	30	10	30	11	"Every dollar invested in sustainable land management yields from three to six dollars of returns in terms of ecosystem services". Please give reference to support this statement. Also ecosystem services are very broad and cover several services including cultural and supporting services. [India]
354	30	10	30	11	The data of invest and return referred here is based on the evidence for drylands which may be derived from Chapter 7, Box 10 (Page 31, Line 25-26). We note this is not the data for entire sustainable land management. Therefore, please describe the sentence consistent with the information in Chapter 7. [Japan]

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Comment No	From Page	From Line	To Page	To Line	Comment
8704	30	10	30	11	This kind of clear and accessible description of the benefits is very helpful in communicating and engaging wider audiences in the SPM - please retain. [New Zealand]
7650	30	10	30	11	Does every dollar really do this? Could you please check whether this is a historic value, estimated future, and whether it's an average (in which case, it's probably not every dollar) or marginal claim? Moreover, it probably warrants a confidence statement as it is a significant claim. [United Kingdom (of Great Britain and Northern Ireland)]
4810	30	10	30	11	The opening sentence of D2.2 should be restated and linked to a source. It seems highly unlikely that every dollar invested in sustainable land management yields returns in this range. The statistic appears to refer to an average, based on simulations, rather than a universal law, and should be cited in this way. It is also doubtful that the entire global community benefits from every improvement in ecosystem services. Note that the statement about returns on investment appears to derive from a sentence in Cross-Chapter Box 10, which refers to evidence from Nkonya et al (2016), and notes that it relies on "evidence from drylands." The authors should review that statement and its basis carefully to reflect the results from that source more precisely. For example, Nkonya et al. (2016) also contains the interesting conclusion that "... there is a large opportunity cost of taking action against land degradation and such opportunity cost explains the economic rationale of land degradation for private land users" and further that "Over the 30-year planning horizon, the cost of action falls dramatically once the opportunity cost is dropped at the establishment period.... This means it is the establishment period that matters most and not the rest of the planning horizon." [United States of America]
1682	30	10	30	13	The expression of confidence is suggested to be added to "Every dollar invested in sustainable land management yields from three to six dollars of returns in terms of ecosystem services, benefiting the entire global community. While they can require upfront investment, actions to ensure sustainable land management can improve crop yields and the economic value of pasture". [China]
4812	30	10	30	13	The first two sentences in D2.2 lack confidence statements. [United States of America]
8556	30	10	30	16	D2.2 the current phrasing is missing part of the important message from 3-5: that every dollar invested can have social returns of 3-6 dollars & be financially profitable within 3-10 years. Both parts of this message are important for policy relevance when thinking of the type of interventions that could make use of this knowledge. i.e. it is possible to align financial and environmental interests - but the environmental returns may be greater, and the financial returns may come later. [European Union (EU)]
2864	30	10	30	16	This seems to be the only instance where quantified costs/benefits of SLM are mentioned in the SPM. Consider adding more information from the underlying chapters in the SPM, e.g. from TS 21 L7-8, as this is of key relevance for policy makers. [Germany]
7914	30	10	30	16	This paragraph is very important. Please keep this and please also consider to include the key points from this paragraph in the bold text. [Norway]
2866	30	13	30	16	There are also synergies with non-climate related environmental benefits that have immediate payoff (e.g. nitrogen pollution). Please revise and add such synergies accordingly. [Germany]
4814	30	17	30	17	The first sentence implies that most early actions are in fact costly. Provide better granularity on what the costs of action are and potential returns on investment. For example, are there land management practices have lower abatement cost than fuel switching, or other mitigation options? [United States of America]

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Comment No	From Page	From Line	To Page	To Line	Comment
4816	30	17	30	17	The statement that not all early actions are costly is very general, well beyond the scope of the SRCCL. Recommend deleting. [United States of America]
1684	30	17	30	19	The expression of confidence is suggested to be added to "Not all early actions are costly (high confidence). Incremental actions in crops and livestock production, dietary change, and reducing food loss and waste sustainable land management simultaneously ease economic burdens of ill health caused by malnutrition in all its forms". [China]
7974	30	17	30	19	In D.2.3 it is stated that options are 'not costly'. However, this is too generic and positively framed, as it is unclear how costs and potential benefits are distributed and if effective mechanisms for transfers and financing can be implemented where needed. Relatively small cost increases in production can be prohibitive, if cost can not be passed on in product prices due to market conditions, or if access to capital is constrained. Public policies may be required to prevent market failures. [Netherlands]
154	30	17	30	19	Consider adding a confidence qualifier to this statement. [Spain]
4818	30	17	30	19	The second sentence in this paragraph lacks a confidence statement. The phrase "all its forms" is vague and does not add meaning to the statement. Suggest removing this phrase. [United States of America]
8558	30	17	30	21	D2.3 encouraging to hear an economic case for early action. Mentioning the barriers to the uptake of theoretically cost-effective actions would also be useful. [European Union (EU)]
5412	30	17	30	21	The paragraph could make clearer that implementing some options could enable to save money, especially in its first sentence. [Gambia]
2868	30	17	30	21	"... ease burdens of ill health..." This is a very true and very important statement (if possible: give it a more prominent place in the SPM). But reduced health costs do not pay the farmer for his investment into mitigation options. There are hardly any no or low cost mitigation options. Mitigation options in crop and livestock production do come with costs. This must be made clear in the SPM (currently, the text gives the impression that the farmer can very easily and at hardly any costs apply the mitigation measures that were mentioned earlier in the SPM. But this is NOT the case. The vast majority of these measures increase production costs and do not increase revenues for the farmer. It is not very helpful to state that "not all early actions are costly". Even if this may be true (it becomes already true if only one single low cost action can be found), it gives the wrong impression of easily implementable low cost measures in agricultural production. Please add this information, see e.g. CH4, P73 L1-3 and CH6. [Germany]
8590	30	17	30	21	There is no confidence evaluation for the last sentence in D2.3 [New Zealand]
7652	30	17	30	21	D2.3 also seems to be missing words/sections and it is unclear what it is trying to say. Is it that not all actions are costly or is it that these 'less costly' (?) options have multiple benefits? (but reference is only made to reducing health but not ghgs? [United Kingdom (of Great Britain and Northern Ireland)]
7972	30	18	30	18	In D.2.3 '....waste sustainable land management...' makes no sense. Rephrase, what may be tried to say is: '... and waste, and promoting sustainable land management...'? [Netherlands]
7916	30	22	30	23	To improve clarity of text- could you please consider to add "negative" before "social impacts" in first sentence ("..would lead to negative social impacts and rising costs") if this is what you mean? [Norway]
4820	30	22	30	24	This sentence lacks a confidence statement. [United States of America]

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5414	30	22	30	27	Please include the following finding from D3.2 in D3: "The consequences of inaction on CC exceed the costs of immediate action in areas such as food and livelihood security, ecosystem viability, and economic prosperity and stability (medium confidence)" [Gambia]
2870	30	22	30	27	Please consider adding the clear and policy relevant statement from the TS P45 L24-25 "There is high confidence that acting early will avert or minimise risks, reduce losses and generate returns on investment. The economic costs of action on sustainable land management, mitigation, and adaptation are less than the consequences of inaction for humans and ecosystems (medium confidence)." to the headline statement D3, in particular the second sentence on costs that is missing in the current version of D3. [Germany]
356	30	22	30	27	Regarding the statement "Delaying climate mitigation and adaptation responses in the land sector would lead to social impacts and rising costs, and would reduce ...", the definition of "delay" is not clear. The same is true with the following "Acting early ..." and D3.3. Therefore, we propose to specify the definition of "delay" and appropriate level of climate mitigation and adaptation responses. We also propose to add explanation on the cost increase due to delayed mitigation and adaptation, including what kind of correlation exists between the two. [Japan]
8706	30	22	30	27	Useful, please retain [New Zealand]
7654	30	22	30	27	This paragraph could be summarised/shortened more (e.g.consequences of delays could be bunched together instead of beginning and end). Also, it would be good include some of D3.3 39-40 which are incredibly important lines. [United Kingdom (of Great Britain and Northern Ireland)]
4822	30	22	30	27	The heading in D3 references climate resilient development, low emission pathways. Suggest rewording (e.g., could add the word or between two clauses or simply state climate resilient development and cut the reference to low emission pathways). [United States of America]
8592	30	23	30	23	Given that impacts can be positive and negative, suggest inserting "negative" before "social impacts" [New Zealand]
8942	30	24	30	24	Write: "... may avert or reduce risks and losses, and generate ..." [Liechtenstein]
8866	30	24	30	24	Write: "... may avert or reduce risks and losses, and generate ..." [Switzerland]
5194	30	27	30	27	SPM Fig. 2 → Figure SPM 2 [Republic of Korea]
4862	30	28	30	28	Delete "Policies and institutions which accentuate" [Iran]
2872	30	28	30	29	It is unclear what is meant by "policies that accentuate cycles of poverty and ill health....". Do you mean "reinforce" or "don't consider"? Also, it seems obvious that policies that reinforce negative dynamics are detrimental to climate resilient development. If the statement is meant to say that such policies exist and are problematic in many countries, it should do so: "In some/many countries, existing policies and institutions that ... form barriers to ..." [Germany]
358	30	28	30	32	SPM D3.1 is constituted of two sentences that are cited from different Chapters. It is quite possible that first sentence is from Chapter 7 (p.7-29, line 31-33), and second is from Chapter 4 (p.6, line21-23). In Chapter 4, "these challenges" that is also included in SPM D3.1, indicates challenges to land degradation, while in SPM D3.1, "these challenges" refers to the challenges to policies and institutions which accentuate cycles of poverty and ill-health, land degradation and climate change. In a nutshell, the argument of SPM D3.1 doesn't support the arguments of these Chapters exactly. We suggest modifying second sentence to avoid misunderstanding. [Japan]

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Comment No	From Page	From Line	To Page	To Line	Comment
1052	30	31	30	31	Should be "land degradation". [France]
8594	30	31	30	31	Insert "land" before "degradation" [New Zealand]
5044	30	31	30	31	Suggest, for clarity, to write as follows: "... to desertification, land degradation and..." [Sweden]
5586	30	33	30	33	suggestion : The consequences of inaction on controlling/avoiding/minimizing (or something in that direction...) climate change... Comment: the inaction is not towards climate change but on its causes, such as controlling emissions... [Brazil]
7656	30	33	30	33	The sentences "The consequences of inaction on climate change exceed the costs of immediate action" and "Deferral of emissions reductions implies trade-offs leading to higher costs of several orders of magnitude" are highlight impactful statements and should be elevated to the headline D3 message. [United Kingdom (of Great Britain and Northern Ireland)]
7658	30	33	30	34	Could you clarify - do you mean to say that the consequences of inaction exceed the costs of immediate action now? i.e. is it already the case that the costs of climate damages (you refer to economic prosperity) are higher than the costs of mitigation in the present day? If not, this needs to be clarified. Moreover, as the evidence base in this area (economic costs) is relatively weak (see the fifth assessment report which states "global economic impacts from climate change are difficult to estimate") you may want to consider whether this can be justified. An alternative approach could be to instead use language around significant risks and impacts from delay. Or, alternatively, leave out economic prosperity as this is likely to be so contentious. Our instinct is that you are ultimately correct in the message you are trying to get across here, but that the evidence base may not be sufficiently strong (particularly if you are referring to the present day and not the future). [United Kingdom (of Great Britain and Northern Ireland)]
8560	30	33	30	38	The consequences of inaction have been very well documented in the 1.5C report. This is high confidence [European Union (EU)]
1054	30	33	30	38	This sentence is unclear, in particular the second part of the sentence "in areas such as..." (is it referring to consequences of inaction and/or to immediate actions ?). The consequences of inaction should be better highlighted in this section. Please consider revising the sentence, including by providing clear examples. [France]
1056	30	34	30	34	Please consider replacing "viability" by "resilience". [France]
7976	30	35	30	38	D.3.2 submits that early action could lower cost by as much as 'several orders of magnitude'. It is not clear if this specifically applies to land use mitigation or more broadly to ambitious mitigation pathways - where measures in other sectors (energy, industry, households, transport) dominate the overall picture. Regardless it is questioned if the literature supports the general finding that early action can reduce costes by a factor of 100 or more as implied by the statement. [Netherlands]
8944	30	36	30	36	Please check if "several orders of magnitudes" is correct. [Liechtenstein]
8868	30	36	30	36	Please check if "several orders of magnitudes" is correct. [Switzerland]
5588	30	39	30	39	suggestion: delaying mitigation responses to climate change by all sectors ... Comment: it is crucial to pass the message that mitigation is central, by all sectors. Although the focus of this text is land use (and not just agriculture...), it should be clear that the needed action on this sector alone will not solve the issue, and if other sectors do not make the necessary changes, all the efforts will not avoid the negative impacts that land will suffer. [Brazil]

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Comment No	From Page	From Line	To Page	To Line	Comment
7920	30	39	30	39	Please consider to add the following sentence in the beginning of the paragraph: ""This assessment reinforces findings in IPCC SR1.5 and IPBES (2019) about the benefitsof resolute and economy-wide mitigation." [Norway]
3042	30	39	30	41	Suggest the tenor of this point (which is very important) could also be elevated/picked up in the introduction section. [Australia]
7660	30	39	30	41	This is a very important point and I recommend elevating it to the chapeau if possible. [United Kingdom (of Great Britain and Northern Ireland)]
7918	30	22	31	4	D3 is especially important and important to keep. Could change order and have D3 before D1 and 2? [Norway]
1728	30	22	31	5	This is a very valuable section, which should be retained. Additional language from cross chapter box 10 could be included, for example, "potentially subsatntial economic damage to many countries" (lines 23-24, page 30). Can any indication of the magnitude of costs of inaction be included? [Saint Kitts and Nevis]
4824	30	22	31	5	Finding it difficult to appreciate these broad sweeping, aggregate assertions without appropriate qualifiers that recognize regional differences and dimensionalities that may or may not fit the aggregate. These regional differences may be more important and more actionable than the aggregate. [United States of America]
4826	30	22	31	5	KEY ISSUE [FLUXES]: This section vastly understates the risks of delaying action with regard to positive feedbacks between climate and the land sector. The opportunity to avoid accelerated carbon loss from permafrost and from wildlife in the Amazon, for example, declines as these ecosystems destabilize and as temperatures continue to increase. The associated gap in the body of the report leads to this general misrepresentation of the magnitude of the risks of delayed action. [United States of America]
516	30	39	31	4	This is a stronger message than that used in D.3 and should be given more prominence [Ireland]
8708	30	39	31	5	Useful, please retain [New Zealand]
4828	30	43	31	2	What specific risks are ecosystems exposed to? The statement could be tightened to reflect the underlying statement on page 6-149: "Early action to stem losses and reverse ecosystem changes (including reducing deforestation, reducing peatland and coastal wetland losses, reducing rangeland degradation) provides a potential way to avoid irreversibility of ecosystem change and the difficulties and costs of restoration (including rapid declines in productivity of rangelands, or barriers to peatland rewetting). [United States of America]
2876	30	43	31	4	This sentence is unclear, please shorten und reformulate to enable understanding. [Germany]
5584	30	10			Include word. "D2.2. Every US dollar.....from three to six US dollars.... [Brazil]
3040	30	26			Suggest clarifying what is meant by 'irreversible impacts on food security'? [Australia]
2874	30	33			Please specify what is meant with "inaction on climate change". It is unclear if this statement refers to the response options specified in this report or to mitigation, adaptation, etc.. [Germany]
5196	31	4	31	4	SPM Fig. 2 → Figure SPM 2 [Republic of Korea]
5046	31	4	31	5	The examples in parentheses are not readily clear in terms of substance/what is referred to, and could perhaps be omitted, without jeopardising the key point made in D3.3. [Sweden]

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30	59	2	59	14	Effective and timely climate services through Global Framework for Climate Services (GFCS) and National Framework for Climate Services (NFCS) such as the analysis of current climate and future climate change scenarios, assessment of climate vulnerabilities and accurate and timely early warnings for disaster risk reduction [Sri Lanka]
18	79		79		On Figure 2.24, on Mitigation Potential Response in Land Management, under Reduce Emission from Agriculture. Please note that GHG emission from synthetic fertilizer production is not covered in the Agriculture sector. It is in the Industrial Processes and Product Use (IPPU) sector. Hence, it is suggested to delete the item "Improved synthetic fertilizer production". [Philippines]
20	80	17	80	17	On Figure 2.24, on Mitigation Potential Response in Land Management, under Reduce Emission from Agriculture. Please note that GHG emission from synthetic fertilizer production is not covered in the Agriculture sector. It is in the Industrial Processes and Product Use (IPPU) sector. Hence, it is suggested to exclude "fertilizer production" in the list of mitigation potential. However, if the author is referring to the mitigation potential of improving "fertilizer application in agricultural soils", the it should be included in the list. It is noted that Chapter 2, page 80, line 38 has already considered "fertilizer application" as potential mitigation measure. [Philippines]
8564	91	16	91	19	Chapter 7: Risk management and decision making in relation to sustainable development Regarding de concept self-determination, it is suggested to rewrite the sentence as follows replacing the word "self determination", a term which would involve further discussions: "Consequently, this broader range of approaches may very well capture informal and indigenous knowledge improving the participation of indigenous peoples in decision-making processes and thereby promote their rights of access and free, prior and informed consent (FPIC)". [Argentina]
8566	98	26	98	31	Chapter 7: Risk management and decision making in relation to sustainable development Regarding the paragraph "There is medium evidence and high agreement that indicators for measuring biodiversity and ecosystem services in response to governance at local to international scale meet the criteria of parsimony and scale specificity, are linked to some broad social, scientific and political consensus on desirable states of ecosystems and biodiversity, and include normative aspects such as environmental justice or socially just conservation (Layke 2009) (Van Oudenhoven et al. 2012) (Turnhout et al. 2014)(Häyhä and Franzese 2014), (Guerry et al. 2015)(Díaz et al. 2015)" and the concepts "environmental justice or socially just conservation" an additional analysis should be considered, since the scope and implications that these concepts can generate are not clear. [Argentina]
8568	119	25	119	27	Chapter 7: Risk management and decision making in relation to sustainable development Regarding de concept "transnational governance", we suggest considering further analysis and the implications that this concept may generate since it is not clear in what way it will be carried out (or what instruments are proposed). Also, it is considered that the initiatives that derive from this governance approach must be carried out taking into account the progressivity and the common but differentiated responsibilities of the parties. [Argentina]

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8570	124	23	124	34	<p>Chapter 7: Risk management and decision making in relation to sustainable development</p> <p>Regarding the concept “Transformational change”: It is considered that the adoption of the concept "transformational change" may require further discussion since the implications that may result from such incorporation are not clear, being that conceptually implies a change of paradigm. On the other hand, it is considered that the initiatives that derive from this conceptual framework must be carried out taking into account the progressivity and the common but differentiated responsibilities of the parties. [Argentina]</p>
8562	124		124		<p>Chapter 6: Interlinkages 1 between Desertification, Land Degradation, Food Security and GHG fluxes: synergies, trade-offs and Integrated Response Options</p> <p>Section 6.5.3.2 Impacts of integrated response options on the UN Sustainable Development Goals.</p> <p>Regarding the third paragraph and the last sentence: [...] Overall, several response options have co-benefits across 10 or more SDG with no adverse side effects on any SDG: increased food production, improved grazing land management, agroforestry, integrated water management, reduced post-harvest losses, sustainable sourcing, livelihood diversification and disaster risk management. Other response options may have strengths in some SDG but require tradeoffs with others. For example, use of local seeds bring many positive benefits for poverty and hunger reduction, but may reduce international trade (SDG 17).</p> <p>We suggest incorporating the fundamentals or the analysis that supports this phrase as associating the use of local seeds with the possibility of reducing international trade may seem as an oversimplification. We consider further discussion in needed to make that statement. [Argentina]</p>
1122					<p>Throughout the SPM (as well as throughout Chapters 2 and 6), there are multiple references to “avoided” impacts (including emissions and other impacts) from activities such as avoided deforestation, avoided forest conversion, avoided coastal and wetland impacts, avoided peat impacts, and avoided desertification. Given that the Glossary to the SR on Land indicates that “mitigation” is defined as “a human intervention to reduce emissions or enhance the sinks of greenhouse gases”, recommend that for the purpose of this report the SPM clarify the scope of “climate change mitigation” as including both avoided emissions (compared to a future emission scenario) and actual emission reductions over time. [Canada]</p>
1124					<p>Bioenergy is presented throughout the report as a mitigation measure, but also a risk to food systems, terrestrial ecosystems, and water supply. Given the risks associated with bioenergy, as described in the SPM, it would be helpful for readers to have a clearer presentations of the potential trade-offs between increasing land use for bioenergy production, and the meeting other socio-environmental objectives. As the overall focus of the SPM should arguably be to highlight low-risk or “no regrets” approaches, further information on the caveats around increased bioenergy production – or safeguards to address the risks presented – would be helpful to include to increase readers’ understanding when considering policy options. [Canada]</p>

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1126					There is no recognition of the mitigation potential from long-term carbon storage and product substitution for GHG-intensive materials with long-lived wood products. This mitigation potential is widely recognized, and increasing the use of long-lived wood products is reflected in a number of countries' nationally-determined contributions under the UNFCCC as a policy response to climate change. Given that this approach does not necessarily result in increased pressure on land (i.e. you can increase the lifespan of wood products without increasing harvests at all, simply by shifting to other end uses), and this is an approach that has the potential to generate multiple co-benefits across various sectors, this exclusion is a considerable oversight, particularly as its potential is noted in Chapter 2 (page 81, line 39, and page 82, line 1-13). [Canada]
1128					Canada appreciates that the figures included in the SPM are trying to convey a significant amount of technical information in a more visual appealing and digestible format, however they are complicated and difficult to follow, we urge to the extent possible that they be simplified or perhaps separated into more figures. [Canada]
1130					While this SPM mentions reduced deforestation as a mitigation option, it is not given as much weight as in the underlying assessment. Chapter 2 ES assesses 'The largest potential for reducing AFOLU emissions are through reduced deforestation and forest degradation'. Section 1.4.2.1 states 'The management of protected areas that reduce deforestation also plays an important role in climate change mitigation and adaptation while delivering numerous ecosystem services and sustainable development benefits'. Chapter 5 ES notes 'Lower carbon density in re-growing forests compared to carbon stocks before deforestation results in net emissions from land use change (very high confidence).' and 'Conversion of primary to managed forests..... result in greenhouse gas emissions (very high confidence)'. and Section 2.7.1.2 notes that 'The mitigation potential for reducing and/or halting deforestation and degradation ranges from 0.4 to 5.8 GtCO ₂ yr ⁻¹ (high confidence)'. Section 4.9.3 assesses 'Maintaining and increasing forest area, in particular of native forests rather than monoculture and short rotation plantations, contributes to the maintenance of global forest carbon stocks (Lewis et al. 2019) (robust evidence, high agreement)'. By contrast, in this SPM B3.3 states 'Avoiding deforestation and forest degradation can help to meet short term goals, while sustainable forest management and agroforestry aimed at providing timber, fiber, biomass, non timber resources and other ecosystem services can provide long-term livelihoods for communities (high confidence)'. This could be read as saying that avoiding deforestation only helps meet short term goals. The mitigation benefits of avoiding deforestation are not otherwise discussed, except in passing in D3.3. Recommend adding more assessment to the SPM on the benefits of reduced deforestation for AFOLU emissions, for consistency with the underlying assessment, and revising B3.3. [Canada]
1132					The overall SPM should be reviewed for consistency in language and to ensure that terms and phrases are defined and consistency with the glossary. There are several examples: (1) use of the term food security (defined in glossary) vs. food insecurity (not-defined in the glossary); (2) definition of land degradation neutrality; (3) the term mitigation is not always consistently used as defined in the glossary i.e. is the case for mitigation in related to avoided emissions. Several other specific cases are identified below related to their page and line numbers. [Canada]

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1134					it is problematic to assume that the SSPs which are based on population growth, resource consumption intensity, and level of technological adoption are directly correlated with risks to land degradation and increased land use change. Use of this approach may reinforce social perceptions that low income countries are solely responsible for land degradation, while it simultaneously obscures the link with high consumption rates and high GHG emissions from more economically advanced countries. Suggest that further explanation is needed as to how the SSPs related directly to cause of land degradation - and include any caveats required to ensure that this is not reinforcing unfounded beliefs. [Canada]
1750					How has the terrestrial GHG balance developed since the industrial revolution, over the last 50 years and since the turn of the millenium? [Denmark]
1752					What are the projections in terms of future terrestrial GHG balance ? [Denmark]
1754					It is important that the report make the difference between differnet GHG's and the magnitudes from different sources absolutly clear. To many laymen (and politicians) GHG's equal CO2 and the report conveys the message that for CO2 terrestrial systems are a sink. However, the point that anthropogenic CH4 and N2O emission from agricultural activities are major sources of GHGs (in terms of CO2-e) does not come across very clearly and is "hidden" in A4. [Denmark]
1792					In general, the figures are quite complex in nature in trying to bring many aspects into the same figure. Simplifying and perhaps slitting figures in to more less detailed figures would be helpful [Denmark]
8946					We thank the IPCC for providing the FGD of the SRLCC. SPM. We thank the authors for their hard work. We are pleased to see that the SPM has significantly improved compared to the previous version. [Estonia]
8948					The summary report still has overlaps in messages (e.g. across sections B and D) and some too general textbook-like statements (mostly in sections C and D). Please condense by deleting these. Stronger and clearer messages are needed and please bring general and overarching messages upfront in the each section. There are missing links to SDGs and climate change in general framing. The summary should be about 10 pages shorter. [Estonia]
8954					It is not clear what is meant by concepts such as sustainable diets and sustainable land management. Perhaps add a short glossary/box with definitions? [Estonia]
8956					Indicators of dietary changes have dissapeared from this version of the SPM. These should find their way back. [Estonia]
8958					For AFOLU - please disaggregate to managed and unmanaged. [Estonia]
4864					Chapter 3 Page 43 line 42, Delete "Arab", because we just have "the Gulf Cooperation Council (GCC)" [Iran]
5054					Respose options are to be blur. In the view of policy makers, they would be expressed to 'So what to do'? [Republic of Korea]
5198					This report is not answering the most important questions regarding land and climate change measures. Renewable energy such as solar power is removing forest in many countries. Is this appropriate action in terms of climate change mitigation and adaptation and also in terms of food security? SRCCL should be able to answer this. [Republic of Korea]
5200					It is not clear what is the difference between urgent action and mid/long term actions [Republic of Korea]

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3872					<p>The following priority topic areas arose from technical review of the second-order draft SPM:</p> <ul style="list-style-type: none"> - Highlighting fluxes that can be managed, and reinforcing the basis by more clearly and consistently using the terms net and gross fluxes [FLUXES] - Land competition between sectors [LAND-COMPETITION] - Cull the clear and actionable points in Executive Summaries, which will also help with alignment of chapters, Technical Summary, and SPM [ALIGNMENT/ACTION] - Figure clarity and complexity [GRAPHICS] - Need for explicit definitions and consistent usage [TERMS] - Low-confidence statements [CONFIDENCE] - Inconsistent treatment of 'sustainable intensification' [INTENSITY] <p>Details regarding these concerns are provided in the whole document and line-by-line comments, flagged for ease of reference. Cells in the body of this table labeled 'KEY ISSUE' with an accompanying tag in brackets indicate specific comments/suggestions that tie back to these broad themes. There is no implied priority order. [United States of America]</p>
3874					<p>In light of references to the Paris Agreement in the SPM, it is worth reiterating that the United States intends to withdraw from the Paris Agreement at the earliest opportunity absent the identification of terms that are more favorable to the American people. The comments provided on this report are expert comments on scientific and technical issues. They do not reflect any statement on or change in the U.S. position with respect to the Paris Agreement or climate change policy or represent any implied commitment. [United States of America]</p>
3876					<p>These comments reflect the input of individual U.S. Government expert reviewers and, as such, do not necessarily reflect official statements of U.S. climate policy. [United States of America]</p>
3878					<p>KEY ISSUE [ALIGNMENT/ACTION]: While the statements in the SPM are, as a rule, drawn from the content of the underlying chapters, the draft SPM often fails to highlight important considerations, context, and straightforward language from the chapters. This is reflected, for example, in the SPM's treatment of scientific uncertainty. The SPM should be written to the appropriate level for the intended audience (policymakers, not technical experts) in terms of readability, clarity, conciseness, and actionable information. The efforts at synthesis are to be lauded but oftentimes the attempts to jam together too much information (textual and graphical complexity) obfuscates rather than enhances messaging. More attention needs to be devoted to ensuring consistency between the underlying report and summaries (from Executive Summaries to Technical Summary to SPM). [United States of America]</p>
3880					<p>KEY ISSUE [TERMS]: The SSPs are difficult to grasp. It will be important to communicate about them very clearly if policymakers and others are to understand the concepts, the implications, and how they interact with the other information being presented. This needs to be improved. [United States of America]</p>
3882					<p>KEY ISSUE [ALIGNMENT/ACTION]: Recommend looking again at key messages from underlying chapters as presented in the executive summaries and ensuring they are appropriately highlighted where they appear in the SPM. As it stands, the SPM does not do justice to underlying chapters. Often key messages that should be in SPM are not well-presented and can be buried in text. [United States of America]</p>

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3884					KEY ISSUE [LAND-COMPETITION]: The SPM has a huge gap in the absence of text to clarify accounting issues that are leading countries to treat bioenergy emissions as zero. In Chapter 6, there is a reference to the IPCC methodology. But there is no assessment relevant for policymakers, explaining why it does not make sense to treat bioenergy emissions in a particular country as zero without an analysis more like a Life Cycle Assessment. That point could be clarified for governments in this report. It would be a very useful contribution. [United States of America]
3886					SRCCCL emphasizes the serious trade-offs involved in implementing natural climate solutions on food security and a range of ecosystem services. These concerns echo those raised in the recent IPBES report, as well as in the IPCC 1.5°C Special Report. Unfortunately, much of the IPCC AR6 CMIP modeling activities rely on IAM scenarios and future land-use and land-cover change scenarios that still integrate BECCS as a major CDR component. There is concern that upcoming IPCC AR6 scenarios are not consistent with previous IPCC SRs and IPBES, and that this won't be reconciled until AR7. [United States of America]
3888					KEY ISSUE [ALIGNMENT/ACTION]: The land area available for bioenergy is such an important number. And the science is heavily contested. The SPM needs to explain this information more fairly and accurately. One place this shows up in the SPM is B5.2 (page 18, lines 32-35): ""...benefits for some land challenges (high confidence). The amount of area for bioenergy, with low to moderate risks to food security, land degradation and desertification, depends on patterns of socioeconomic developments, reaching limits between 2 and 6 million km2. {4.3, 6.5; Cross-Chapter Box 7: 'Bioenergy and BECCS' in Chapter 6; SPM Fig. 2c}"" Looking at the chapters from which the SPM drew for these numbers: 1) Chapter 6: Numbers do not correspond to the SPM. It has a much wider range. 2) The SPM figure appears to come just from Figure SPM.2 (page 13), picking the high end of the range where impacts from bioenergy go from medium to high impact. But the numbers are shown as low confidence in the burning embers figure. This is not a fair way to portray the information. Language elsewhere is much clearer (referencing SSP1, SSP3), explaining that we can have more bioenergy production if we have a low population, really high efficiency of production, etc. So there are ways to communicate a range that do not communicate ""Everything is fine until we reach to 6M km2."" This should be addressed in Section B 5.2 but it is such a critical number that the entire SPM should be reviewed to make sure the number is addressed consistently, fairly, and accurately throughout and in the underlying chapters. [United States of America]
3890					KEY ISSUE [FLUXES]: As it stands, the reader needs to devote a lot of effort pulling out of the text actionable response options to the information presented, even though there are a number of response options that can deliver significant mitigation potential with limited harmful and many beneficial impacts on land challenges. Recommend: (1) Where response options have associated risks, clearly state those; and (2) add a separate section that pulls together actionable response options together all in one place. [United States of America]

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3892					<p>KEY ISSUE [FLUXES]: The SPM has a major gap that leads to misinterpretations and misrepresentations of the science in paying too little attention to feedbacks between warming and climate change and terrestrial (especially soil) carbon. This reflects in part a gap in the underlying chapters, which ultimately leads to a lopsided presentation of evidence and conclusions about the role land can play in mitigating climate change, as well as its vulnerability. To provide one specific example, A.4.5 concludes with ""The balance between increased respiration in warmer climate and carbon input from enhanced plant growth is a key uncertainty for the size of the future land carbon sink (medium confidence)."" Section 2.8.5 uses or interprets the soil C response to temperature very selectively, and uses one of the most cited, and most negative (in terms of a temperature response), papers to support this idea (Davidson, 2006). The review only focuses on warming experiments, both in the field and lab. ** It ignores a century of observational research that demonstrates that soil C storage is strongly related to temperature, that soil C turnover rates are temperature dependent.** The net result of reviewing select literature, and concluding we don't know the sign of soil C response to temperature, is to greatly (i) underestimate positive feedbacks between climate and the terrestrial environment, and (ii) over-estimate the potential land sink of soil C. While there is uncertainty about the short-term dynamics as soil ecosystems respond to boundary condition changes (and there are many unacknowledged artifacts in many of the warming experiments), we fundamentally know what the ultimate trajectory of soil C will be for a new set of temperature/moisture combinations. Two additional specific examples of places where the absence of feedbacks is a glaring gap:</p> <ol style="list-style-type: none"> 1) A5 under-considers the feedbacks – especially the far northern latitudes. 2) In A6, permafrost loss is listed only as a physical problem, not a chemical one, in the climate/land feedback system. [United States of America]
3894					<p>KEY ISSUE [TERMS]: The SPM seems written for a more scientific audience. Technical words need to be defined. When they are first discussed, the authors need to define terms for deforestation (changing from a forest land use to a non-forest land use), afforestation (planting trees where they did not previously exist), and reforestation (regeneration after harvest). [United States of America]</p>
3896					<p>KEY ISSUE [TERMS]: A 'Key Concepts' box needs to be placed early in the SPM, perhaps as part of the Introduction. Many technical terms are introduced without explanation or context, and -- depending on a reader's level of familiarity -- this could lead to misinterpretation. Policymakers need to know precise applications and meanings to understand and fully appreciate the key findings that have been elevated to the SPM. Suggested terms include, but are not limited to, the following: desertification, sustainable land management (including sustainable agriculture, sustainable forestry, sustainable intensification), food security, global food system, biochemical effects, biophysical effects, net and gross emissions, land degradation, greenhouse gas fluxes, land use, land use intensification, bioenergy, and BECCS. [United States of America]</p>
3898					<p>Broad, sweeping assertions need appropriate qualifiers that recognize regional differences and dimensionalities that may may not fit the aggregate. These regional differences may be more important and more actionable than the aggregate. [United States of America]</p>
3900					<p>The SPM and underlying report are still weak on aspects of food security not related to production. Are aspects such as transportation and distribution within scope? [United States of America]</p>

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3902					The SPM contains little information on potential benefits of climate change for different resource and economic sectors. The majority of effects are negative, but positive outcomes also exist, and scientific literature is available to support this. The text as a whole should align with the weight of the evidence. [United States of America]
3904					The SPM needs a thorough technical edit to improve readability. The current draft contains incorrect grammar, dense writing, and long sentences with series that reduce the effectiveness of communication. [United States of America]
3906					KEY ISSUE [ALIGNMENT/ACTION]: Compared to the Executive Summary of Chapter 6, Section B (Adaptation and Response Options) is really disappointing. The SPM would be much stronger if it just included verbatim the paragraphs beginning on p. 6-3, line 32 through p. 6-4, line 45. As written it is a hodge-podge of observations about how different response options are site-specific, some contribute to multiple challenges, some have side effects, some take time, etc. For a policymaker (the intended audience of the SRCCL summary), there is no real message communicated in all of that except the notion that there is no clear guidance, or something like "there are various response options but some are better than others and they all depend on local circumstances, and some are better than others and some have harmful side effects,". The Chapter 6 Executive Summary, on the other hand, provides a more actionable message – e.g., "Eight response options have large mitigation potential (>3 GtCO _{2e}) without adverse side effects for other challenges. These are...." That type of conclusion deserves to be in the SPM. [United States of America]
3908					KEY ISSUE [FLUXES]: There is no mention in the SPM of how to account for bioenergy emissions. The IPCC's methods for reporting fluxes from different aspects of the bioenergy life cycle, which is conceptually fine if one is concerned about overall global fluxes, has led to the obvious problem that countries use the IPCC methodology to say that burning biomass or biofuels results in zero emissions, which of course is not true. Countries are thus scaling up the use of biofuels and the use of woody biomass and treating them as zero-emissions without taking into account the "carbon debt" and without any consideration of whether the production of that bioenergy had resulted in significant emissions through forest loss. If the energy used was entirely from biomass produced in the same country, then the only accounting problem would be the "carbon debt" but today we see growing global trade in woody biomass and in biofuels. The only place that this comes up in the underlying report is in Chapter 6 (page 6-50, line 43), but this only gives a short summary of how inventories are reported and doesn't provide any actual assessment. This is a huge gap in the SPM and, if it is not included in the underlying report, then it too has a major gap that effectively misrepresents the state of science. [United States of America]
3910					KEY ISSUE [FLUXES]: The SPM ignores the challenge of land carbon permanence/reversibility and provides estimates of sequestration rates that are higher than others are able to obtain through good management practices. [United States of America]
3912					KEY ISSUE [FLUXES]: Both because of issues of soil carbon reversibility and permanence, and because of climate-carbon feedbacks – both of which this SPM currently ignores (largely if not completely) – in the end, the relatively large potential rates and stocks of C storage (attractive to governments and the public) are very likely not attainable. Recommend the SPM point out this discrepancy between what the science suggests is feasible and what many targets assume. [United States of America]

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3914					<p>The issue of power relationships is well-captured in Chapter 6 and should be brought explicitly into the SPM because it is a key – and often overlooked – factor in determining the likelihood that response options will have the intended impact in the anticipated time frames. This could happen in Section C3, but might also be appropriate elsewhere – for example, in B3 which also addresses implementation of response options: B3.1 ""Compatability between specific land management practices and socio-economic conditions ... is essential.""</p> <p>SUPPORT:</p> <p>p. 6-139, lines 25-30: ""It is simply not a matter of putting the 'right' institutions or policies in place, however, as governance can be undermined by inattention to power dynamics (Fabinyi et al. 2014). Power shapes how actors gain control over resources, and negotiate, transform, and adopt certain response options or not. These variable dynamics of power between different levels and stakeholders have an impact on the ability to implement different response options. The inability of many national governments to address social exclusion in general will have an effect on the implementation of many response options."" [United States of America]</p>

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3916					<p>KEY ISSUE [INTENSITY]: ""Sustainable Intensification"" – a term used several places throughout the report – is noticeably missing from the SPM. On the one hand, this is a plus because there are problems with the way the term is used in the underlying report, so those problems have not been brought forward. The term is not well-defined. It is not clear exactly what ""sustainable intensification"" means or if it means the same thing in each case. On the other hand, it is a term used so commonly in research, programs, and policy to describe ways of increasing agricultural productivity while minimizing harmful consequences (including land use change such as deforestation) that this report really needs to get it right throughout and in the SPM. The SPM should reflect that ""sustainable intensification"" means at a minimum intensification without associated agricultural expansion, either direct or indirect. The underlying report should also point out that far too often the term is used synonymously with ""intensification."" In fact, the report makes this error on p. 5-8, lines 26-27: ""...sustainable intensification (increasing productivity per hectare)...."" Finally, to create the ""sustainable"" features in policies and programs requires addressing governance issues that fall outside the expertise and remit of most agricultural projects and institutions, which makes success very challenging. The closest the report comes to providing a clear definition of ""sustainable intensification"" is in Box 5.6.4.4: ""Producing more food, fuel and fibre without the conversion of additional non-agricultural land while simultaneously reducing environmental impacts requires what has been termed sustainable intensification."" Page 5-95 also includes helpful text: ""Further, adoption of high-input forms of agriculture under the guise of simultaneously improving yields and environmental performance will attract more investment leading to higher rate of adoption but with the environmental component of SI quickly abandoned (Godfray 2015)."" This language captures some of the problematic issues with ""sustainable intensification"" but much of the other text in this report does not (and even reflects and adds to the confusion). For the benefit of the Core Writing Team, here's where ""sustainable intensification"" appears in Chapters 5 and 6:</p> <ol style="list-style-type: none"> 1) p. 5-46, Table 5-3 2) pp. 5-68–5-69, Box 5.4 (which illustrates well how challenging and complex it is to achieve sustainable intensification ... it could make that point more explicitly and other sections in the report including the SPM could reference it for that purpose) 3) pp. 5-94 – 5-98 (Section 5.6.4.4), including Cross-Chapter Box 6. It's notable that the section on sustainable intensification never defines the term except in the box, which simply adds to the general confusion about what it means. The exception is in Box 5.6.4.4: ""Producing more food, fuel and fibre without the conversion of additional non-agricultural land while simultaneously reducing environmental impacts requires what has been termed sustainable intensification."" One of the reasons for this ubiquitous confusion may be that the natural resource management, climate change, and agriculture research and management communities rarely have gathered to define it collectively. This report offers a unique opportunity to clarify what the term means and to help avoid having it used synonymously with intensification, with the very poor assumption that intensification will avoid agricultural expansion and its attendant increases in carbon losses and ecosystem services. 4) p. 6-60. ""Pretty et al. (2018) report that 163 million farms occupying 4.53 Mkm² have passed a redesign threshold for application of sustainable intensification, suggesting the minimum number of people benefiting from increased productivity and adaptation benefits under sustainable intensification is >163 million, with the total likely to be far higher (Table 6.21)."" But it's not clear what sustainable intensification even means.

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3918					KEY ISSUE [CONFIDENCE]: The SPM contains a number of statements designated as "low confidence." The IPCC guidance note developed for AR5 states that "Presentation of findings with 'low' ... confidence should be reserved for areas of major concern, and the reasons for their presentation should be carefully explained." In many cases, it is not clear why the low-confidence statements are included in the SRCCL SPM and why they are given such prominence, often at the expense of other statements with high or moderate confidence. The authors are encouraged to carefully consider the low-confidence statements in the SPM and whether their inclusion is merited in light of the guidance provided for AR5. In such cases they should be accompanied by an explanation (e.g., lack of evidence, conflicting evidence, small signal amplitude, etc.). An alternative approach to addressing these topics would be to include a section in the SPM that identifies important knowledge gaps, which would presumably encompass issues for which low-confidence statements have been offered. Where multiple statements are presented, those conclusions that can be made with greater confidence should be given greater prominence. [United States of America]
3920					KEY ISSUE [TERMS]: The term 'Land Degradation' is in the title of this report, and is used extensively throughout the SPM; however, it is never defined. Section 1.3.1.2 (page 1-14, lines 17-21) is the first place in this report that defines land degradation, stating that, "In the SRCCL, land degradation is defined as a negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity or value to humans." This definition should be brought forward to the SPM (as well as the Executive Summary of Chapter 1 and the Technical Summary). One option would be for the SPM to include a "core concepts" box that explains terms like "land degradation." Importantly, the definition makes it clear that there can be tradeoffs involved between biological productivity, ecological productivity, and value to humans, and between the impacts on a particular land area and the follow-on effects on other areas due to the inter-linkages in the land-use system. [United States of America]
3922					KEY ISSUE [TERMS]: The first mention of the term "sustainable land management" in the SPM text is on page 7, line 32. This term is in the title of the report, and discussed extensively in the SPM, but never defined for the reader. Section 1.4.2.1 (page 1-31, lines 4-8) of the report gives a good definition, "the stewardship and use of land resources, including soils, water, animals and plants, to meet changing human needs while simultaneously assuring the long-term productive potential of these resources and the maintenance of their environmental functions," and this description should be carried into the SPM. One option would be for the SPM to include a "core concepts" box that explains terms like "sustainable land management." This definition should also be brought up to the Executive Summary of Chapter 1 and the Technical Summary of the report. [United States of America]

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3924					KEY ISSUE [INTENSITY]: The first use of the concept "land use intensification" is in Section A2 (page 3, line 37). The concept is used extensively, but never defined in the SPM or the Technical Summary. Cross-Chapter Box 6 (page 5-95, lines 34-37) defines land use intensification as follows, "Land use intensity may be defined in terms of three components: (i) intensity of system inputs (land/soil, capital, labour, knowledge, nutrients and other chemicals), (ii) intensity of system outputs (yield per unit land area or per specific input), and (iii) the impacts of land use on ecosystem services such as changes in soil carbon or biodiversity." One option would be for the SPM to include a "core concepts" box that explains terms like "land use intensification." This definition should also be brought up to the Executive Summary of Chapter 1 and the Technical Summary of the report. It would also be useful to contrast land use intensification with land use extensification. [United States of America]
3926					KEY ISSUE [ALIGNMENT/ACTION]: The current version of the SPM does not adequately and, in some places, accurately reflect the underlying chapters in the report. The authors should cross-reference Technical Summary and key messages from each chapter to ensure the key messages in SPM are consistent. There are several areas in the SPM that can be enhanced to reflect the Technical Summary and the underlying chapters: (1) the roles of human-driven activities in land use and land use change, climate change, land degradation, and other areas of concerns. The SPM provides balanced and detailed discussion of the biogeochemical and biophysical effects and complex land-climate interactions, but falls short of emphasizing the human drivers of these changes. Further, the report covers a number of complex topics related to land resources. The SPM should highlight their interconnections in both the drivers and responses. (2) Discussion of impacts of climate change, desertification, land degradation, food security and loss of ecosystem services need to be better linked with societal and human impacts - who are impacted, where and how? The discussion should also highlight the heterogeneous socioeconomic impacts and that the vulnerable and marginalized regions and social groups are mostly affected. In addition, the SPM discussion can better incorporate social and behavioral sciences, such as related to consumption, food waste, and dietary change. [United States of America]
3928					KEY ISSUE [TERMS]: There are references here (and in individual chapters) to the Glossary. Check that definitions are consistent and accurate (e.g., Chapter 2 discussion of iLUC is incomplete/biased so it would be important to ensure a valid definition is used in the Glossary). [United States of America]
3930					KEY ISSUE [ALIGNMENT/ACTION]: The technical summary seems to flow better and have more basic graphics and more concise text, so suggest cross-walking this SPM with that. [United States of America]
3932					The reviewers thank the authors for the substantive improvements made to Section 7.5.4.2 on Mitigation Instruments (page 1269, line 13 - page 1272, line 11). One note, however, is that there is a subsection on "Market-based Instruments", but no corresponding discussion of non-market based instruments. The previous draft had some discussion of these instruments and a short paragraph on non-market instruments seems appropriate. An alternative would be to re-title the section as Market-based Mitigation Instruments since that is what is currently discussed. [United States of America]

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3934					Chapter 2 (page 2-85, lines 37-53): Authors were not fully responsive to comments previously submitted in regard to the representation of indirect land use change associated with biomass for energy use. "This section is extremely biased and does not represent the literature in a balanced manner, which is inappropriate for this report. Strongly recommend revising this section to be more balanced and to use less subjective language to better reflect the science to date. Currently it seems to carry specific intent to discredit iLUC emissions accounting for biomass." The authors did address some of the more egregious, unsupported statements, but a few remain. (1) There is no clear definition of iLUC (preferably from IPCC as submitted before: "There are different definitions of GHG leakage in the literature, but – according to the IPCC (2000) Special Report on Land Use, Land-Use Change, and Forestry – leakage is "the indirect impact that a targeted LULUCF activity in a certain place at a certain time has on carbon storage at another place or time." (2) The connotation that iLUC is insignificant. Please add an example or range of negative iLUC leakage in the literature (as examples are given for positive leakage). (3) This statement is not supported by the literature (line 52-53): "There is low confidence in attribution of emissions from iLUC to bioenergy." There may be low confidence in the estimates and ranges, but there are ample studies showing that it indeed exists. Strongly recommend deleting this misleading statement. [United States of America]
3936					Unresolved Chapter 2 comment from the Government Review: There is no discussion of the costs associated with different mitigation options. It is important to include that element here when putting forth estimates of mitigation potential from the literature, as costs are important (and are included in other chapters in this report). [United States of America]
3938					Section 5.8.2.2 Conflict (page 119) could use some additional resources relating conflict discussion to water governance and climate change. There have been many peer-reviewed papers over the years that show how transboundary rivers related cooperation has been significant at the international basin levels despite issues related to climate change challenges; but also how intra-national and local related conflicts related to climate change have led to conflict. [United States of America]
3940					Chapter 7 greatly exceeds the projected page length, making key points difficult to identify and extract. The chapter would benefit from a thorough technical edit to reduce redundancy, improve internal consistency, and enhance readability. More strictly focusing on sustainable development and removing findings that have low evidence or agreement could also help to shorten the chapter. [United States of America]
3942					Chapter 7 (Section 7.4.3) cites dated references. If the Literature Cutoff Date allows, this section could be updated by referring to the recent IPBES global assessment, which may have findings worthy of note in the SPM. This could be relevant for A6.5, Figure SPM.2, and other sections of the SPM. [United States of America]

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3944					The report does a nice job emphasizing the potential impact on GHG emissions of demand-side changes in the food system (e.g., C3.1, C3.3, D1.1). For entry points like dietary change and demand for beef, it is hard to think of unintended, indirect outcomes. But demand-side measures should also be addressed for managing wood production sustainably, and in this case there are additional considerations that should be included. The conclusion is likely to be something like: "Demand-side measures can work very well by, e.g., changing building codes, but they can also have unintended consequences depending on how wood is sourced (similar to biofuels)." Suggest the SPM retain the language about demand-side drivers applied to the food system and that the authors add a section on demand-side drivers for managing wood production sustainably. In this new section, suggest acknowledging that: (1) supply-side changes are more intuitively linked to better vs. poorer land management practices, whereas demand-side can sound like "just increase building with wood"; and (2) because demand-side drivers are less intuitive, authors make clear that for demand-side drivers of sustainable wood production to be effective, it is necessary to consider multiple steps along supply chains, in particular how the wood is sourced, because using more poorly-sourced wood does not achieve the desired objectives. [United States of America]
3946					The SPM would do a greater service by presenting the challenge of food insecurity more completely. As it stands, the presentation of this concept could lead to misunderstanding and confusion. Recommend greater attention to conflict and the unprecedented human population increase which are stressing the global food system to the limit. Diet quality and diversity, including hidden hunger, should be brought out as main foci. The report should make the full extent of the challenge clear to the reader. [United States of America]
3948					Although consistent with the EAT Lancet report on planetary diets, SRCCL treats dietary change without sufficient nuance and ends up presenting it as THE solution. In highly developed countries this is an important part of the solution, and the trajectory of diets in developing countries will be important in the future. However, in the present day, a key flaw in the reasoning (in a chapter on food insecurity) is that about 1/3 of the world's population does not consume enough of the foods the report suggests should be eaten less. Nutritionally this is bad advice (leave alone the livelihood impacts) and seems to fail to manage trade-offs through the belief in the flawed concept of a 'global average diet.' Recommend that: (1) the SPM distinguish more clearly among diets and capacity in different parts of the world; (2) identify options for dietary change that do not require nutritionally bad outcomes; and (3) at a minimum point out that for cultures where ruminant-based diets are deeply embedded in cultures (like pastoralists), dietary change of the type discussed here would entail major disruption (although in some places disruption is occurring or likely to occur anyway for other reasons). [United States of America]
3950					Pastoralism could be addressed more effectively. This includes confirmation of the estimated number of pastoralists. At present there is inconsistency stating 200 or 500 pastoralists. These are some of the most food-insecure people while serving as custodians of approximately 40% of the land surface area. [United States of America]
3952					That climate change will impact food security and how is well-established in the document. The fact that the food system – from production to post-consumption (i.e., food waste) – is a larger contributor to climate change is less emphasized publicly yet equally important. The system must be adaptive and resilient to shocks and crises, must feed the world, and must be profitable for all who participate. [United States of America]

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3954					This is a great effort. Very well done overall. That said, some of the most salient results for the general public – associated with effective early actions – come at the very end. While this is a logical progression, from a 'decision support/action motivation' perspective it may be concerning. Only the most dedicated readers will make it to page 29. The authors are encouraged to find a means (a Highlights box?) to define and communicate very clearly key takeaways or action items for a non-technical audience. [United States of America]
3956					A review of cost and benefits should be brought forward to help policymakers determine trade-offs and net benefits of each action particularly when considering transforming the food system in response to climate change. Further consideration of how this change impacts small holders in the poorest countries should also be made. [United States of America]
3958					KEY ISSUE [ALIGNMENT/ACTION]: The report provides a broad overview of the key issues pertaining to the impacts of climate change on food security. It meets its purpose in reviewing literature and introducing key issues and concepts. It also attempts to provide a preliminary overview of pathways forward in addressing some of these challenges. However, given the broad nature of the report, it fails to provide a clear pathway forward and leaves the reader with more questions than answers. This in a sense leaves the reader feeling limited in his/her capacity to respond to the report in an meaningful and impactful way. In addition the research that is being presented seems dated in the sense that some of the key gaps in knowledge have yet to be addressed. Some of the broader concerns around messaging, presentation (i.e., which graphs and charts should be included), and prioritization of information sharing should be addressed, along with bringing forward some of the more innovative and solution-oriented research that is being conducted to provide options for adaption and mitigation. Despite uncertainties, there is a strong need to provide a clear path forward. [United States of America]
3960					KEY ISSUE [TERMS]: Separate the terms "bioenergy" and "BECCS", and use them appropriately. When discussing the impact of bioenergy on land use, the bioenergy production and consumption itself is relevant. Whether carbon capture and storage is used at the end is less relevant to questions around land use, displacement, etc. The use of CCS (and therefore "BECCS") is relevant to some of the discissions on scenarios, models, and pathways. This comment is also relevant to Chapter 6. [United States of America]
3962					Several figures (e.g., Figures SPM.3 and SPM.4) are not possible to read well in black and white. Suggest crafting figures in such a way that they can be read in greyscale as well as color. [United States of America]
3964					The Executive Summary of Chapter 7 contains policy-prescriptive language that is not appropriate for an IPCC report. This includes references to policies that advance the Paris Agreement (p. 7-5). The statement that the full mitigation potential assessed in this report will only be realized if agricultural emissions are included in mainstream climate policy is both curious and unclear. [United States of America]

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3966					<p>Policy-prescriptive language in Chapter 7 (page 43, lines 25-40): In context, the sentence beginning on line 25 should be describing actions to reduce emissions, but the latter part of the sentence refers to finance and support, not mitigation. Moreover, the focus specifically on the “mechanisms” of the UNFCCC is policy-prescriptive. Suggest ending the sentence with the reference (United Nations Environment Programme 2017). In the sentence beginning on line 29, it is not relevant to reference the 1/CP.21 decision in this paragraph outlining policies. The reference is extraneous to the content of this paragraph, and other financial sources are not cited (e.g., role of multilateral development banks, private sector) so it is misleading as a "target" within the UNFCCC. Suggest removing this sentence. In the sentence beginning on line 33, in the context of the UNFCCC, "financial mechanisms" refers specifically to the Financial Mechanism Serving the Conference of Parties and would only speak to the Global Environment Facility (GEF) and Green Climate Fund (GCF). Suggest that perhaps "policy on finance and enabling conditions" is what was meant in this context. Also suggest replacing "technology transfer" with a broader term, "development and deployment of low-emissions technology" – which is both more descriptive and avoids getting into terms of art that could be interpreted as policy-prescriptive in the UNFCCC context. Suggest that the sentence would read: "Mitigation policy instruments include, INTER ALIA, POLICY ON FINANCE AND ENABLING CONDITIONS, carbon pricing, cap and trade or emissions trading, and DEVELOPMENT AND DEPLOYMENT OF LOW EMISSIONS TECHNOLOGY." [United States of America]</p>