

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
	4	0	0	0	0	I identified two main points that might be fatal for the report and IPCC: 1) The section on Himalayan (and Andes) glaciers (4.3.4.5) is again completely inadequate. After the Himalayan glacier '2035' story of AR4 we have to be extremely careful about what will be published on this subject. Frankly, I can't understand why the authors of this chapter or section did not contact the glaciology experts after the '2035' experience. Summarizing and interpreting grey literature reports without the necessary expertise in glaciology, and without contacting the experts, can be fatal as has been shown. I'm sure you agree that we have to follow here a more strict line. I made several comments in the attached excel file but I strongly suggest that the authors get into contact with me or with my colleague Frank Paul who is a lead author in AR5 WG I, cryosphere chapter. We should also synchronize this section with the one I contributed in chapter 3 (3.5.6), and this brings me to my second major point; 2) in chapter 4, page 6, line 16, the authors refer to chapter 3 as 'they' and some shortcomings of this chapter in terms of adaptation. This gives the impression that two opposing communities have contributed to this report that are not really speaking to each other. I believe it is exactly a major achievement of this report to bring WG I and II together, although I am aware of the difficulties that were related to that. I strongly suggest that this report appears as one complete document, integrating the communities. Even if different perspectives exist, the report needs to appear towards the 'outside' as a consistent document. I may be over-interpreting somewhat the small word 'they' but I believe in fact it is the expression of diverging perspectives that must be overcome in the report (and in general) as well as possible. (Huggel, Christian, University of Zurich)	text reworded
1	4	0	0	0	0	Very good links elaborating on CC, ecosystem and vulnerabilities. The discussion on "extreme impacts" is not as good as "extreme events" and hence actions to improve assessment of losses and impacts must be advocated. The notion of "impact" should also consider the spatial and temporal scale. Studies under the UNISDR Global Assessment Report 2009 reveal that impact in a number of localities are accumulated over time. Impact is not therefore not limited to one extreme event which may not be large, but the bigger contributor to poverty is the accumulated and compounded effects of several extreme events over a period of time. (Jegillos, Sanny, IINDDP)	Agreed
2	4	0	0	0	0	Figures of damage cost and adaptation cost be by country base rather than regional base because we cannot get any image of scale of damage from the regional base figure. I think at least a table showing the costs by country is necessary. (morisugi, Hisayoshi, Nihon University)	Agreed, but this is not practical as comparable data exist for only a few countries. A major research study could address this gap.
3	4	0	0	0	0	Japanese study should be referred as S-4 study(Kazamaand Kawagoe(2009)but S-4reort in not included). Project Team for Comprehensive Projection of Climate Change Impacts: Global Warming Impacts in Japan-Long-term Climate Stabilization Levels and Impact Risk Assessment, Ministry of Environment, Japan, May 2009J (morisugi, Hisayoshi, Nihon University)	The chapter is concerned with extremes and most studies look at the impacts of gradual change.
4	4	0	0	0	0	Chapter 4 deals with human systems. Yet it seems rather disconnected from the generally very full discussion of vulnerability in Chapter 2. Chapter 2 seems to have been written by social scientists who are aware of various debates about vulnerability. Chapter 4 seems to have been written by specialists in the physical impacts on different locations, rather than specialists in understanding vulnerability as something distinct from physical impacts (eg relating to social characteristics, access to livelihoods and resources, etc). (Forsyth, Tim, London School of Economics and Political Science)	We refer to Chapter 2 for this discussion.
5	4	0	0	0	0	I support all the proposed indicative issues in the Chapter 4. However, there are so many poorly written sections in Chapter 4. Some sections contain too much detail, there are many overlapping explanations, repeats in the sections. Furthermore, some sections in the Chapter 4 contain too much detail, some sections remained very weak. As summarizing ,Chapter 4 needs to be substantively reconstructed in order to be usable to the Special Report's audience. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	We have worked on these issues to improve the Chapter, and we will continue to address them in the preparation of the final draft.
6	4	0	0	0	0	General comments: it is important to have a consistent definition of 'extreme' and 'extreme events' with all other chapters. Meanwhile, it may not contribute to the clarity by defining 'extreme' at each chapter, instead, it may cause confusion. (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	We continue to work on consistency, and we will ensure consistency with the report glossary in the preparation of the final draft.
7	4	0	0	0	0	General comments: The discussion are very confusing. Authors should really consider to make more efforts to clarify their views. Writing should also be improved. (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	The Chapter has ben edited.
8	4	0	0	0	0	Preliminary note: By reason of unforeseeable working load over the last weeks I could not step into much detail of chapter 4. So it had to be a coarse look at chapter 4. (Faust, Eberhard, Munich Reinsurance Company)	OK
9	4	0	0	0	0	Ch.4 seems very broad and partly overlapping with ch.1 and ch.2. (Faust, Eberhard, Munich Reinsurance Company)	We have tried to reduce this overlap.
10	4	0	0	0	0	My focus here is not on typos and the quality of language used - because there are lots of typos and uncorrect syntax. E.g. p.10 l.13 "intensity trends seem[s]...", p11 l.39 "...the difference ... cannot explain[s] ...", p12 l.22f "However, the impacts ... depend[s]...", p.22, l.19-20 (without "and"), p.29 l.42 "...as human beings [instead of humanity] expand activities...", p.33 l.12 "The heat wave of...", p.33 l.51 "substantially MORE [instead of less]...",p.55 l.23-25 "The Netherlands ... because 55% of its territory ... HAS ELEVATIONS below sea level", p.62 l.27 "... since A COLLAPSE OF THE MOC...", p.69 l.39 "... does not leads...", p.76 l.38 "... for WHICH [instead of who] losses from floods..." and many more. (Faust, Eberhard, Munich Reinsurance Company)	OK checked and where necessary corrected.
11	4	0	0	0	0	Organization of chapter is o.k., but contents must be presented much more condensed and concise. (Faust, Eberhard, Munich Reinsurance Company)	Agreed, but there are many areas to cover.
12	4	0	0	0	0	This Chapter has numerous references, and a text box, based on Jared Diamond's book. Given the recent Inter-Academy Council review of IPCC processes and procedures it should be noted that this is not a peer-reviewed reference. (Dumbrell, Amy, Australian Government Department of Climate Change and Energy Efficiency)	Much of the disaster literature including that from the ISDR is grey. We are following IPCC procedures for such material.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
13	4	0	0	0	0	A long chapter drew to a close rather abruptly. It would be pleasant for the reader to have a brief summary, as a way to fully understand the evolution of thought through the chapter, and and to give a final chance to for the authors to cement their findings. (Ammann, Walter J., Global Risk Forum GRF Davos)	Not done. Instead, and also in the preparation of the chapter final draft, the framing of the chapter has been improved, especially in the executive summary and opening sections. The final section continues with assessment to the end, but with development of material towards a logical conclusion.
14	4	0	0	0	0	The chapter focusses rather exclusively on extreme events. The role of extreme imoacts from not-extreme events plays no relevant role, although these may be just as serious for livelihoods. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	We have tried to make it very clear that we are dealing with extreme impacts that do not always need extreme events. This is also reflected in the SPM.
15	4	0	0	0	0	It is important to mention that mitigation measures are not for free and that they cause costs as well. However, there are only few studies on measuring mitigation, but a good source is Benson and Twigg (2004). I do not know where this information fits best in the chapter. Full citation: Benson, C. and J. Twigg, 2004: Measuring mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation. ProVention Consortium, Geneva. (Weichselgartner, Juergen, GKSS Research Center)	This is dealt with in chapters following Chapter 4. The topic is not appropriately in the scope of chapter 4. Also, the topic will be thoroughly assessed in the 5th assessment report.
16	4	0	0	0	0	I saw not discussion of the expected changes in precipitation as rain versus snow. In the US, it is expected that as climate change continues, precipitation that currently falls as snow in the Sierra and Cascades will fall as rain. The result will be more extreme flooding and reduced storage in the snow pack now used for domesic water supplies. (Ballantyne, Donald, MMI Engineering)	This topic is under the purview of chapter 3, not chapter 4.
17	4	0	0	0	0	There is discussion about how sea level rise will affect populations and facilities near sea level. However, there was no discussion about the expected mitigation that will occur on an ongoing basis over the next 50 years as a result of replacement of old infrastructure. This may be less helpful for populations in poor countries. (Ballantyne, Donald, MMI Engineering)	The chapter deals with extremes rather than gradual change.
18	4	0	0	0	0	General comment on Chapter 4 is that floods are almost everywhere in the chapter related to river inundations; inundations of urban drainage systems are of a completely different nature and have not been considered. Interesting to mention in that respect is that a review report on "climate change and urban drainage" is currently being prepared by the International Working Group on Urban Rainfall (IGUR) of IWA & IAHR (Willems, Patrick, Katholieke Universiteit Leuven)	The effects of climate change on floods is considered by chapter 3. Chapter 4 considers in some places impacts of floods for human systems. Consideration of the topic has been expanded slightly also in the preparation of the chapter final draft.
19	4	0	0	0	0	The development of the chapter is not always easy to follow. I think also because it seems at an early stage of completion. I have some broad suggestions, but need a perhaps improved version to provide more useful comments. (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	The Chapter has been edited.
20	4	0	0	0	0	There are many case studies, which sometimes make reading difficult. Maybe some can be moved to ch. 9? (Mechler, Reinhard, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS)	They have been moved with in some cases a brief description retained, and one or two text boxes.
21	4	0	0	0	0	LENGTH: The chapter is rather long and has many places where the actual assessment is preceded by lengthy, textbook-like general introductions to the individual sections. It seems that those could easily be shortened without loosing any of the chapters substance. Furthermore, at many places in Chapter 4, the authors have decided to also provide an assessment of the underlying physical science basis of extreme events and extreme impacts. But that's clearly the task of Chapter 3 of SREX entitled "Changes in Climate Extremes and their Impacts on the Natural Physical Environment" and thus there is no reason at all reassess in Chapter 4 what is already done in Chapter 3. Chapter 4 authors can simply refer to the corresponding sections in Chapter 3. The observations and projections given in Chapter 3 of SREX should serve as the starting point for the discussion of impacts given here. (Stocker, Thomas, IPCC WGI TSU)	Agreed
22	4	0	0	0	0	COORDINATION WITH CHAPTER 3: Make sure to refer to the relevant sections in Chapter 3 if Changes in Climate Extremes and their Impacts on the Natural Physical Environment are mentioned. There is significant duplication of material between chapters 3 and 4, and a cross-chapter meeting is needed to resolve these issues. We note many instances in the detailed comments where material could be removed or relocated to another chapter. (Stocker, Thomas, IPCC WGI TSU)	This coordination was improved in the 2nd order draft. It was perfected in the preparation of the final draft of the chapter.
23	4	0	0	0	0	SECTION STRUCTURE: The setup of the individual sections of Chapter 4 differs quite a bit throughout the chapter. A homogeneous section structure within Chapter 4, ideally also consistent with the structure of Chapter 3, would be most useful. We therefore propose that Chapter 4 follows the approach used by Chapter 3, where all the main sections start with (1) the status of assessment in AR4, (2) an assessment of new science since AR4, (3) key conclusions, including uncertainties and a summary of how AR4 assessment needs to be/can be revised (if at all). This setup will also allow Chapter 4 to present a much clearer and more concise scientific assessment, rather than the more limited review of a few available studies that occurs in some sections. (Stocker, Thomas, IPCC WGI TSU)	Given the report's focus on impacts and adaptation which have not been systematically reviewed in the same way as climate science, alignment with Chapter 3 may be difficult. We have tried to improve the chapter.
24	4	0	0	0	0	CASE STUDIES: The use of case studies throughout the chapter is not effective and not always logical. Important case studies that complement the main chapter structure would best appear as boxes. Box 4-2, Melbourne Fires, does this very well. On the other hand, the 'Forest Fires in Indonesia' case study (4.2.2.2) just appears as a random collection of fire related paragraphs with no cohesion and no real purpose. Given the chapter is already very large, some critical thought should be given to including only the most effective and purposeful case studies, and presenting these as a series of boxes. (Stocker, Thomas, IPCC WGI TSU)	OK - either moved to Chapter 9 or reworked as text.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
25	4	0	0	0	0	4°C RISE: We are very uncomfortable with all the sections entitled "Comment on 4°C Rise". Commenting on one specific climate policy target is incomplete and may send an incorrect message to the public and the policy makers. It is clearly not a comprehensive assessment of the various options that exist (e.g., 2°C, 1.5°C which are mentioned in the Copenhagen Accord are equally valid). Therefore, an IPCC assessment cannot single out one "scenario" and therefore limit the assessment to 4°C. In doing so, this Chapter is moving the IPCC very close to being policy prescriptive. Why not choosing 3°C or 5°C which scientifically are as valid as 4°C; we clearly don't see the scientific justification to highlight this one target so prominently. (Stocker, Thomas, IPCC WGI TSU)	Deleted.
26	4	0	0	0	0	4°C RISE: One must also note that "comments" are generally based on a very limited number of studies that have actually specifically investigated the consequences of a 4°C Rise, which makes a sensible assessment impossible. One possible way to keep it in the report could be to synthesise all the individual parts into one Box and/or into one FAQ, if needed. However, we would prefer complete removal of this material given the overall need to reduce the SREX length and particularly Chapter 4 quite substantially. (Stocker, Thomas, IPCC WGI TSU)	Deleted.
27	4	0	0	0	0	UNCERTAINTY: The assessment of uncertainty to specific findings and the use of the IPCC uncertainty language needs to be consistent throughout the text; also the result of such an uncertainty assessment should be highlighted by putting the words "likely" etc. in italics. "Likely", "very likely" and all other expressions from the IPCC Uncertainty Guidance are part of calibrated IPCC language and therefore reserved. These words can only be used in relation to the formal treatment of uncertainty! (Stocker, Thomas, IPCC WGI TSU)	Usage of calibrated uncertainty language was improved in the 2nd order draft. Subsequently, usage was very carefully refined in the preparation of the chapter final draft.
28	4	0	0	0	0	GAPS/REFERENCES: At several places in the chapter, there are still entire subsections missing. Also at some places authors did not provide the references they are basing their assessment on, by either not providing references at all, by adding XX (or similar, e.g. page 39), or even by writing "References Forthcoming" (e.g., section 4.6). It's entirely unclear how one should provide a sensible review of the assessment when the sources of the information are missing or substantial parts of information is not provided. (Stocker, Thomas, IPCC WGI TSU)	Corrected
29	4	0	0	0	0	TABLES: Many of the tables need considerable attention. Specific recommendations are given later, but some general thought should be given to removing tables that are least effective or crucial to the overall quality of the chapter. Many of the tables are not even referred to in the text, so their relevance is further undermined. (Stocker, Thomas, IPCC WGI TSU)	Done
30	4	0	0	0	0	TABLES: Chapter 4 needs to coordinate with Chapter 3 regarding Tables 4-14 and 4-15 and the summary of climate extremes. It would also be very beneficial if those two Chapters could coordinate their structure of the tables. (Stocker, Thomas, IPCC WGI TSU)	Agreed. This coordination was considered in the preparation of the 2nd order draft. In the preparation of the final draft, it was insured that <u>coordination was perfected for all material in the chapter.</u>
31	4	0	0	0	0	FIGURES: Chapter 4 needs to coordinate with Chapter 3 regarding Figures. Figures 4-7, 4-9, 4-11, 4-16 are basically showing changes in climate extremes and their impacts on the natural physical environment and if part of the assessment should be assessed in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Agreed. This coordination was considered in the preparation of the 2nd order draft. In the preparation of the final draft, it was insured that <u>coordination was perfected for all material in the chapter.</u>
32	4	0	0	0	0	FIGURE CAPTIONS. Particularly for the graphs, there are no explanations given as to how the data were derived, eg, snow cover - Figure 4-9., coral beaching survey - Figure 4-10. (Stocker, Thomas, IPCC WGI TSU)	Agreed. Captions were considered in the preparation of the 2nd order draft. They were further refined in the preparation of the final draft of the <u>chapter.</u>
33	4	0	0	0	0	Reading through the chapter, there are too many statements in this chapter that could be revised according to the criticism mentioned above (appropriate references to prove statements of potential impacts of climate change on extreme events). There is an overall trend to try to explain the occurrence of extreme events by climate change as the main single source for extreme events. But in fact nearly all, including the most recent extreme events in Russia (peat and forest fires), Pakistan (floods), China (landslides), central Europe (floods), etc have a large chain of causes that have turned them into disasters, mostly inappropriate land use. Also, the forest fires quoted on page page 13 were actually triggered by arsen. The climatic conditions at that time then contributed to the disaster that occurred but where not the main reason. It is certainly possible that the current warming leads to shifts in wind patterns, prolonged dry spells, etc. But these shifts are not the only cause for disasters, as human vulnerabilities and potentials (and political willingness) to be prepared, or to reduce vulnerability are very much constrained. In short, it could be of scientific interest to keep a strong eye on the bigger picture behind disasters in this chapter. This is somehow achieved in some parts of the chapter but the emphasis is still mainly lying on climate changes as the main triggering factor for disasters, which might hold only partly true if examples are scrutinized. (Schmidt-Thome, Philipp, Geological Survey of Finland)	The revision of the chapter, also in the preparation of the chapter final draft, has improved consideration of all factors contributing to the occurrence of disasters, including trends in vulnerability the liability, exposure, and climate extremes themselves.
34	4	0	0	0	0	It is unclear why an alternative definition of vulnerability has been used. This is often (e.g. IPCC TAR, 2001) considered to be a function of exposure, sensitivity/susceptibility and adaptive capacity; it is not clear why exposure has been taken out of this and treated separately. (Darch, Geoff, Atkins & University of East Anglia)	Usage of the term vulnerability reflects the definition in the report glossary.
35	4	0	0	0	0	There needs to be a clearer commentary on each element of vulnerability (exposure, sensitivity, adaptive capacity) throughout the chapter, more like Section 4.5.10 and Table 4-14. Table 4-14 in particular is a useful synthesis; and regional and sectoral versions of this would be a very tangible outcome of the report. (Darch, Geoff, Atkins & University of East Anglia)	First, usage of the term vulnerability reflects the definition in the report glossary. Second, clarity of assessment has been addressed throughout the chapter, also in the preparation of the chapter final draft.
36	4	0	0	0	0	There needs to be a review of methods available and used in vulnerability assessments (as section 4.6.2 does for economics). This is only very briefly discussed in the pre-ample to Section 4.4.2 yet the methods used have a strong influence on the results and the limitations of such assessments; this also needs to link to Chapter 3 because some of the limitations relate to the abilities of climate models. (Darch, Geoff, Atkins & University of East Anglia)	Covered in Chapters 1 and 2.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
37	4	0	0	0	0	There is a strong focus on existing extremes and a lack of information on how these might change in future; this may be due to lack of information (perhaps relating to the ability of climate models and knowledge of impacts) and if so this should be clearly stated in the Executive Summaries of the Chapter and whole report. (Darch, Geoff, Atkins & University of East Anglia)	The nature of available evidence has been clarified in the opening of the chapter, also as reflected in the chapter final draft.
38	4	0	0	0	0	I had unfortunately little time to review this chapter. From the Executive Summary, I draw out some general issues that require attention. Some sections of the chapter deal with changes in hazards, that should be brought in line with chapter 3, and cross-refer to that chapter. (Bouwer, Laurens, Institute for Environmental Studies)	OK, done.
39	4	0	0	0	0	I have only three comments related to this Chapter: (i) Resiliency concept should get much prominent exposure in this section (for both, humans and ecosystems). Work of Holling and his followers should be presented in much more detail. (ii) Consideration of impacts on human systems and ecosystems already takes a systems approach. However, there is not discussion and separate section pointing out basic principles behind the systems approach. (iii) It will be useful to think is there a way to bring the impacts on infrastructure in the context of impacts on human and ecosystems. (Simonovic, Slobodan, University of Western Ontario)	Resilience is considered in other chapters, such as chapters 2 and 8. Additionally, impacts on infrastructure are considered in this chapter.
40	4	0	0	0	0	The emphasis put on crop response to temperature extremes is correct yet could be strengthened. Additional references listed below: Porter JR, Semenov MA. Crop responses to climatic variation. Philosophical transactions of the Royal Society of London. Series B, Biological sciences. 2005;360(1463):2021-35. Available at: http://rstb.royalsocietypublishing.org/cgi/content/abstract/360/1463/2021 . Battisti, D. and R. Naylor. 2009. Historical warnings of food insecurity with unprecedented seasonal heat. Science 323 (5911): 240-244. Burke, M.B., D.B. Lobell, and L. Guarino. 2009. Shifts in African crop climates by 2050, and the implications for crop improvement and genetic resources conservation. Global Environmental Change, doi:10.1016/j.gloenvcha.2009.04.003. Hertel, T.W., M.B. Burke, D.B. Lobell. 2010. The poverty implications of climate-induced crop yield changes by 2030. GTAP Working Paper No. 59. Purdue University, IN: Center for Global Trade Analysis. Lobell, D.B. and M.B. Burke. 2008. Why are agricultural impacts of climate change so uncertain? The importance of temperature relative to precipitation. Environmental Research Letters 3, doi:10.1088/1748-9326/3/3/034007. Lobell, D.B., et al. 2008. Prioritizing climate change adaptation needs for food security in 2030. Science 319 (5863): 607-610. Schlenker, W. and D.B. Lobell. 2010. Robust negative impacts of climate change on African agriculture. Environmental Research Letters 5, doi:10.1088/1748-9326/5/1/014010. Schlenker, W. and M.J. Roberts. 2009. Nonlinear temperature effects indicate severe damages to US crop yields under climate change. Proceedings of the National Academy of Sciences 106: 15594-8. Stanford University Program on Food Security and Environment. 2009. Climate extremes and crop adaptation. Summary Statement, Meeting on Climate Extremes and Crop Adaptation, 16-18 June. (Stabinsky, Doreen, College of the Atlantic)	These references have been considered, with further revision of material provided in the chapter final draft.
41	4	0	0	0	0	Every small section, 'Comments on 4C Rise' should be integrated in , for example, 'section 4.7'. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Deleted.
42	4	0	0	0	0	A general concern that arises from my review of parts of SREX Chapter 4 (and also Chapter 3) relates to the advice to reviewers that "Comments about wording and editorial details are generally not useful at this relatively early stage". The Inter-Academy Council seemed to reinforce this advice by highlighting (on page 3 of its recent report "Climate Change Assessments") the editorial/substantive distinction. The boundary is fuzzy, of course. But if reviewers think that they do not have to bother with editorial points and if, as is usually the case, copy editors do not think it is part of their function to address the substance of the text, the result is a crack through which embarrassing inaccuracies can fall. Further, my experience has been that unclear writing is a reliable guide to unclear thinking. Questionable points of style, when investigated, usually turn out to be pointers to errors of fact or logic or both. I do not have a solution for this problem, but I do have a suggestion which would be practical if it were not for the cost: a team of IPCC "senior copy editors", who would be both equipped and authorized to challenge unclear statements and ensure that they are clarified. A less expensive alternative would be to encourage reviewers to see editorial weaknesses as clues to probable substantive weaknesses (in other words, to give them somewhat different advice) and to encourage the existing teams of copy editors to be more active in querying (presumably through the Review Editors) the meaning of text that is ungrammatical or otherwise obscure. (Cogley, J. Graham, Trent University)	You make a good point. In the preparation of the 2nd order draft and especially the final draft, clarity of language has been considered as, yes, content and editorial clarity are intricately linked.
43	4	0	0	0	0	The relative weights between "Human" and "Ecological Systems" is unbalanced. First, I would call "Human" part as "Human Ecology" with all its heavy weight as a human being and communities. Second, look after the basic needs and "Happiness" as the United Nations called for " Satisfaction and Happiness" as main goals for living on Earth. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	The title and core topics addressed in the chapter were provided to us in the plenary approved outline for the chapter.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
44	4	0	0	0	0	The text, the provided material, and the provided figure entirely miss to meet what is suggested by the chapter title: "Case Study – Glacier Retreat: Himalaya and Andes" as a sub chapter of "Observed Trends in Human Systems and Sector Vulnerability to all Climatic Extremes and to Specific Types of Hazards". In the present state, the chapter draft (i) superficially (and inappropriately) tries (and fails) to give an overview on glaciers and climate and on GLOFs, (ii) lists very generally (and without reflection related to the chapter task) literature on areas being susceptible to glacier related outburst floods, (iii) gives one detailed example of a GLOF-kind event into an un-inhabited Fjord in Alaska which was caused by the advance of a tide water glacier, and (iv) extends into some general technical statements on GLOFs, mostly derived from not peer-reviewed material and of little relevance for the chapter topic. Only few sentences in the 3rd paragraph try to address the topic of concern. The last paragraph, if shortened, may stand as an introductory to the chapter. I strongly suggest that the chapter 4.3.4.5 is being re-written from scratch by one or (better) two experts to be invited as Contributing Authors. (Kaser, Georg, University of Innsbruck)	This case study was deleted from the chapter.
45	4	0	0	0	0	The global level of information given by the FOD is already impressive and informative. However, the text is still very heterogeneous, some parts are too developed and others non enough: it is clear that time has lacked for a better equilibrium, which will be the goal for moving to SOD. I shall precise later this aspect along the pages, but I may also comment now on main criticisms in general terms, basically based on the still insufficient connection with other chapters: definitions and discussions about keywords like extremes, vulnerability, exposure, risk, etc.. take too much space, whilst they would have to be limited to specific complements, if existing, to the text of chapters 1 and 2. Similarly for the question of adaptation. The frontier with chapter 3 is also not evident for some events (floods, droughts, but also landslides, sand and dust storms) or sectors (cryosphere, hydrology): the final partition will be surely questionable, but at least it will need interactions between the two chapters. The complementarity with chapter 9 about case studies deserves more attention, as pointed out by the extreme example of neighbouring texts in the two chapters on the Sidr and Nargi cyclones. An effort will have also to be made in some parts which seem to more set out personal views of the authors than the present status of knowledge from the literature. (Seguin, Bernard, INRA)	We have addressed points about connections with other chapters in consultation especially with Chapter 3. Additionally, uniformity of assessment approach across the chapter has been addressed, also in the preparation of this chapter final draft.
46	4	0	0	0	0	Chapter 4: The motivation of the "4° C warming" sections 4.2.6, 4.3.7, 4.5.12, and 4.6.6 is not clear. Some of them do not contain any text at the moment, and the others contain text that does not refer specifically to "Climate Extremes". Is it suggested that a global warming of 4 °C constitutes a "climate extreme" in itself? These sections should be removed and the relevant content moved to other sections as appropriate. (Fuessel, Hans-Martin, European Environment Agency)	Deleted.
47	4	0	0	0	0	This FOD needs an extensive revision. In general the whole chapter should be made more concise and focussed, clearer in the messages which need to be conveyed, much less repetitive (within the chapter itself and with other chapters) and should make a better use of the examples (lessons learned rather than mainly description). Executive summary is mostly a collage of existing text (i.e. page 4 lines 7-10 = page 30 lines 9-12) and fail to address the impacts in a comprehensive way as well as an overall message for the whole chapter. Definitions of different concepts (vulnerability, exposure, risks, disaster etc.) are addressed in other chapters as well, for instance chapter 1. There must be an overall agreement on working definitions to be used throughout the whole report. For instance vulnerability is well defined in chapter 1.1.3.2 and it is re-defined in a number of instances in Chapter 4. In addition, several quotations of definitions developed by other (see pages 6-7 for instance) are not very informative and useful without a clear attempt to provide a working definition for the current report to refer to throughout the text. In page 4 lines 4-5, vulnerability is defined as a stable characteristics. What about increase urbanization and aging with heat related risk as well as the poverty associated risks? Indeed this very statement contradicts with the concepts illustrated in the same page in line 16-18 (increase number of poor people in informal settlements). (Bertollini, Roberto, World Health Organization)	We have tried to address the issues raised here. Conceptual issues re vulnerability are covered in Chapter 1 and 2. Additionally, concise, focused presentation was a primary focus in our preparation of the chapter final draft. Also, usage of all terms has been considered with respect to definitions provided in the report glossary, also in the preparation of the chapter final draft.
48	4	0	0	0	0	It would be useful to know what is the relation of this chapter to chapter 5.4.2 Costs of managing disaster risk and risk from climate extremes. Both chapters treat costs of extreme events and disasters. Also, the level of analysis is at least partly the same: chapter 5.4.2. starts with examples of economic damages measured at GDP level and even higher levels. Also, it would be useful if the scope of this chapter and what is meant by the term total cost would be defined and clarified. (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	Chapter 4 has to cover the "total costs of climate extremes and disasters" as this task was given by the IPCC. We have worked with economists from across the report. Terms used have been clarified, also in the preparation of the chapter final draft.
49	4	0	0	0	0	Please note, that the number 3. is missing from the chapter title. Please define what is meant by the term Region in this chapter. Region can also be understood as an area or governmental level between the national and local levels. (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	It is unclear what the reviewer means in reference to the number 3 in the chapter title. Regions used throughout the chapter reflect those used generally by the IPCC in assessment reports.
50	4	0	0	0	0	Please reconsider the titles of chapters 4.6.3. and 4.6.4. They are currently quite similar. Chapter 4.6.3. however seems to treat costs of disasters - maybe this should be added to the title. On the other hand, the first chapter of 4.6.4. also discusses damage costs of extremes, which is a bit confusing. Would it be more clear if this chapter treated only studies on adaptation costs? (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	Agreed - have been changed.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
51	4	0	0	0	0	This chapter would benefit from the following improvements. First, in their current form, some paragraphs and sections do not make connections to the underlying literature clear enough. Statements that are conclusions stemming from assessed literature should more explicitly be supported by that literature in some places. Second, paragraphs on climate extremes and physical impacts, which are redundant with Chapter 3 and might be eliminated or moved to Chapter 3, have been flagged. Such text should be checked for consistency with the assessments of Chapter 3 and for the appropriateness of its current placement. Third, sections that might incorporate the Case Studies in Chapter 9 have been identified. (IPCC WGII TSU)	We have tried to address these issues in the SOD, and they have also been extensively considered in the preparation of the chapter final draft.
52	4	0	0	0	0	Authors have done a fine job assembling information, and more work is needed to organize and present it clearly. Major sections would benefit from clear, concise introductions that summarize what is to come, with clear progression from one topic to the next. Section 4.2 needs streamlining for a clearer logical flow. Section 4.3 needs a clearer organization more parallel to 4.4. 4.4 also contains extensive and important information about the sensitivity of different sectors to extremes based on observations. Consider shifting more of this information to 4.3 (which would cover observed trends and sensitivity), so that 4.4 can focus more on future projections with this information as its basis. Consider consolidation of regional information on regional economic damages in 4.6 with the regional information in 4.5. Consistency with Chapter 3 must also be confirmed. (IPCC WGII TSU)	We have tried to address these issues in the SOD, and they have also been extensively considered in the preparation of the chapter final draft.
53	4	0	0	0	0	Figures overall: Need a small number of compelling synthetic figures. Need to avoid simply repeating figures from earlier publications. (IPCC WGII TSU)	Some figures have been deleted.
54	4	0	0	0	0	Opening pages: good emphasis on the ways in which global climate change and even some implications of extremes could lead to benefits, at least in the short term. (IPCC WGII TSU)	OK
55	4	0	0	0	0	4.4.4.1 (???) good section, relevant and compactly written (IPCC WGII TSU)	Ok
56	4	0	0	0	0	this chapter is a bit less well structured than the others and a bit chaotic (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	We have tried to address these issues of structure and flow in the SOD, and they have also been extensively considered in the preparation of the chapter final draft.
57	4	0	0	0	0	General comments. This chapter is probably the most complex of the report, and the authors should be commended for their impressive work of collecting so many sources and information. I think that most of what is needed in the chapter is included in this version, which is a very good first draft. In terms of organization and clarity, however, some additional work is necessary, and I found the FOD extremely difficult to read. Here is what I can suggest: 1- The outline should be revised to be better organized and avoid redundancies. For instance, the results on loss trends are present in many sections, and it should be summarized in a single one. Also, the outline is too complex, with too many subsections. At the beginning of each section, it would help to have a paragraph explaining the content of the section. Regional information is provided in two locations (4.5 and 4.6.3); it would really help to have these sections merged. 2- The chapter is too long and some content probably needs to be removed. I think that the concept section can be reduced, and that most case studies can be removed. In general, the text should be simplified, and organized in a simpler way. 3- There is sometimes a possible confusion between observed and past trends and expected future trends. The structure should help make a difference between these two aspects. A important point in the literature is that climate has started to change only very recently (see, AR4, WGI), and the fact that no climate-change-related trend is detectable today does not mean that future trends will not exist. 4- The "4°C" sections are surprising, since the chapter says in general little on climate change impacts. We are not really able to say something on how 4°C is different than 2°C. This is particularly clear in Section 4.6.6., in which many results do not seem to be specific for a 4°C world. I think that the 4°C sections could be removed, or merged in the end of the chapter. 5- The entire report does not review the literature on models used to assess the economic cost of disasters. It seems crucial to me to include this discussion. Some of this was in the ZOD of Chapter 5, but it has been removed. According to the outline, Chapter 4 should include this information. If the authors are interested, I recently wrote a review on this point, which could be used. I also suggest a few paragraphs below on the methodologies to assess economic consequences. (Hallegatte, Stephane, CIREAD and Meteo-France)	We have attempted to address these issues. 4 degree sections have been deleted.
58	4	0	0	0	0	The chapter has an unloved feel to it. A bunch of information has been thrown together with very little thought given to the overall structure. It is very repetitive. It really needs someone to take charge, give it a framework, organise the materila to fit that framework, throw out the redundant repition, and then seek to achieve an overall consistency of style. The latter is probably the most difficult, but also the least necessary - there doesn't have to be consistent style, but good English throughout should be a goal. (Palutikof, Jean, Griffith University)	The Chapter has been edited.
59	4	0	0	0	0	The chapter starts about three times. The first start, from the beginning, is extremely uneasy. It combines some rambling text with a couple of case studies of uncertain relevance. Then the second start, at the beginning of Section 4.2.3, is much more sure-footed. It repeats much of the information in the earlier few pages, but with a much more authoratative voice. I suggest the earlier pages are deleted, and the chapter begins here. Of the earlier case studies, I really only found the one on the Melbourne fires of direct relevance, and this could be carried forward. I wasn't convinced of the relevance of the case study on melting permafrost - is this an extreme? The case study on Indonesian forest fires seemed to be mainly about the effects on carbon stocks - is this part of the remit of the SREX? If so, it too could be carried forward. If not, it should be deleted. The third start is at the beginning of Section 4.6 - although this is labelled as a sub-section on economic impacts, it ranges more widely, and opens with a set of definitions which it would have been good to see at the beginning of the chapter. (Palutikof, Jean, Griffith University)	We have tried to address these issues, also in light of the other, in the SOD, and they have also been extensively considered in the preparation of the chapter final draft.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
60	4	0	0	0	0	The chapter needs to relate back more to the results in Chapter 3 to say something authoritative on future trends in extremes impacts. I found the chapter much more comfortable when talking about present-day extremes, and especially in its discussion of disasters (Section 4.6 is one of the most successful in the chapter) but much less certain when talking about the future. With clear reference back to the Chapter 3 findings, this analysis could be more insightful. (Palutikof, Jean, Griffith University)	Linkages to chapter 3 material have been carefully considered, especially in the preparation of the chapter final draft. Additionally, the nature of the available evidence has been clarified.
61	4	1	0	87	0	There is a difference between literature review and IPCC assessment. In many places of this chapter, the text reads more like a review than an assessment. Also, the IPCC calibrated language "likely" etc. have been used in many places, but they many mean something different. Such use of the special wordings should be avoid if possible. (Zhang, Xuebin, Environment Canada)	The chapter has been edited and in places re-written in order to develop assessment, working from the literature reviews completed. Also, current IPCC terminology on uncertainty has been applied, as consistent with the uncertainties guidance for the 5th assessment report.
62	4	1	0	87	0	There is a considerable overlap with Ch3. The section 4.5 has a title "Regionally based aspects of vulnerability, exposures, and impacts". But the content of this section is mostly about changes in mean climate and climate extremes. Those related to changes in mean climate shall perhaps be removed, and those about extremes shall be combined with what is in Ch3. This chapter can then make a link to Ch3 and focus your discussion on what are indicated in the title. (Zhang, Xuebin, Environment Canada)	Linkages and overlap with chapter 3 have been very carefully considered, especially in the preparation of the chapter final draft.,
63	4	1	0	87	0	There are several case studies. They are in general poorly written without a clear focus. It is hard to understand why a particular case study is there and what a lesson people learn from the case, and from the case study. (Zhang, Xuebin, Environment Canada)	They have either been shifted or merged with the text to address this problem.
64	4	1	0	87	0	I don't think there is a strong enough justification to comment specifically on 4C temperature change. Why 4, why not 3 and why not 5? (Zhang, Xuebin, Environment Canada)	Deleted
65	4	1	27	0	0	What is a "climate event", and how does it differ from a "weather event"? The climate is the average weather. The only answer I can think of is that a climate event is an extreme weather event that is so extreme that it alters the climate. But that does not seem to be the meaning attached to the term in this chapter. See for example Page 3 Line 23 and Page 4 Line 35. (Cogley, J. Graham, Trent University)	Usage of these terms reflects the definitions present in the report glossary.
66	4	1	34	0	0	"Phenomena". (Cogley, J. Graham, Trent University)	OK
67	4	1	39	0	0	change in : 4.3 Observed and projected trends in exposure and vulnerability (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	These titles and logic of the chapter structure has been considered, with extensive revision made in the preparation of the chapter final draft.
68	4	1	39	2	9	The title of subsections is not always consistent with the title of the sections. There is also asymmetry between titles and parts. In principle each section (exposure, hazards and impacts, human system and sector vulnerability) should analyze (as far as possible obviously) the same categories or stressors (see below). My suggestions are the following (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	These titles and logic of the chapter structure has been considered, with extensive revision made in the preparation of the chapter final draft.
69	4	1	41	0	0	change in : 4.3.2 Observed and projected trends in exposure (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	These titles and logic of the chapter structure has been considered, with extensive revision made in the preparation of the chapter final draft.
70	4	1	47	0	0	change in: 4.3.4 Observed and projected trends in human systems... (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	These titles and logic of the chapter structure has been considered, with extensive revision made in the preparation of the chapter final draft.
71	4	2	1	0	0	change in: 4.3.4 Observed and projected trends in ecosystems... (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	These titles and logic of the chapter structure has been considered, with extensive revision made in the preparation of the chapter final draft.
72	4	3	0	0	0	Exec summary: clearer statement of the relative roles of changes in vulnerability and trends in climate? (IPCC WGII TSU)	The executive Summary has been completely redone.
73	4	3	0	0	0	Executive Summary: This summary would benefit significantly from organization into clearly specified key findings and associated explanation, as much as possible, with clear reference to the relevant sections of the chapter. Many statements are currently too general to have real meaning. Key findings will also need to use newly revised uncertainty guidance that will be presented at LAM3. An overview of what types of events are covered in the chapter is also lacking. (IPCC WGII TSU)	The Executive Summary has been completely redone. Improvements along these lines continued with the preparation of the chapter final draft.
74	4	3	1	0	0	Executive Summary: the ES is far too long and needs to be cut down to only cover the key messages of the chapter. (Stocker, Thomas, IPCC WGI TSU)	The Executive Summary has been completely redone. Improvements along these lines continued with the preparation of the chapter final draft.
75	4	3	2	0	0	It is suggested to include references to the underlying subchapters to make the executive summary more user-friendly and transparent. (Radunsky, KLaus, Umweltbundesamt GmbH)	The Executive Summary has been completely redone. Improvements along these lines continued with the preparation of the chapter final draft.
76	4	3	2	0	0	Executive Summary: The Executive Summary requires substantial shortening and focussing. (Fuessel, Hans-Martin, European Environment Agency)	The Executive Summary has been completely redone.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
77	4	3	2	0	0	Executive Summary: The Executive Summary makes several statements on the vulnerability of rural and urban populations, suggesting that both rural and urban locations can contribute to high vulnerability. It needs to be ensured that these statements are as specific as possible (i.e., specifying the climatic and non-climatic hazards, and the outcome considered). Otherwise, readers might be confused because they interpret one set of statements as "the rural poor are particularly vulnerable" and another set of statements as "the urban poor are particularly vulnerable". (Fuessel, Hans-Martin, European Environment Agency)	The Executive Summary has been completely redone. Improvements to address this point were also carefully considered in the preparation of the chapter final draft.
78	4	3	2	6	10	It is not easy to give an advice about the executive summary by itself, because it mixes questions about the whole content and about the sole writing. In general terms, the summary is a good first basis, but would need to be improved by giving more facts and less concepts. The first parts are too verbous, especially the unnamed first 4 paragraphs, of which maybe only the two first could be kept. We still perceive the collection of individual contributions rather than a global synthesis: we know it is a difficult exercise, which will be surely easier in a second round. (Seguin, Bernard, INRA)	The Executive Summary has been completely redone. Improvements to address these points were also carefully considered in the preparation of the chapter final draft.
79	4	3	4	3	28	General background on extreme events, extreme impacts, disaster, etc. or definitions for vulnerability and exposure, etc. should be given in Chapters 1 and 2. Chapter 4 should only refer back to what is available in Chapters 1 and 2, not redefine these terms. Also, it will be important to be consistent with whatever will be defined in the Glossary. (Stocker, Thomas, IPCC WGI TSU)	Agreed. The scope for the chapter was considered in the preparation of the 2nd order draft, with extensive refinements included in the final draft as well.
80	4	3	4	87	54	paintfully I must say here the same that I expresed in 11 about the chapter 3... (Linayo, Alejandro, Research Center on Disaster Risk Reduction CIGIR)	This is chapter 4. It is unclear what exact point is being made here.
81	4	3	7	3	9	In an Executive Summary "depend on" might be better than "are a function of". I would add "(defined below)" after "vulnerability". And I would delete the "Or put another way" sentence, which is simply a definition of the jargon "mediated by". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone, reducing the relevance of the specific wording changes suggested here.
82	4	3	8	3	9	The sentence beginning with "Or put another way. . ." could be deleted. The point it makes is adequately conveyed by the previous sentence. (IPCC WGII TSU)	Sentence deleted.
83	4	3	9	3	10	Then probably, adaptive capacity also modifies the impact and occurrence of disasters. Or does the definition of vulnerability here include adaptive capacity? Then this should be clarified. (Bouwer, Laurens, Institute for Environmental Studies)	Use of the term vulnerability is consistent with the report glossary.
84	4	3	10	3	10	Here the notion that disaster is defined by the lack of capacity to cope I know is part of the ISDR definition but I am not sure if it is the best and is certainly not the only way of defining it given that the notion of coping is so subject to different interpretations and questioning in this study and elsewhere. As there is debate on this and many dont go with this idea I think that disaster defined as the breakdown in normal functioning of the affected society or some such more generic definition is better. There are those that also insist on the idea that in order to have disaster, damage and loss must exceed the autonomous options of those affected to deal with it--this one is also legitimately questioned by many. But the idea that there is a severe breakdown in the normal functioning of the affected society seems less contentious as it does not require the ascribing of very particular conditions in order to define disaster as is the case in emphasising coping and inability to have autonomous response-the more specific the definition becomes the more objection there will be from different quarters, so maybe best keep it purer and simpler and less committed . But this is one of those things we are going to have to resolve along the way as each chapter has its own varied definition of many things, including disaster. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	As required, in the revision of our chapter, use of the term disaster must be consistent with the report glossary.
85	4	3	12	3	12	It may be worth inserting "extreme" before "impacts" and before "weather and climate events" to emphasize the focus of the chapter. Then, along these lines, later text in the chapter that is focused on gradual, not extreme events and impacts should be shortened or removed. (IPCC WGII TSU)	This change has been incorporated, with broader point considered for the chapter.
86	4	3	16	3	20	The fact that "extreme events" are largely defined from their impacts, not their own characteristics, could be stressed here. (Hallegatte, Stephane, CIRED and Meteo-France)	Use of the term extreme (weather or climate) event is consistent with the report glossary. We also recognize and make clear the importance of exposure and vulnerability in determining impacts and disasters, in addition to the extreme weather or climate events themselves.
87	4	3	16	3	28	It is not clear that these paragraphs are needed in the ES. Suggest moving them to chapter text. (IPCC WGII TSU)	The presentation of this material in the executive summary has been reduced.
88	4	3	22	0	0	Vulnerability defined as ability to recover..? (Ammann, Walter J., Global Risk Forum GRF Davos)	Our revision aimed to make use of the term vulnerability consistent with the report glossary.
89	4	3	22	3	23	This definition of "vulnerability" may be standard in the study of impacts, but I do not understand it. Should "and ability to recover" be "offset by ability to recover"? I do not understand the definition of "exposure" either. Should "in the way of" be "that are vulnerable to"? And can "tangible and intangible assets and activities" be replaced by something a little more focussed? (Cogley, J. Graham, Trent University)	Our revision aimed to make use of the terms vulnerability and exposure consistent with the report glossary.
90	4	3	26	0	0	Delete this sentence. It says, in a needlessly elaborate way, that weather events may or may not be harmful. (Cogley, J. Graham, Trent University)	Deleted.
91	4	3	31	0	0	"Annual material damage", please be more specific with few examples. (Kazama, So, Tohoku University)	The executive Summary has been completely redone.
92	4	3	31	3	33	It should be added that the most important cause for these increases has been shown to be increasing exposure to hazards. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone and this point made.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
93	4	3	32	0	0	There are more recent loss figures beyond the 1990s, so data could be updated. (Mechler, Reinhard, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS)	The executive Summary has been completely redone and this point made.
94	4	3	32	0	0	Delete the comma after "events" and insert "the" before "1960s". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
95	4	3	34	0	0	Delete the redundant "observed", and more importantly define "hazard". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
96	4	3	35	0	0	"led", not "lead". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
97	4	3	35	3	38	"this conclusion is subject to debate" -- why then is it elevated to the ES? Suggest to only keep uncontested conclusions in the ES as well as in the higher level documents of the SREX (SPM). The details of the scientific debate, however, need to be assessed and reported in the Chapter text. (Stocker, Thomas, IPCC WGI TSU)	The executive Summary has been completely redone and this point made.
98	4	3	35	3	38	This is a good example of a key finding that requires communication of the degree of certainty using the IPCC calibrated language. What does "most likely" mean, is this a probabilistic statement? What do "no conclusive evidence" and "subject to debate" mean in terms of your level of confidence in the statement as an author team? Or does it prevent you from making a confidence assignment? (IPCC WGII TSU)	Revision of this statement has been carefully considered in the preparation of the 2nd order draft. Calibrated uncertainty language is now used.
99	4	3	35	3	43	These sentences contain some redundancies and could be tightened and shortened while still conveying the same conclusions. (IPCC WGII TSU)	The executive Summary has been completely redone.
100	4	3	36	0	0	"likely the major cause" -- see the comment on treatment of uncertainty; only use likely in the context of a formal uncertainty analysis. (Stocker, Thomas, IPCC WGI TSU)	The executive Summary has been completely redone.
101	4	3	37	3	38	This conclusion is only up for debate for hazards for which changes have been determined. For hazards for which no changes have been established, the normalization is robust. See the paper by Bouwer in press in BAMS (already referred to in the chapter). (Bouwer, Laurens, Institute for Environmental Studies)	Revision of this statement has been carefully considered in the preparation of the 2nd order draft, incorporating the points made by the reviewer.
102	4	3	39	0	0	Define "longitudinal". I suspect that like me (a natural scientist) many policymakers will not know what it means. "Over time"? (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
103	4	3	39	3	39	what is "longitudinal loss data"? Please explain or replace by other formulation. (Stocker, Thomas, IPCC WGI TSU)	The executive Summary has been completely redone and this point corrected.
104	4	3	40	3	40	"A second area of uncertainty" -- what's the first area of uncertainty? (Stocker, Thomas, IPCC WGI TSU)	The executive Summary has been completely redone.
105	4	3	41	0	0	What does "livelihoods and people of informal settlements and economic sectors" mean? And, independently, what does "informal settlements" mean? If it means what I think it means, explain here why social scientists do not like the plain English "shanty towns". Does "informal economic sectors" mean "casual jobs"? (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
106	4	3	42	0	0	Change "with the result that they" to "and". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
107	4	3	43	3	43	A third area of uncertainty can be added: that longitudinal loss (and other impact) data are available mostly for complex extremes (mostly storms and floods), and for developed countries mostly. So for heat waves, drought, extreme rainfall, and hailstorms, fewer loss data is available. Cross reference to section 4.6.3. can be made here. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone and this point made.
108	4	3	46	0	0	Change "the weather/exposure interface" to "vulnerability to climatic extremes". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
109	4	3	47	0	0	Delete "both the severity of droughts as well as". Cleared up in this way, it becomes obvious that this sentence is just a repetition of the preceding one. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
110	4	3	51	3	51	Human exposure is increasing. Over what time period? At what rate? Based on what evidence? Such statements are too general to be meaningful. (IPCC WGII TSU)	Further specificity has been incorporated in this statement during the revision of the executive summary.
111	4	4	0	0	0	Somewhere on page 4 it may be good to introduce the distinction of system and sector as used later on, and summarize findings accordingly (Mechler, Reinhard, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS)	We have aimed to present these terms appropriately in the context of the executive summary, defining them further subsequently in the chapter.
112	4	4	4	0	0	Is "Overall" an adjective (qualifying "vulnerability") or an adverb (qualifying "vulnerability ... stable")? Does "stable" mean that vulnerability to climatic extremes is not increasing? If so, it contradicts several earlier statements. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
113	4	4	4	4	5	The meaning of the statement "Overall vulnerability appears to be fairly stable" is not clear. (Fuessel, Hans-Martin, European Environment Agency)	The executive Summary has been completely redone and this point corrected.
114	4	4	4	4	5	This is a sweeping statement and the contents of the chapter seem to suggest otherwise. Overall vulnerability is not stable, and the concept of homeostatis is probably not the best choice of words in this chapter, as we are dealing with a state of flux and dynamic changes which is far from stable. (GIROT, Pascal, IUCN)	The executive Summary has been completely redone and this point corrected.
115	4	4	4	4	5	It is not clear what "appears to be fairly stable" means. Determine what can be said more precisely and with what level of confidence. Also, not everyone may understand which direction a negative trend implies here. (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
116	4	4	7	4	8	Delete "Higher levels of vulnerability may evolve from", and insert "may increase vulnerability" at the end. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
117	4	4	8	4	10	Unclear what this example has to do with extreme climate and weather events. Suggest deletion or relocation to chapter text. (IPCC WGII TSU)	The executive Summary has been completely redone.
118	4	4	8	4	9	Delete "the" before "mental" and "of those involved" after "health". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
119	4	4	10	0	0	Subsequent not subsequence. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The executive Summary has been completely redone.
120	4	4	10	0	0	Change "for subsequence events" to "in the face of subsequent events". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
121	4	4	12	4	12	The impacts of disasters are greatest on poorer households. Is this a finding only for disasters and not for extreme climate and weather events? This is unclear currently. (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
122	4	4	12	4	23	This discussion is somewhat meandering--needs tightening to clearly explain the factors affecting vulnerability to extreme events/disasters. (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
123	4	4	15	0	0	Like "hazard", "risk" should be defined. There may be merit in having a box for definitions like these. (Cogley, J. Graham, Trent University)	We have aimed in the revision of the chapter to make use of the term disaster risk consistent with the report glossary.
124	4	4	15	4	15	This is the first mention of risk, without a definition--do you mean vulnerability here? (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
125	4	4	17	0	0	Give a definition of 'informal settlement' (Darch, Geoff, Atkins & University of East Anglia)	The executive Summary has been completely redone and this point corrected.
126	4	4	22	4	23	Which is exacerbated, migration or crop failure? Please make this sentence more clear. Supported in the chapter? (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone.
127	4	4	23	0	0	What is being exacerbated: the crop failures or the migration to the towns? If the latter, why use the pejorative "exacerbated" rather than a neutral verb such as "accelerated"? And is there any firm evidence about whether urbanization increases vulnerability or decreases it? (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
128	4	4	23	4	23	Is this supported in the chapter? Is really vulnerability meant, or exposure? Some explanation is required. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone.
129	4	4	25	4	25	Weakly supported statement on the fact that the most devastating impacts will be related to sea level rise and storm surges. (Hallegatte, Stephane, CIRED and Meteo-France)	The executive Summary has been completely redone.
130	4	4	25	4	26	should it not rather be extreme storm surges instead of extreme sea levels? (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone.
131	4	4	25	4	26	Most devastating measured in what terms? Likely over what time frame? What is the assignment of "likely" based on? Consider using a confidence statement if this is not based explicitly on probabilistic information. (IPCC WGII TSU)	The executive Summary has been completely redone, and we have used the current IPCC uncertainty terminology.
132	4	4	25	4	32	The recent flooding in Pakistan suggests that fluvial flooding could also be very important, particularly for south Asia. It would be useful here to draw a distinction between short- and long-term effects. (Darch, Geoff, Atkins & University of East Anglia)	The executive Summary has been completely redone.
133	4	4	26	0	0	Change "due to tropical and extra-tropical storms" to "during storms". The latitude of the storm is not pertinent. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
134	4	4	26	0	0	See my general comment 0. Tropical storms should not be mentioned if the report deals with anthropogenic climate-change induced extreme events and impact. (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	The executive Summary has been completely redone. The report deals with extreme impacts.
135	4	4	27	0	0	Change "large urban centers" to "coastal cities". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
136	4	4	28	0	0	"The likely impacts" -- see the comment on treatment of uncertainty; only use likely in the context of a formal uncertainty analysis. (Stocker, Thomas, IPCC WGI TSU)	The revised version uses current IPCC uncertainty terminology
137	4	4	28	0	0	Find a better verb than "mediated", and explain what is meant by "local system". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
138	4	4	29	4	31	Weakly supported statement on the fact that the most devastating impacts will be through transportation and ports. (Hallegatte, Stephane, CIRED and Meteo-France)	Deleted - note that the executive Summary has been completely redone and this point corrected.
139	4	4	30	0	0	Delete "associated with", and say "disruption of" (not "to"). (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
140	4	4	34	5	31	References are necessary (Wibig, Joanna, University of Lodz)	The executive Summary has been completely redone.
141	4	4	35	0	0	Replace "changes in" with "more frequent", and "has" with "have". On "weather and climate events", see comment at Ch4 P1 L27. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
142	4	4	35	4	50	The ecosystem impact aspect, particularly in relation to extreme events, clearly needs to be considered and contrasted with the impacts of gradual climate change--changes in averages and norms and with the impacts of humans. I imagine that this is considered later but will make the point here in this summary statement. This relates to a fundamental aspect of this report in general as regards the fact that although the central topic of the whole study is extreme events and disasters and managing risk henceforth, this does not mean we can ignore normality, less extreme events etc as the reaction to extremity is always conditioned by reaction to normalcy and other stress factors of different types and levels in more continuous time. Holistic thought does not allow us to split off autonomous units or scales for analysis and hope to understand how things work or could work integrally and globally. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The focus of this chapter has been revised to aim more clearly towards the impacts of extreme weather and climate events. This revision process proceeded also in the preparation of the chapter final draft.
143	4	4	36	0	0	Change "such situations" to "they", and move "have consequences ... predict" to end of sentence.. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
144	4	4	37	4	38	Delete "in the Northern Hemisphere" and change "northward" to "poleward". Explain "since 1904", if necessary with a citation to a particular study. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone and this point deleted.
145	4	4	37	4	38	The statement that "in the Northern Hemisphere the gradual northward and upward movement of the range of many species since 1904 is likely due to the effects of a few extreme weather events on population extinction rates" appears to give too much weight on extreme weather events compared to gradual climatic changes. For instance, the northward movement of many marine species observed in many maritime areas in the Northern Hemisphere is only marginally influenced by extreme weather events. (Fuessel, Hans-Martin, European Environment Agency)	The executive Summary has been completely redone and this point has been deleted.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
146	4	4	37	4	38	As far as can see the statement here is based on one single paper by Parmesan 2006. I am not convinced that it is generally true that it is only the effects of a few extreme weather events... (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone and this point has been deleted.
147	4	4	37	4	38	What is your level of confidence about this statement? What about other changes in climatic and other conditions? What is the assignment of "likely" based on? Correct uncertainty language to use here? (IPCC WGII TSU)	The executive Summary has been completely redone and this point has been deleted.
148	4	4	38	4	42	Begin with "The extreme events include sudden and transient ...". At Line 41, delete "melting" and (after "rapid") "and sudden". At Line 42, "slumping" needs to be "thawing and slumping". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
149	4	4	40	0	0	"Abnormally high precipitation", Is it in terms of intensity or duration or both. (Kazama, So, Tohoku University)	The executive Summary has been completely redone.
150	4	4	44	0	0	Change "the incidence" to "increased incidence". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
151	4	4	46	4	50	It is not clear how this paragraph relates to the themes of extreme events and impacts. Described trends could be interpreted as "gradual." (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
152	4	4	47	0	0	I am not sure what an "ecosystem service" is. One or two examples would assist the reader here. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
153	4	4	47	4	48	What does "service flow" mean? Change "is" to "are". The stock of what? What is a "provisioning service", and what is a "regulating ecosystem service"? (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone and this point corrected.
154	4	4	48	4	50	should be specified: the ecosystem services can mitigate the intensity or frequency of the hazards (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone and this point corrected.
155	4	4	53	4	54	floods' must be removed from this list of extremes. Chapter 3 clearly states that their is insufficient literature to project an increase in flood intensity or frequency. (Stocker, Thomas, IPCC WGI TSU)	Although this point was not thoroughly incorporated in the preparation of the 2nd order draft, consistency with chapter 3 in all respects was insured in the final draft.
156	4	4	53	4	54	Please insert reference that scientifically proves this statement "for most regions". Tables 3.1. and 3.2 do not allow this conclusion as the data sets are too vague. (Schmidt-Thome, Philipp, Geological Survey of Finland)	Although this point was not thoroughly incorporated in the preparation of the 2nd order draft, consistency with chapter 3 in all respects was insured in the final draft.
157	4	4	53	4	54	Cut, this should be included in Chapter 3, not 4. (Bouwer, Laurens, Institute for Environmental Studies)	Although this point was not thoroughly incorporated in the preparation of the 2nd order draft, consistency with chapter 3 in all respects, as well as presentation of topically distinct assessments, was insured in the final draft.
158	4	4	53	4	54	I would prefer the term hazard instead of extremes here (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone.
159	4	4	53	4	54	Is this consistent with the treatment in Chapter 3? Regardless, "become even more extreme" can be interpreted in different ways. May be clearer to simply say: are projected to increase in frequency and/or intensity. Again timeframe and magnitude should be communicated if possible, with associated confidence. (IPCC WGII TSU)	Although this point was not thoroughly incorporated in the preparation of the 2nd order draft, consistency with chapter 3 in all respects, as well as further specificity of presentation, was insured in the final draft.
160	4	4	53	5	16	Elsewhere, but notably in these paragraphs, there is switching between extreme events, extreme impacts, and disasters in various statements, and it is not clear that these are really being used differently here with purpose. Clear distinction is made between these terms, but it does not always translate clearly to their usage. For example, when it is stated that smallness renders island states at risk of losses when impacted by disaster, do you really mean only when impacted by disasters, or when impacted by extreme impacts or extreme events more generally? (IPCC WGII TSU)	The executive Summary has been completely redone and this point corrected.
161	4	4	54	5	2	Other statements could work equally well; e.g. coastal cities in Asia, Europe and America's, rather than Arctic and African regions. By what definition is vulnerability ranked here? (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone and this point corrected.
162	4	5	1	0	0	Delete "on natural systems". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
163	4	5	1	5	1	In the Arctic both high rates and magnitudes of warming are projected--important to mention both. (IPCC WGII TSU)	The executive Summary has been completely redone.
164	4	5	2	0	0	Add ", because of sea-level rise" after "small islands". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
165	4	5	2	5	2	Not clear what increasing hazard means here. Also, to be parallel, should mention briefly here the reasons for small islands to be included in this list. (IPCC WGII TSU)	The executive Summary has been completely redone.
166	4	5	4	5	5	replace cattle by livestock (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone.
167	4	5	4	5	9	It should be added to this chapter, that many of these examples underline the tremendous impact from climate variability, which indicates the potential impacts of future climate change. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone and this point corrected.
168	4	5	7	0	0	Insert "the" before "1980s". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
169	4	5	8	0	0	Change "famine and high" to "great". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
170	4	5	8	5	9	Please insert reference for the increase in forest fires. (Schmidt-Thome, Philipp, Geological Survey of Finland)	The executive Summary has been completely redone.
171	4	5	8	5	9	This is not concluded from Chapter 3. So either the studies included in Chapter 4 need to be transferred to Chapter 3, or the SREX report should make clear that some hazards are treated elsewhere. (Bouwer, Laurens, Institute for Environmental Studies)	Chapter 3 and 4 CLAs have worked through the chapter to ensure that the text in Chapter 4 is an accurate reflection of the findings in Chapter 3. Additionally, although this point was not thoroughly incorporated in the preparation of the 2nd order draft, consistency with chapter 3 in all respects was insured in the final draft
172	4	5	11	5	12	This is then additional to eralier statements on 'most vulnerable regions'. Perhaps it should be explained why these are so vulnerable, probably what is meant here is exposure. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone and this point corrected.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
173	4	5	13	0	0	Delete "risk of". Exposure is exposure to events (P3 L23), not risks. (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
174	4	5	13	5	13	Population and infrastructure are exposed to sea-level rise, not the risk of sea-level rise. (IPCC WGII TSU)	The executive Summary has been completely redone.
175	4	5	14	5	15	"Changes ... impacts": this sentence is out of place here, but it is worth making the point (earlier in the Summary) that a changing climate implies a change in the meaning of "extreme". It follows that "extreme" must always be defined with respect to a stated reference climate; otherwise, extremes are "moving targets". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
176	4	5	18	0	0	Say "The frequency of intense precipitation ...". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
177	4	5	18	5	18	"Intense precipitation is on the rise in many regions" -- add reference to the relevant sections in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This statement was deleted.
178	4	5	18	5	18	Please insert reference for the statement that intense precipitation is on the rise in many regions (which one's?) and scientific evidence that flooding is thus increasing (which regions) (Schmidt-Thome, Philipp, Geological Survey of Finland)	This statement was deleted.
179	4	5	18	5	18	Again, this is a too general statement, partly inaccurate, and should be brought in line with Chapter 3. (Bouwer, Laurens, Institute for Environmental Studies)	This statement was deleted.
180	4	5	18	5	19	Bangladesh most flood prone: by what definition? Projections indicate increases: because of deforestation or because of climate change? (Bouwer, Laurens, Institute for Environmental Studies)	This statement was deleted.
181	4	5	18	5	20	Why Bangladesh is picked here in the ES? (Zhang, Xuebin, Environment Canada)	The executive Summary has been completely redone.
182	4	5	22	0	0	Authors have given the examples for the countries or the regions affected by the droughts (Africa) and floods (Bangladesh). Therefore, it would be easy for readers if few examples for the summer heat waves also given. (Kazama, So, Tohoku University)	This has been done in the SOD
183	4	5	22	5	23	Please insert reference for increasing heat waves and for economic impacts (Schmidt-Thome, Philipp, Geological Survey of Finland)	References cannot be inserted in the executive summary. However, the revision aimed to ensure consistency with the findings of chapter 3, with further references on economic impacts included in the underlying chapter sections.
184	4	5	22	5	23	Again, need to be brought in line with Chapter 3. Rather indicate the impact of heat waves, regardless of the cause of their frequency. (Bouwer, Laurens, Institute for Environmental Studies)	Revision aimed to ensure consistency with the findings of chapter 3. Additionally, in the preparation of the chapter final draft, we worked carefully to ensure harmonization with chapter 3.
185	4	5	22	5	23	.. and significant biological impacts. E.g. coral reefs and heat related mortality of species. Ref. McKechnie AE, Wolf BO 2010 Climate change increases the likelihood of catastrophic avian mortality events during extreme heat waves. Biology Letters 6, 253-256. (Chambers, Lynda, Australian Bureau of Meteorology)	Revision aimed to ensure consistency with the findings of chapter 3. Additionally, in the preparation of the chapter final draft, we worked carefully to ensure harmonization with chapter 3.
186	4	5	22	5	27	In line-22 authors have narrowdowned the climate extremes to summer heat waves. But in Line-22, flow of the sentense make again generalize by talking about climate extremes. Therefore, I sugest to remove the part "In every region..." and combine two sentences to one paragraph. (Kazama, So, Tohoku University)	The executive Summary has been completely redone.
187	4	5	25	0	0	Insert "particularly" before "vulnerable". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
188	4	5	25	5	25	It would be useful to move this statement up above the mention of Bangladesh, since Bangladesh is not mentioned in the previous list of "most vulnerable" regions. This would help more logically set up the mention of Bangladesh and Europe here. (IPCC WGII TSU)	The executive Summary has been completely redone.
189	4	5	25	5	27	heat-related deaths happened not only in southern Europe, but also in Great Britain (London)and Paris. (Wibig, Joanna, University of Lodz)	The executive Summary has been completely redone.
190	4	5	25	5	27	This paragraph mentions the very substantial mortality impact of the 2003 European heat wave. It should also mention that detailed statistical analyses(e.g., Peter A. Stott, D. A. Stone & M. R. Allen. Human contribution to the European heatwave of 2003. Nature 432, 610-614, doi:10.1038/nature03089) have shown that the likelihood of a heat wave of this magnitude was substantially increased by anthropogenic climate change. (Fuessel, Hans-Martin, European Environment Agency)	Consideration of such analyses is under the purview of chapter 3. We have worked to ensure consistency with their chapter.
191	4	5	25	5	27	omit "southern" before Europe -- according to e.g. EM-DAT (CRED), the 2003 heat wave claimed more than 70000 lives in Austria, Belgium, Czech Republic, France, Germany, Italy, Luxembourg, The Netherlands, Portugal, Slovakia, Slovenia, Spain, Switzerland, United Kingdom. (Wehrli, Andre, European Environment Agency)	The executive Summary has been completely redone.
192	4	5	27	0	0	Paris was badly affected and is not considered to be in southern Europe (Darch, Geoff, Atkins & University of East Anglia)	The executive Summary has been completely redone.
193	4	5	29	5	30	This discussion of tipping points is really going beyond the scope of this report. (IPCC WGII TSU)	Deleted
194	4	5	29	5	31	"system tipping points" -- what are system tipping points, how are those defined. Suggest to not use the word "tipping point" unless it is clearly defined and specified what is meant. For example, the two examples given "weakening of the THC" and "amazon forest collaps" have fundamentally different characteristics and should not be mixed. (Stocker, Thomas, IPCC WGI TSU)	Deleted
195	4	5	29	5	31	Please insert reference to undermine this statement (if possible not only modelling results but also observed/measured results) (Schmidt-Thome, Philipp, Geological Survey of Finland)	deleted
196	4	5	29	5	31	theories of thermohaline circulation weakening and collapse of the Amazon forest need to be strongly references. (Wibig, Joanna, University of Lodz)	point deleted
197	4	5	29	5	31	Here "climate events" (see comment at Ch 4 Page 1 Line 27) seems to mean "climate phenomena". Change "where" to "when". Neither of the two examples are "tipping points". (Cogley, J. Graham, Trent University)	point deleted

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
198	4	5	29	31	31	"system tipping point" etc. It's unclear what message is here? "Thermohaline circulation is mentioned only once in the chapter and in the ES. This means that discussion about "thermohaline circulation" here in the ES is not supported by the main body of the assessment. "Oscillations ..." is an empty assessment in that this statement can be made without a need to do the SREX assessment. The whole passage should perhaps be removed. (Zhang, Xuebin, Environment Canada)	point deleted
199	4	5	31	0	0	Do not capitalize "ocean" or "atmosphere". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
200	4	5	35	0	0	Change "modelling" to "models". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
201	4	5	37	5	39	Inclusion of environmental values is not only important in disaster loss assessment but also in vulnerability assessments, as they define what are the sources of potential hazards and the ecosystem services that can be harnessed to abate these hazards and reduce vulnerability. (GIROT, Pascal, IUCN)	This sentence has been deleted.
202	4	5	41	5	43	Work on flooding, and there is a lot of this e.g. in the UK and the Netherlands, is naturally focused on extremes. (Darch, Geoff, Atkins & University of East Anglia)	The executive Summary has been completely redone.
203	4	5	41	5	43	Is this really true? For sea-level rise, yes. But many studies have looked at storms and floods as well. Many studies focus on the water and agricultural sectors, where extremes (wind, rainfall, drought) in fact are important. (Bouwer, Laurens, Institute for Environmental Studies)	The executive Summary has been completely redone. Agree but they have not been seen as part of the adaptation literature.
204	4	5	41	5	48	Probably it could be stated here that most regions are not even prepared for current extremes (including Europe), which is highlighted by the increasing costs of damages to due extreme events. (Schmidt-Thome, Philipp, Geological Survey of Finland)	This is appropriate for later chapters.
205	4	5	42	0	0	Hyphenate "slower-onset". Insert "on" before "impacts". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
206	4	5	43	0	0	Change "can be split into" to "belong to one of". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
207	4	5	43	5	44	Why 'building on assessments contained in NAPA'? It seems to me that NAPAs have played a minor role in vulnerability assessment, especially in the scientific literature. (Hallegatte, Stephane, CIRED and Meteo-France)	Deleted
208	4	5	44	0	0	What is "NAPA"? (Cogley, J. Graham, Trent University)	Deleted
209	4	5	44	0	0	"NAPA" This has not mentioned before. (Kazama, So, Tohoku University)	Deleted
210	4	5	45	0	0	What does "Piloting adaptation strategies" mean? (Cogley, J. Graham, Trent University)	deleted
211	4	5	46	5	46	It is not only to cope with "new hazard" but also changes in old hazards characteristics. (Hallegatte, Stephane, CIRED and Meteo-France)	The executive Summary has been completely redone.
212	4	5	46	5	48	Benefit valuation is another area where there are weaknesses. (Darch, Geoff, Atkins & University of East Anglia)	This is a good point, but it is relevant to the subsequent chapters in the report on adaptation.
213	4	5	47	0	0	Questionable: ecosystems as part of the economic sectors? Human activity need not to be involved with ecosystems.. (Faust, Eberhard, Munich Reinsurance Company)	This is a good point. Ecosystem services are part of a broader view on economic systems, but the specific sentence addressed here has been deleted in the revision.
214	4	5	47	5	47	"Lack of consideration for adaptation deficit": it seems to me that the adaptation deficit is discussed by almost all papers on adaptation. It is even often at the basis of the idea that poor communities are more vulnerable. Adaptation deficit has been overlooked in assessments of the cost of adaptation, not in all adaptation research. (Hallegatte, Stephane, CIRED and Meteo-France)	The executive Summary has been completely redone.
215	4	5	47	5	48	What does "adaptation deficit" mean? What does "climate proof investment" mean? (Hyphenate "climate-proof"? (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
216	4	5	50	0	0	"vary", not "varies". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
217	4	5	51	5	53	"In general, a wealthier country is a safer country." At Line 52, delete "level". At Line 53, insert "all" before "reduce". (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
218	4	6	1	6	4	I would mention here the role of thresholds and coping capacity. (Hallegatte, Stephane, CIRED and Meteo-France)	This statement has been extensively revised, reflecting the assessment in the underlying chapter sections and considering this point.
219	4	6	1	6	4	Say "...disasters, greater proportionate losses of GDP (gross domestic product) ...". Delete everything from ", which imposes" to "it is very likely that" (so that a new sentence begins "Poorer developing countries ..."). (Cogley, J. Graham, Trent University)	The executive Summary has been completely redone.
220	4	6	2	6	3	"Although there is an absence of any conclusive agreement regarding the long term effects of disasters, it is very likely that poorer ... are likely to suffer more..." -- this sentence needs to be reformulated. It mixes several "high confidence" uncertainty statements (very likely, likely) where it is unclear whether those are actually meant to represent the result of a formal uncertainty assessment. In addition, it's a bit odd to combine "high confidence" assignments in a statement that starts with a hint to "absence of any conclusive agreement"... (Stocker, Thomas, IPCC WGI TSU)	The executive Summary has been completely redone - and use current IPCC terminology for uncertainty.
221	4	6	2	6	4	"It is very likely that poorer developing countries and smaller economies are likely to suffer more..." Needs change of wording-- cannot use both very likely and likely in the same phrase. Also, this statement appears more appropriate for assignment of a confidence statement rather than likelihood (see new guidance--this does not appear to be intended as a probabilistic statement). (IPCC WGII TSU)	The executive Summary has been completely redone - and use current IPCC terminology for uncertainty.
222	4	6	4	6	4	This statement holds true if these regions do not adapt to extremes, but it must be taken into account that many regions are not even adapted to current extremes. (Schmidt-Thome, Philipp, Geological Survey of Finland)	Adaptation, including adaptation deficits, is considered in subsequent chapters of the report. We have worked to clarify assumptions relevant to statements provided in our chapter.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
223	4	6	6	6	10	para belongs to Chapters 1/2 -- suggest to delete here. (Stocker, Thomas, IPCC WGI TSU)	Deleted
224	4	6	6	6	10	This is content that should be covered in other chapters, not here. (IPCC WGII TSU)	Deleted
225	4	6	7	6	10	This language is too prescriptive. It does also not address the caveats related to insurance and highlighted in chapters 1 and 2. Furthermore linkage to the underlying literature should be provided in order to reflect the uncertainty of any statement on the role of activities related to increase of resilience properly. (Radunsky, Klaus, Umweltbundesamt GmbH)	This statement has been deleted.
226	4	6	13	0	0	Section 4.1: a significantly expanded introduction is required, particularly to provide a clear introduction and explanation of the chapter structure (Darch, Geoff, Atkins & University of East Anglia)	The introduction has been expanded, along the lines of introducing the chapter structure and scope.
227	4	6	13	0	0	mentioning the "Current Status" and the "Possible Changes" only gave the negative effects of the extremes without mentioning what would be the positive ones. Another point could be added which is the potentiality to make of these extremes, if there is any. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	Positive aspects are mentioned in the chapter.
228	4	6	13	0	0	4.1 concept of exposure and vulnerability from ch1. Need for a special section on extreme impacts and how these differ from extreme events? (IPCC WGII TSU)	Further discussion of these distinctions has been added in the revision of the chapter.
229	4	6	16	0	0	"in doing this they have" -- who is they? unclear, reformulate (Stocker, Thomas, IPCC WGI TSU)	Corrected.
230	4	6	16	6	17	But aren't you covering the impacts of the natural phenomena covered in Chapter 3? This could imply not. This section would also benefit from a clear overview of what categories of events are covered in this chapter. (IPCC WGII TSU)	The introduction has been revised to more clearly indicate the chapter structure and scope.
231	4	6	20	6	21	Severe impacts" should be "extreme impacts" to be consistent. More generally, it is important to clarify here, as you do very clearly in section 4.2.1, that all such "extreme impacts" are not the purview of this report. Instead, it is specifically focused on extreme events and their impacts. The framing in the next paragraph is a bit clearer that the extreme impacts that are relevant here are those resulting from less than "extreme" weather/climate conditions, but, as is implied, conditions which directly provide insights into the impacts of extreme events (and are thought of as extreme events even if not caused by extreme weather conditions in a statistical sense) (IPCC WGII TSU)	We have made the distinction clear.
232	4	6	21	6	21	"Minor events", what is the definition of "minor events"? (Zhang, Xuebin, Environment Canada)	Clarified.
233	4	6	29	6	32	Not completely clear why this is mentioned here. Suggest more clearly linking this to the fact that this chapter considers impacts independent of actions to reduce their severity/adapt. (IPCC WGII TSU)	Agreed. The focus and scope of the chapter have been more clearly conveyed in the revision of the introduction.
234	4	6	35	7	34	It would be useful to note that (1) Identifying 'extreme impacts' differs down to the level of individuals. It is the same issue of subjectivity that shapes perceptions of 'consequences' in risk assessments (discussed in notes 3 and 5 above). While one person may feel 'extremely' affected by a climate extreme, someone else may not. (2) extremes are a relative term and so will change as 'normal' conditions change under climate change. (Rickards, Lauren Amy, University of Melbourne)	Agreed and this point is made. The chapter though has to focus on generalities given space and time constraints. Usage of the term extreme events in the chapter also implies recognition of some of these complexities, given the report glossary definition.
235	4	6	37	0	0	Section 4.2.1: this section would benefit from an expanded review of definitions e.g. probabilistic, worst-known event, return-period event etc. (Darch, Geoff, Atkins & University of East Anglia)	Where we have used non-standard terms definitions are provided. We have not defined standard terms. Further, usage of terms is consistent with definitions provided in the report glossary.
236	4	6	37	0	0	4.2.1 good but extended quote from ch1 not necessary (IPCC WGII TSU)	Reduced.
237	4	6	37	6	37	should this definition not rather be in chapter 1? (Wehrli, Andre, European Environment Agency)	Reference to chapter 1 and 2 added throughout. In addition, in subsequent revision and preparation of the chapter final draft, this material was greatly reduced.
238	4	6	39	0	0	Section 4.2.1. -- "in the context of this chapter extreme refers to...." -- this whole section is problematic, as the definition of "extremes" etc. should be the identical for the entire report. This definition clearly belongs to Chapter 1/2 and none of the following Chapters should redefine its meaning. Referencing back to Chapter 1 is done here, however, it's not necessary to cite the full text. Most of the section 4.2.1 can thus be removed from Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	The section has been greatly reduced and brought into alignment with chapters 1 and 2. We build on the definitions for the specific purposes of the chapter.
239	4	6	42	7	54	delete citation of Chapter 1 definitions; just refer back to Chapter 1. (Stocker, Thomas, IPCC WGI TSU)	We refer back to chapter 1 and have removed the quotes.
240	4	6	44	7	23	P6-7 long quotes not necessary (IPCC WGII TSU)	Reduced.
241	4	7	0	0	0	P7 drop text on warmest years (IPCC WGII TSU)	This text was deleted.
242	4	7	1	0	51	Difficult passage to follow on extreme events and extreme impacts. Better explanations have already been covered in earlier chapters (specifically chapter 1). (Ammann, Walter J., Global Risk Forum GRF Davos)	Clarified and reduced. In addition, further revision of this chapter in the preparation of the final draft replaced some of this discussion with references to chapter 1 and the report glossary.
243	4	7	15	7	23	the reference to IPCC AR4 is good, but there is no need to repeat the definition here, refer back to Chapter 1 (Stocker, Thomas, IPCC WGI TSU)	Reduced and reference to Chapter 1 added.
244	4	7	29	0	32	This is a very important caveat. As today's extreme events may become tomorrow's "norms" and given we can't in general manage today's extremes in any convincing way and much less diminish significantly the risk associated with them, in the future this harbors for a very difficult situation--continuity of today's extremes and on top of this newly defined extremes. This aspect has to be dealt with explicitly in this report--not necessarily in this chapter but somewhere. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Agreed, and the revision of the chapter retained this discussion.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
245	4	7	40	0	0	"Interactions and feedback both suggest that the probability and characteristics of current extreme events can only be understood with reference to the history of the event regime. Interactions among different kinds of disturbances add to the complexity of approaching an understanding of extreme event impacts. The interaction of disturbances that have varying temporal rhythms and spatial extensions and are subject to varying positive or negative feedback is a major challenge. However, data on many biotic and abiotic parameters and records of historical events and processes are often missing or are difficult to acquire. Reference: White PS, Jentsch A (2001): The search for generality in studies of disturbance and ecosystem dynamics. Progress in Botany 63: 399-449." (Jentsch, Anke, University of Koblenz-Landau)	Agreed
246	4	7	44	0	0	40 C must be changed as 40 °C (Kazama, So, Tohoku University)	Editing issue.
247	4	8	0	21	0	I have had a problem with the focus of this subchapter 4.2 : I admit that it is not easy to elaborate, because it would have to give a set of concepts already developed in previous chapters, but also to illustrate them by giving examples which could be also be kept for the forthcoming part of observed trends. In this context, maybe there are too much case studies (apart the fact that one of them, about Sidr and Nargis, is also present in the chapter 9), and that they would need to be more precisely linked with the text. The second part, 4.2.3, comes back to the definitions, which gives an impression of redundancy with chapter 1 or previous pages of the same subchapter 4.2. The authors could check what is new and specific here and keep only that. The part 4.2.5 is directly linked with the observed trends: is it justified here, or better to group it with 4.3? (Seguin, Bernard, INRA)	Case studies moved to Chapter 9 with very brief reference in Chapter 4 text. Redundancy with Chapter 1 and earlier parts of Chapter 4 have been removed. These references now tie the cases into the chapter material.
248	4	8	1	8	1	please explain the term "hydro-climatic variables" (Stocker, Thomas, IPCC WGI TSU)	Done.
249	4	8	6	0	0	4.2.1.1 good paragraph, but a few more refs would be helpful (IPCC WGII TSU)	Done. Note this para was removed from the final draft.
250	4	8	6	10	4	It would also be useful to note the importance of the way in which we detect, declare and act on extremes. Often categories such as Catastrophic Fire are used as triggers for response. This could mean that the impact of a less-extreme event is greater than of a more-extreme event, because the latter triggers a more comprehensive response. Obviously this introduces many issues about governance. (Rickards, Lauren Amv. University of Melbourne)	We have included this important point. J261
251	4	8	8	8	15	The introductory paragraph of this section could be improved by being more clearly linked to underlying literature. (IPCC WGII TSU)	This para was removed from the final draft.
252	4	8	12	0	0	The relationship between religion and spirituality and the capacity to cope with extreme events is not clear (page 8 line 12) (Bertolini, Roberto, World Health Organization)	Amended with references.
253	4	8	12	8	12	"This includes major roles in religion and spirituality, and in people's minds" -- I am not sure I understand this sentence in the context of the para. Are religion, spirituality and people's minds really something to be assessed by IPCC? (Stocker, Thomas, IPCC WGI TSU)	Amended with references.
254	4	8	17	0	0	Box 4.1 need some mention of the relevance of societal collapse in our globalized age. (IPCC WGII TSU)	Good point. This was done.
255	4	8	17	8	32	The discussion on the collapse of past societies would fit better in Chp 8. Also, in this chapter, it creates confusion between extreme events (repeated events in one climate) and extreme impacts of climate change (i.e. low probability high impact climate change). (Hallegatte, Stephane, CIREN and Meteo-France)	The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
256	4	8	19	0	0	Box 4-1: suggest to drop the box; it does not add anything of substance to the Chapter, which is also reflected in its very short length. (Stocker, Thomas, IPCC WGI TSU)	The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
257	4	8	19	8	32	Considering "collapse of society" as an "extreme impact" perhaps overly broadens the scope of "extreme impact" in the context of this report. Discussion of societal collapses *due* to extreme events or impacts may be a better focus. The section would benefit at least from further literature citations. (IPCC WGII TSU)	It is now specially focussed on extremes. More references were added.
258	4	8	19	8	32	This is outside the scope of this report, unless these collapses specifically were due to extreme events and relevant extreme impacts, rather than just more general climate or environmental changes. For example, collapse would not be an extreme impact itself, but rather due to extreme impacts as defined above. Needs to be tied better to the focus here. (IPCC WGII TSU)	The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
259	4	8	19	8	35	Maybe a good idea, but to be more developed with facts: the role of climate change on these collapses is still very controversy, and even Diamond presents a larger set of contributing factors (Seguin, Bernard, INRA)	Additional references (outside Diamond, 2005) were added, with the part entirely rewritten. The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
260	4	8	19	8	37	This box should be enlarged or excluded. It does not bring anything new. At least the list of probable climate related causes of collapsing of past societies should be presented. (Wibig, Joanna, University of Lodz)	The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
261	4	8	19	8	37	I didn't really understand the purpose of Box 4-1. Unless it can discuss the collapse of past societies in relation to climate extremes, it should be deleted. (Palutikof, Jean, Griffith University)	The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
262	4	8	21	0	24	We think that this paragraph should include some examples of collapse or failure of past societies (Easter Island, Maya-culture). (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Good point. This was done.
263	4	8	22	8	22	Jared Diamond's book popular science (not peer reviewed scientific literature) and his conclusions are not anonymously accepted. If this book is quoted here it might be taken into account to also quote "Reichholf, J. H. 2008. Eine kurze Naturgeschichte des letzten Jahrtausends, Frankfurt am Main, 336p." (available only in German). Reichholf sees Diamond's conclusions, and especially the selection of cases somehow critical. There are also other possibilities to explain the collapse of societies (Reichholf 2008., page 277 onward). (Schmidt-Thome, Philipp, Geological Survey of Finland)	I have added new references and this part was rewritten to focus more on extremes.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
264	4	8	27	0	29	Not sure that perception should be equated with monitoring. And if we say "adapted to through a societys resilience" is this accurate and comprehensive as a statement and why do we say it that way as opposed to saying, for example "adapted to through a society's coping, adaptive, or risk management capacity"? The statement now puts the onus and responsibility for adaptation on the resilience of a society and given this term is interpreted in all sorts of different ways it may be better to choose another way to express the idea in order to avoid conflict in interpretations. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Point acknowledged. However, with "landscape amnesia" relying on instrumental records is more objective. Monitoring (precipitations, land cover, temperatures,...) can be seen as one way to ensure objective perception. The decision to keep this box or not will be discussed during LAM4. In the final draft, we might remove it or change it to chapter 8.
265	4	8	29	0	0	and the willingness? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	OK, it's been added: "the successful paths, when anticipation is not an option anymore, are to perceive new threats (meaning capacity in monitoring), the willingness to take action and attempt to solve the issues and finally to have the necessary funds, capacities (technologies, know-how) to adapt."
266	4	8	31	0	0	Is rational behaviour an unsolved problem or is it irrational behaviour? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Rational behaviour is a question of enforcements. Now, not placing appropriate enforcements measures can be part of "irrational behaviour", but can also be a question of capacity.
267	4	8	31	8	32	This sentence does not make much sense, as it amalgamates these issues as "threats of unsolved problems". (GIROT, Pascal, IUCN)	Agreed. It was changed to "Current political approaches in dealing with climate change share many aspects with cases where no attempts were made to solve the problem."
268	4	8	34	0	0	Figure 4-1: Flow chart ok but awfully wordy for a figure. (IPCC WGII TSU)	Totally agree. Text was removed and included in the text. The figure is now much lighter.
269	4	8	39	8	44	Is it really sure that all these changes, especially the collapse of societies, were results of extreme events? (Wibig, Joanna, University of Lodz)	The discussion on collapse of past societies has been removed. It is an extreme - perhaps the most extreme - impact and extreme events played a role the extent of which is contested.
270	4	8	46	0	0	P8 last sentence stated to seem overly broad even though point is important (IPCC WGII TSU)	Good point. Although not addressed in the SOD, revised accordingly for the FD.
271	4	8	46	0	53	A good example of this from the south is the case of Spanish colonial government work in Mexico in drying up the lake where the Aztec city Tenochichtlan was located, in order to avoid flooding, and which was achieved after a flood that lasted 7 years!!!! This drying up of the lake later has had severe consequences as Mexico City expanded and grew over the dried lake bed-the 1985 earthquake had most effect in the centre where the city is sinking into the ground due to uncompacted soils and the weight of buildings. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	OK.
272	4	8	49	8	53	These sentences could benefit from further citations. Additionally, "every location" is, strictly speaking, an exaggeration; perhaps a more measured phrasing would be appropriate. Finally, "reducing vulnerability" by "raising dwelling in flood prone areas" seems counterintuitive. (IPCC WGII TSU)	Clarified.
273	4	8	52	8	53	This statement should be revised, as there are several reasons for human beings to increase the vulnerability. Certainly in many poor areas with a fast growing population and land deficit, such as Bangladesh or parts of East Africa, this statement holds partly true. But there are several reasons for people moving into hazard prone areas, including political and land ownership and many more. In richer countries there is a trend to move into flood prone areas because of the nice scenery, but without any "need" to move there (e.g. Galveston, (Texas), Baltic Sea coast and many, many more). It cannot be simply stated that we cannot avoid vulnerability because there are too many people in this world. (Schmidt-Thome, Philipp, Geological Survey of Finland)	Amended.
274	4	9	0	0	0	P9 something about wealthy countries being willing to sacrifice(insured) property (IPCC WGII TSU)	Comment is unclear and cannot be responded to
275	4	9	1	9	23	Maybe better in Chp 1 ? (Hallegatte, Stephane, CIREN and Meteo-France)	Reduced with reference to Chapter 1.
276	4	9	4	9	12	It might be mentioned here that there has been an increase in trends towards mono-cultures (world wide) and a decrease of crop diversification. E.g. droughts affecting regions in Spain and China are so increasingly damaging because of mono-cultures. (Schmidt-Thome, Philipp, Geological Survey of Finland)	Done.
277	4	9	4	9	39	These paragraphs should be linked further to the underlying literature or should be cut down. (IPCC WGII TSU)	Citations have been added.
278	4	9	14	9	33	merge paragraphs, redudant content (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Done.
279	4	9	16	9	16	In theory this holds true as the design of protective measures is for certain recurrence levels but does not cover for all potential extremes. If these occur disasters happen (acceptable risk, etc) (Schmidt-Thome, Philipp, Geological Survey of Finland)	agreed.
280	4	9	23	0	0	We propose that "carbon" is substituted by "greenhouse gas emissions". (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Done.
281	4	9	25	9	33	The statement is not clear. Discussion on mutiple threads causes confusion. Is there any reference to support that? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	Clarified.
282	4	9	27	9	28	Is risk as described here consistent with definitions in Chapter 1 (e.g., Section 1.3.1)? (IPCC WGII TSU)	Yes, usage is consistent with chapter 1.
283	4	9	27	9	28	This definition of risk could be clearer (it is not clear what "expressed through" means). Can you be more specific? (IPCC WGII TSU)	clarified.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
284	4	9	35	0	42	We think that this paragraph, including the examples, might describe only half the truth. Will also physical size in itself significantly reduce percentage losses, due to the fact that most extreme events only have a local or regional range of impact? (Asphjell, Torggrim, Climate and Pollution Agency (Norway))	Agreed, also see revised section 4.6.
285	4	9	40	9	42	These figures on GDP would need to be normalised by such measures as area of the country, proportion of area affected, population, proportion of population affected, and population density in order to be meaningful. (Palutikof, Jean, Griffith University)	They are averages from international agencies and are subject to all the limitations of any such figures. In particular it would be expected that small countries would have greater impacts from similar climatic events.
286	4	9	40	9	42	Is there any reference to support that? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	Reference added.
287	4	9	44	9	49	I would be cautious in drawing conclusions about the death rates per disaster (lines 44-49 page 9). Although is very much likely that lethality is higher in poor countries, there might also be a reporting difference (only more severe disasters only are reported in LDC, while also minor ones in HDC). (Bertolini, Roberto, World Health Organization)	Agreed. But the differences are very large.
288	4	9	47	9	49	Do these numbers take into account that a country might be less developed because it is located in an area that is frequently affected from extreme events? (Koppe, Christina, Deutscher Wetterdienst)	They are averages. So this point could be valid as could be similar caveats. This issue is examined briefly in section 4.6.
289	4	9	51	9	51	The term 'dynamism' occurs a few times. Please define. (Palutikof, Jean, Griffith University)	Amended.
290	4	9	51	10	2	This paragraph would benefit from citations. (IPCC WGII TSU)	Done.
291	4	10	0	0	0	4.2.1.1.1 Sidr vs Nardis: Move to case study? (IPCC WGII TSU)	This case study has been totally changed, corrected and moved to chapter 9
292	4	10	7	0	0	Section 4.2.1.1.1 Case Study -- parts of the section are poorly written (with regard to the english language as well as structure). Relevant information is mixed with information which seems highly irrelevant here ("the previous event also occurred in May"). Furthermore, the Case Study overall heavily reliant on grey literature and thus it's unclear to us whether it should be retained at all. If kept, the entire section needs to be substantially revised/improved. (Stocker, Thomas, IPCC WGI TSU)	This case study has been totally changed, corrected and moved to chapter 9
293	4	10	7	0	0	Review the PDNA (Post disaster evaluations) made of these events (http://www.asean.org/21765.pdf for Nargis and http://gfdrr.org/docs/AssessmentReport_Cyclone%20Sidr_Bangladesh_2008.pdf for Sidr) (Zapata-Marti, Ricardo, United Nations Economic Commission for Latin America and the Caribbean (ECLAC))	Thank you for the links, we were already using the one on Sidr, I forwarded the other one on Nargis to to the person in charge in ch.9, as this case study has been totally rewritten and moved to chapter 9. Although, they are part of the grey literature category, These reports are very useful.
294	4	10	7	0	0	The case study about the Sidr and Nargis tropical cyclones is very important. However, it should be better described (the two events illustrated separately with a similar sequence of information following the items summarized in table 4.1). Conclusions should better articulated and more linked to the evidence and the differences in governance. (Bertolini, Roberto, World Health Organization)	This case study has been totally changed, corrected and moved to chapter 9
295	4	10	7	0	0	Section 4.2.1.1.1. This case study is redundant with Chapter 9, Case Study 9.1, "Tropical Cyclones," which explicitly compares Sidr and Nargis. There is also overlap with Case Study 9.18, "Linking Disaster Risk Reduction and Climate Change Adaptation--Cyclones in Bangladesh." It might be appropriate to move novel factual elements of this Chapter 4 Case Study to the Chapter 9 Case Studies; the Chapter 9 Case Studies could then be cited or recapitulated to some extent here in Chapter 4, with emphasis on discussion of extreme impacts for humans and ecosystems. (IPCC WGII TSU)	This case study has been totally changed, corrected and moved to chapter 9
296	4	10	7	11	55	The text in this case study needs careful editing. It can be misleading. (Palutikof, Jean, Griffith University)	This case study has been totally changed, corrected and moved to chapter 9
297	4	10	7	12	2	Maybe better in Chp 9? Also, this existence of natural subsidence should be mentioned in line 20, page 10) (Hallegatte, Stephane, CIREC and Meteo-France)	This case study has been totally changed, corrected and moved to chapter 9
298	4	10	10	10	10	poor governance' is sweeping, especially as the case study goes on to contract good governance in bamgladesh with poor governance in Myanmar. (Palutikof, Jean, Griffith University)	We moved this case study to chapter 9 and further completed it. The demonstration on weak governance is still at the core of the case study.
299	4	10	11	10	20	These sentences should be linked to relevant text in Chapter 3 (Section 3.4.4), with redundant material removed from this section. Also, consideration of Section 3.4.4, page 54, lines 23-39, and page 55, lines 30-39, would be prudent, as that text contradicts, to some extent, statements made in these Chapter 4 sentences. (IPCC WGII TSU)	Sentence removed
300	4	10	15	10	16	Refer to section 3.4.4 of Chapter 3 here also. (Stocker, Thomas, IPCC WGI TSU)	this part was removed
301	4	10	19	10	19	Section 4.2.1.1.1 Case Study -- "climate change leading to more intense tropical cyclones (Chapter 3)" -- the assessment in Chapter 3 is much more detailed and the conclusion is not one of generally "more intense tropical cyclones". Please refer to Chapter 3.4.4 for the details of the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	This was corrected, links were made. Jim Kossin (from ch. 3) reviewed directly this section and recommended several changes, which were all introduced.
302	4	10	19	10	20	Maybe this should read "Storm surges associated with climate change induced increases in the magnitude and intensity of tropical storms, and sea level rise, will be exacerbated" Or some thing that does not imply that storm surges lead to more intense storms, as the phrase may be read now. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	This was removed.
303	4	10	20	0	0	Please add some references for the effects of sea level rise on storm surge. (Kazama, So, Tohoku University)	Statement was removed

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
304	4	10	22	10	22	early warnings do not systematically include storm surge warnings' true everywhere? Or only in Myanmar? (Palutikof, Jean, Griffith University)	Unfortunately, this is only depending on the good will of the centre. It is not compulsory to provide such warning. People are still debating on a specific scale for storm surge warning. However, the use of meters (or feet) should be clear enough.
305	4	10	25	0	0	A reference year should be included in this sentence. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Reference (Paul, 2009)
306	4	10	38	10	38	A storm surge can not reach "between 4m" - if no other number is given it is just about 4m. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This was replaced by "about 4 m)
307	4	11	21	11	21	delete "the previous event also occurred in May" -- it holds no relevant information in the SREX context. (Stocker, Thomas, IPCC WGI TSU)	Deleted
308	4	11	22	11	22	We assume you are referring to the "highest SEA SURFACE temperature on the planet"? (Stocker, Thomas, IPCC WGI TSU)	Indeed, but sentence removed anyway
309	4	11	22	11	22	The phrase "highest temperature on the planet" cannot be literally correct. Perhaps "highest sea surface temperature" or some other more measured phrase is what was intended? (IPCC WGII TSU)	Indeed, but sentence removed anyway
310	4	11	33	0	35	The status of the newspaper should be indicated (is it a national newspaper and is it in Burmese language). (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Status checked and modification introduced: "The New Light of Myanmar (a government-owned newspaper published by the Ministry of information)".
311	4	11	38	11	39	Unprecise: GDP ppp refers to PER CAPITA, isn't it? Then it should be cited "GDPppp p.c.". (Faust, Eberhard, Munich Reinsurance Company)	Corrected by "Growth Domestic Product per capita in purchasing power parity (GDPppp p.c.)"
312	4	11	42	11	42	The meaning of the parenthetical numbers on this line is unclear. It would be helpful to define more explicitly how they should be interpreted, i.e. is each number the indicator for Bangladesh minus the indicator for Myanmar? And if so, how large is the range for each indicator, i.e., are they determined on a 100-point scale? (IPCC WGII TSU)	This is now part of chapter 9 and was rewritten. The numbers were cut in the process. So issue solved.
313	4	11	42	11	43	What are the numbers in brackets? (Palutikof, Jean, Griffith University)	This is now part of chapter 9 and was rewritten. The numbers were cut in the process. So issue solved.
314	4	11	46	11	47	"while two different hazardous events cannot necessarily be compared, the large discrepancy in resulted casualties recorded appears highly significant" -- this is an odd and contradictory statement: (1) this case study over 3 pages compares two hazardous events just to then conclude that they can't necessarily be compared; and (2) concludes that two events can't necessarily be compared, but then the result is statistically significant?...that's truly confusing. (Stocker, Thomas, IPCC WGI TSU)	This was to nuance the conclusion, but true I shouldn't state that they cannot be compared. Different objects can be compared. I acknowledged the fact that they are different events, and still conclude that the difference in the hazard cannot explain the difference in casualties. What really make Nargis 30 times more deadly is not the hazard itself but the casual way that the authorities dealt with the warning as well with the deny of risk. The case study has been totally rewritten and moved to chapter 9, it should now, read better.
315	4	12	0	0	0	P12. Good sentence about the natural and human dimensions of floods (IPCC WGII TSU)	good
316	4	12	5	0	0	section currently has not a single reference (Stocker, Thomas, IPCC WGI TSU)	Section has been re-written
317	4	12	5	0	0	"Some paragraphs you might want to use or quote for expanding the chapter: Disturbances and extreme events play a crucial role in maintaining biotic diversity. They have been evolutionary forces, causing adaptations in the biota exposed to them. Dominant and less dominant species switch in abundance under changing environmental conditions allowing functional stability. Moreover, extreme events can remove the inertia represented by existing ecosystems, thus resulting in a relatively sudden response (or adjustment) to previous climate changes. Exotic invasions can occur more quickly after disturbances to ecosystems (if only because disturbances remove competitive dominants and increase the rate of establishment of new individuals, exotic or not), which in turn can also alter the disturbance rate. Impacts of extreme effects vary in heterogeneity, patch size, resource levels and biotic legacy they create. These post-disturbance characteristics influence the mode and speed of ecosystem recovery towards pre-disturbance conditions or alteration towards qualitatively different ecosystems. Species are also idiosyncratic in their effects on disturbance regimes. Some species are keystone species that greatly influence disturbance regimes. For example, the fuel provided by a dominant understory grass is critical to the fire regime, species diversity and pine regeneration in longleaf pine forests in the southeastern United States (Christensen 1981). That individual species can affect a disturbance is also illustrated by exotic-species invasions that have altered disturbance regimes in the western grasslands and the southern Florida everglades in the United States. An important form of species influence on disturbance regimes is the influence associated with the effects of variation in characteristic growth forms. Dominant growth forms (trees, shrubs, forbs and grasses) are associated with different environments but also influence disturbance characteristics. The combination of changes in environmental conditions and disturbance can sharpen ecotones and produce feedback on disturbance rates across the ecotone. Generalizations will have to take into account the influence of species and growth forms on disturbance regimes and effects. Reference: White PS, Jentsch A (2001): The search for generality in studies of disturbance and ecosystem dynamics. Progress in Botany 63: 399-449." (Jentsch, Anke, University of Kassel, Germany)	Due to space limitations, the chapter cannot be expanded.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
318	4	12	5	0	0	Section 4.2.1.2. Some suggestions for expansion of section. Consider heat related mortality, temperature determined sex ratio, range shifts etc. E.g. Easterling DR, Meehl GA, Parmesan C, Changnon SA, Karl TA, Mearns LO 2000 Climate extremes: observations, modeling, and impacts. Science 289, 2068-2074. ALSO Parmesan C, Root TL, Willig MR 2000 Impacts of Extreme Weather and Climate on Terrestrial Biota. Bull. Amer. Meteor. Soc., 81, 443-450 (Chambers, Lynda, Australian Bureau of Meteorology)	Due to space limitations, the chapter cannot be expanded.
319	4	12	5	12	13	This opening statement is very important and should be expanded when finishing this section. One aspect is the need to make clear that when talking, as many do, of the "vulnerability" of ecosystems to extreme events and the "damage or loss" inflicted on them, we are talking of vulnerability, damage and loss in very different ways, both causally and impactwise, than when we use these terms with reference to human system contexts. The natural transformation of nature by nature can not really be depicted as loss and damage or even vulnerability given that the physical history of the earth is the history of natural change through the occurrence of catastrophic events or gradual processes like erosion. If a hurricane leads to impacts on natural coastal ecosystems this is not loss and damage as we understand it in human systems but rather, transformation and renovation. If, of course, previous human intervention has led to loss of ecosystem assets then when a hurricane hits and leads to impacts we may be able to talk of loss and damage given that such intervention may have weakened the natural system, reduced its natural resilience--landslides on deforested slopes for example. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Usage of all terms, such as vulnerability, is consistent with report glossary.
320	4	12	5	12	13	This section certainly need expanding as there are still much to say about the complexities of interactions between climate and ecosystems. (GIROT, Pascal, IUCN)	Agreed, but due to space limitations, the chapter cannot be expanded.
321	4	12	7	12	8	The term "extremes" is not appropriate in this context, it should rather be natural disturbances (which are very relevant in the dynamics of ecosystems). However, if such disturbances are becoming extreme (like e.g. a forest fire with a high destructive intensity), it can lead to ecosystem degradation (Wehrli, Andre, European Environment Agency)	Usage of the term extreme event is consistent with report glossary.
322	4	12	8	0	0	"If certain events are required for reproduction, not necessarily regular rhythms are needed but a certain frequency and magnitude can be expected from the evolutionary point of view. Alteration of frequency (shortening of return periods) or magnitude (intensity) of an event regime, which is likely to occur as a consequence of increased climatic variability, may lead to regime shifts and ecosystem change." (Jentsch, Anke, University of Koblenz-Landau)	This is a good point. However, citations would be required to add it to the section.
323	4	12	16	0	0	The whole chapter 4.2.2 is not systematic, there are several repetitions and duplications of similar issues (Bertolini, Roberto, World Health Organization)	Edited
324	4	12	18	13	23	The argument that climate change is more serious than the ability of human systems to change for better or worse is not clear here. More clarity could be given to the potential threats of climate change and how they supercede all else. (Ammann, Walter J., Global Risk Forum GRF Davos)	Considerations of such points are more nearly relevant to the scope of subsequent chapters.
325	4	12	21	12	22	To better reflect the uncertainty on this subject, this sentence should be rewritten to something like "...are believed to be driving changes in MANY climatic variables and corresponding impacts (see Chapter 3)" (Stocker, Thomas, IPCC WGI TSU)	Done
326	4	12	21	12	22	"changes in climate and atmospheric systems are believed to be driving changes in climatic variables and corresponding impacts"? -- this sentence is very odd; (1) the atmosphere is part of the climate system; (2) climate variables are part of and essentially characterize the state of the climate system; (3) "are believed" should be replaced by "are" as it's a scientific fact, not a belief that humans are driving changes in the climate system. (Stocker, Thomas, IPCC WGI TSU)	Done
327	4	12	21	12	22	Human-induced changes ...' is confusing. What does 'human-induced changes' mean? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	We believe this phrase is commonly used and is clear as is
328	4	12	21	12	22	"are believed to be" is not really appropriate language for this statement. Suggest rephrasing with more precise language about this linkage. (IPCC WGII TSU)	Done
329	4	12	24	12	24	"with reference to" -- replace with "focusing on the impacts from.." (Stocker, Thomas, IPCC WGI TSU)	done
330	4	12	27	12	27	what does 'Changes in socio-economic patterns are a key component of exposure' mean? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	We mean that changes in socio-economic patterns contribute to trends in exposure, as exemplified with the discussion of population growth.
331	4	12	32	0	0	Should the authors reconsider the statement - 'Urbanization, often driven by rural poverty,...' - it seems overstating the significance of rural poverty on urbanisation. (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	We feel this statement is supported by the cited source.
332	4	12	33	12	36	This sentence implies that people in flood-prone areas are aware of the described risk (increased flooding due to climate change). It seems feasible that some of these people would not be aware that changes in flooding may be linked to climate change, either because of educational reasons or because of some of the uncertainties described in Chapter 3, Section 3.5.2. (IPCC WGII TSU)	Agreed. Although this point was not considered in the preparation of the second-order draft, it is reflected in the final chapter draft.
333	4	12	34	0	0	Authors wrote, 'living in these areas without appropriate adaptation is mal-adaptive from a climate change perspective'. Is it really mal-adaptive? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	Although this statement was not revised in the 2nd order draft, this point was considered in final chapter draft.
334	4	12	41	12	41	replace flood risk by intensity and frequency of floods (risk includes vulnerability, exposure and the hazard, as indicated in other sections) (Wehrli, Andre, European Environment Agency)	Done

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
335	4	12	43	12	43	"change the conditions under which precipitation becomes runoff" -- "conditions under which" seems not to be the correct formulation here. Would "change the percentage of precipitation turning into above ground runoff" (or similar) be better? (Stocker, Thomas, IPCC WGI TSU)	Done
336	4	12	49	12	50	add potentially (since developments on slopes do not necessarily have to be endangered by landslides etc, it depends i.a. on the geological underground) (Wehrli, Andre, European Environment Agency)	Done
337	4	12	49	12	50	it would be interesting if a reference to some research in mountainous areas is included. (Kazama, So, Tohoku University)	Agreed
338	4	12	49	12	51	Please add some references for few practical examples. (Kazama, So, Tohoku University)	Agreed, but we have not yet done this.
339	4	12	50	12	51	this sentence should be rephrased, it is difficult to understand (Wehrli, Andre, European Environment Agency)	Edited
340	4	12	58	12	58	"serious disaster" -- how is "serious" defined? Suggest to delete/replace (Stocker, Thomas, IPCC WGI TSU)	Edited
341	4	13	1	13	2	there must be many examples in Africa and Asia. Please mention few important references. (Kazama, So, Tohoku University)	Agreed, but we have not yet done this.
342	4	13	2	13	2	From my perspective, desertification in the Amazon basin is also worth mentioning. (Kazama, So, Tohoku University)	Agreed, but we have not yet done this
343	4	13	4	0	0	"Aral sea basin", please explain the countries, which is located with (e.g., The Aral Sea located in Uzbekistan and Kazakstan) (Kazama, So, Tohoku University)	Done
344	4	13	6	0	0	"dramatically), please explain as a percentage. (Kazama, So, Tohoku University)	Text revised accordingly.
345	4	13	8	13	8	"sectors" -- which sectors are meant here? (Stocker, Thomas, IPCC WGI TSU)	Text revised to indicate sectors.
346	4	13	13	13	18	avoid repetition: heat wave, drought and wildfire example need not be repeated. (Stocker, Thomas, IPCC WGI TSU)	Repetition has been eliminated.
347	4	13	13	13	23	This paragraph would benefit from citations. Redundancy with Chapter 3 should also considered. (IPCC WGII TSU)	Citations added, and we are working with Chapter 3 to avoid overlap.
348	4	13	17	13	19	a good example could be the (forest) fire in Russia in 2010... (Wehrli, Andre, European Environment Agency)	Further examples have been added.
349	4	13	19	13	19	likely -- italics? (Stocker, Thomas, IPCC WGI TSU)	The usage of this term does not reflect calibrated language. It was addressed accordingly in the final chapter draft.
350	4	13	19	13	21	rephrase: ..., e.g. intense precipitation leads to flash floods and landslides which finally damages infrastructure... (Wehrli, Andre, European Environment Agency)	This sentence has been revised.
351	4	13	28	0	0	This is an excellent case study, with the box title clearly identifying what the purpose of this case study/box is. This case study should serve as the template for how other case studies in this chapter are presented. However, in order to reduce the overall length of the chapter, we think the last 3 paragraphs could sensibly be deleted, without losing any of the key inputs for the SREX. Furthermore, is Footnote 1 really needed? It probably could also be deleted without losing much, referring back to the original reference should be enough. (Stocker, Thomas, IPCC WGI TSU)	Good - thanks. The box has been revised with these points in mind.
352	4	13	28	0	0	Box 4-2. This Box is redundant with Chapter 9, Case Study 9.6, "Drought, Heat Wave, and Black Saturday Bush Fires in Victoria." Overlap should be reduced, perhaps with factual details regarding the fires highlighted in Case Study 9.6 and with that Case Study then referenced and extreme impacts discussed further here. (IPCC WGII TSU)	We have retained the box as it emphasises certain aspects of the risk that are not covered in the Chapter 9 case study. The two are addressing different issues.
353	4	13	28	0	0	Box 4.2 to case studies? (IPCC WGII TSU)	We have retained the box as it emphasises certain aspects of the risk that are not covered in the Chapter 9 case study.
354	4	13	28	13	28	Is this box really necessary? Better in chp 9? (Hallegatte, Stephane, CIRED and Meteo-France)	We think it is.
355	4	13	28	14	44	Consideration should be given to renaming the text box 'Victorian Bushfires' as this was the term given to the Royal Commission etc. Case study 9.6, in chapter 9, repeats much of the information presented in this text box however does not provide the level of synthesis that this discussion does. Consideration should be given to the authors of this text box working with the author of Case study 9.6 to ensure consistency in messaging. (Dumbrell, Amy, Australian Government Department of Climate Change and Energy Efficiency)	We have discussed this with Chapter 9 authors.
356	4	13	36	13	39	"with the northeast winds" should be added. Besides, Melbourne air temperature on 7th Feb 2009 and the preceding and following days could be given in a separate figure. This will allow better understanding of this event. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	The case study in Chapter 9 is dealing with the more technical details
357	4	13	39	13	39	"5%", this is indeed very low. Please check and make sure this number is correct. (Zhang, Xuebin, Environment Canada)	yes it is correct.
358	4	13	41	13	41	"very likely" -- refer back to Chapter 3 and check consistency with their assessment. (Stocker, Thomas, IPCC WGI TSU)	We are working with Chapter 3 to avoid overlap and to ensure consistency.
359	4	13	41	13	44	Chapter 3 (Section 3.3.1) should be considered and referenced for these sentences. (IPCC WGII TSU)	We are working with Chapter 3 to avoid overlap and to ensure consistency.
360	4	13	49	14	36	See comment 4 on evacuations, relocations and the law. For a critique of the estimations of numbers see Future Floods of Refugees in comment 1. For a pilot study on current disaster displaced persons, broken down into climate-related disasters, see OCHA and IDMC/NRC, 2009, Monitoring Disaster Displacement in the Context of Climate Change, available at http://www.internal-displacement.org/8025708F004BE3B1/(httpInfoFiles)/12E8C7224C2A6A9EC125763900315AD4/\$file/monitoring-disaster-displacement.pdf (Kolmannskog, Vikram, Norwegian Refugee Council)	Major issue perhaps outside the scope of the report
361	4	13	54	14	1	If Fire Danger Index ranges from 0-100, how it can have the value over 160? The reference for the index definition should be given. (Wibig, Joanna, University of Lodz)	This index is no longer discussed.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
362	4	14	0	0	0	4.2.2.1. About Permafrost -why are the elaborations on permafrost degradation limited to the Russian Arctic? (Hama, Angela Michiko, United Nations International Strategy for Disaster Reduction)	This was the expertise available and it serves as an example. However, the placement of this text has been moved to reflect this fact.
363	4	14	1	14	1	Fire Index of 160+; on the previous page, last sentence, line 54 it says that "the Fire Danger Index (FDI) ranges from 0-100"...how come that the Index can be 160 (or even 189)? Please explain. (Stocker, Thomas, IPCC WGI TSU)	This index is no longer discussed.
364	4	14	1	14	1	The given FDI values (160+ and 189) exceed the range presented on the previous page (0-100). Please clarify. (IPCC WGII TSU)	This index is no longer discussed.
365	4	14	15	14	16	This sentence could be improved through the addition of a citation. Is it documented that fire risk has not been considered in related land planning decisions? (IPCC WGII TSU)	I have not found any are peer reviewed references. Natural hazards are a very low priority in Australian land use planning.
366	4	14	15	14	20	there is no needs to give the information given in the paragraph between lines from 15 to 20. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	This material has been greatly reduced.
367	4	14	22	14	27	this expanlation should be rewritten using climatological terminology. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	This material has been greatly reduced.
368	4	14	29	14	31	This paragraph would benefit from citations. (IPCC WGII TSU)	This material has been greatly reduced.
369	4	14	47	0	0	This 'About permafrost' section really seems out of place, and does not provide a very good example of 'complex interactions between climate events, exposure, and vulnerability'. This section appears appears completely random in the middle of two sections relating to forest fires. Most of this text is anyway repeated again in section 4.5.9 'polar region'. I would strongly suggest keeping the permafrost related discussion focussed within 4.5.9, and deleting this strange 'About Permafrost' section. (Stocker, Thomas IPCC WGI TSU)	Agreed - section moved.
370	4	14	47	0	0	In any case, the scientific quality of this permafrost section is poor. It is unclear over what time period the 40-80 cm increase in seasonal thaw depth has been observed/projected, and completely unclear what region the projections from Anisimov et al. 2004 relates to. For a much clearer scientific assessment, and better treatment of all Arctic regions, the 'Frozen Ground' chapter from the 2007 UNEP Global Outlook for snow and ice should be consulted as a starting point. http://www.unep.org/geo/geo_ice/PDF/GEO_C7_LowRes.pdf (Stocker, Thomas IPCC WGI TSU)	Section has been moved.
371	4	14	47	0	0	An introductory sentence can be used before line 49 such as "permafrost is soil at or below the freezing point of water". "The extent of permafrost can vary as the climate change". (Incecik, Salahattin/Selahattin, Istanbul Technical University)	This section has been moved.
372	4	14	47	0	0	Section 4.2.2.1. This section should probably include mention and/or discussion of Case Study 9.11, "Vulnerable Regions: Case Study: The Arctic." (IPCC WGII TSU)	This section has been moved.
373	4	14	47	0	0	Section 4.2.2.1. This section should be revised to make it less of a disjointed list of possible impacts. As is, the section seems to lack a "bigger picture" assessment of the underlying literature relevant to the overarching topic of "Complex Interactions between Climate Events, Exposure and Vulnerability." (IPCC WGII TSU)	This section has been moved.
374	4	14	47	0	0	4.2.2.1: Section needs a better heading to make it clear why it is in this larger section. Seems more appropriate for the regional section, 4.5. (IPCC WGII TSU)	This section has been moved. Note that it is the impacts that are seen as extreme.
375	4	14	47	0	0	4.2.2.1 Permafrost impacts difficult to characterize as an extreme (IPCC WGII TSU)	This section has been moved.
376	4	14	47	15	15	Strong overlap with p.64 I.39-49. (Faust, Eberhard, Munich Reinsurance Company)	This section has been moved.
377	4	14	49	14	53	In which time the 40-80 cm increase in seasonal soil thawing took place? (Wibig, Joanna, University of Lodz)	This section has been moved.
378	4	14	49	15	15	The section 4.2.2.1 needs to be coordinated with Chapter 3. The content of the first is already in Ch3. (Zhang, Xuebin, Environment Canada)	This section has been moved. We are coordinating with chapter 3.
379	4	14	49	15	3	Discussion of extreme impacts related to permafrost should consider the material in, and reference, Chapter 3, Section 3.5.7. (IPCC WGII TSU)	This section has been moved. We are coordinating with chapter 3.
380	4	14	51	14	52	Relevance of this reference to marine mammals in a section on permafrost? (Palutikof, Jean, Griffith University)	This section has been moved.
381	4	15	0	0	0	Amazon example to case studies? (IPCC WGII TSU)	No longer a case study, but a full assessment - see comment 383.
382	4	15	5	15	10	These examples of permafrost degradation are used twice in chapter 4 - see page 64, lines 44-49 (Hama, Angela Michiko, United Nations International Strategy for Disaster Reduction)	The permafrost material has been moved. Now in polar region.
383	4	15	18	0	0	This case study needs rewriting/removal. It currently appears as a collection of disjointed paragraphs, and the overall purpose of this case study is not clear. Furthermore, the title "forest fires in Indonesia" is not accurate, given these paragraphs jump between Indonesia, The Amazon, and Panama. (Stocker, Thomas, IPCC WGI TSU)	This is no longer a case study, but a full assessment on forest fires, drought and deforestation for Amazonia and Indonesia. It has been rewritten and renamed. It will be discussed in LAM4 if this stays in this place or if it moves to ecosystems.
384	4	15	18	0	0	The heading should be changed to reflect that this chapter also deals with Brazil and other countries. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	This is no longer a case study, but a full assessment on forest fires, drought and deforestation for Amazonia and Indonesia. It has been rewritten and renamed. It will be discussed in LAM4 if this stays in this place or if it moves to ecosystems.
385	4	15	18	15	18	Is this box really necessary? Better in chp 9? (Hallegatte, Stephane, CIRED and Meteo-France)	This is no longer a case study, but a full assessment on forest fires, drought and deforestation for Amazonia and Indonesia. It has been rewritten and renamed. It will be discussed in LAM4 if this stays in this place or if it moves to ecosystems.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
386	4	15	20	15	20	"old growth forests are usually carbon sinks" -- No. While old growth forest store a lot of carbon, which they have been taking up while growing, once they reach equilibrium, there won't be any net uptake of CO2 (unless some organic material is transferred into soils etc.). (Stocker, Thomas, IPCC WGI TSU)	Agree. What I meant is precised in the next sentence. Given that this first sentence was obviously not clear enough, it was removed.
387	4	15	20	15	22	This first paragraph is policy prescriptive and should be removed. In any case, it hardly serves as an introductory paragraph to the purpose of this case-study. (Stocker, Thomas, IPCC WGI TSU)	First paragraph entirely rewritten
388	4	15	20	15	22	This paragraph is not the best way to begin this section. In general, the opening paragraphs of this section might be tightened to increase focus on the overarching topic of "Complex Interactions between Climate Events, Exposure and Vulnerability," shifting attention from carbon emissions associated with forest fires. (IPCC WGII TSU)	First paragraph entirely rewritten
389	4	15	20	16	10	This is a poorly written case study. It is unclear what the message is, what can one learn from this case study on forest fires in Indonesia? I wonder why do you need to discuss Amazon forest, and Panama if the case study is about Indonesia forest fires? (Zhang, Xuebin, Environment Canada)	This is no longer a case study, but a full assessment on forest fires, drought and deforestation for Amazonia and Indonesia. It has been rewritten and renamed. It will be discussed in LAM4 if this stays in this place or if it moves to ecosystems.
390	4	15	21	0	22	We think that the concluding statement as regards carbon-accounting rules should be deleted, since it is a policy related and complicated issues that can not be decided in just one sentence. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Agree. Sentence removed.
391	4	15	22	15	22	"carbon accounting rules should give credit" -- this is a policy-prescriptive statement, needs to be rephrased or deleted. (Stocker, Thomas, IPCC WGI TSU)	Agree. Sentence removed.
392	4	15	26	15	28	It would be good to link, to the extent possible, discussion of drought projections to the text of Chapter 3, Section 3.5.1. (IPCC WGII TSU)	Yes, we could linked with 3.5.1, although, the specificity of this triangulation, forest fires, deforestation and drought, is not approached in chapter 3. I suppressed the sentence on projected drought and El Niño.
393	4	15	30	15	36	how relevant for the SREX is this section about the contributions of fires in Indonesia to total emissions? It seems rather irrelevant and thus could be deleted in order to reduce the overall length of the Chapter (Stocker, Thomas, IPCC WGI TSU)	Because this highlight the positive feedback: deforestation and global warming inducing further drought. Drought inducing further forest fires, forest fires inducing both deforestation and further GHG,... and the circle continues. Part totally rewritten.
394	4	15	32	0	0	PNG = ? Please explain. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	PNG=Papua New Guinea, corrected.
395	4	15	33	0	0	We would prefer that the denomination Mt was used instead of Pg. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	OK, Mt it is.
396	4	15	38	0	40	We would prefer that the denomination Mt was used instead of megagrams. And petagrams. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	OK, Mt it is.
397	4	15	38	15	41	This paragraph should be given on line 34 before the sentence starting " Drought episode, .. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	This is no longer a case study, but a full assessment on forest fires, drought and deforestation for Amazonia and Indonesia. It has been rewritten and renamed. It will be discussed in LAM4 if this stays in this place or if it moves to ecosystems.
398	4	15	40	0	0	it should be 10powered 15 instead 1015 (two times) (Wibig, Joanna, University of Lodz)	Typo error, the indent was removed accidentally, thank you.
399	4	16	13	16	13	What are 'they' in the heading for 4.2.3? (Palutikof, Jean, Griffith University)	Clarified
400	4	16	15	0	0	Section 4.2.3.1 -- General concepts relevant in the SREX context are to be introduced and assessed in Chapters 1 and/or 2; remove the section from Chapter 4 and coordinate with Chapter 1 and 2 for a comprehensive discussion in Chapters there. (Stocker, Thomas, IPCC WGI TSU)	We are coordinating with the earlier chapters and have reduced/deleted this material as appropriate. However, some is retained to provide context for Chapter 4. This point was also further addressed in the preparation of the final draft.
401	4	16	15	18	4	The concept section could be reduced, and mention Chp 1. (Hallegatte, Stephane, CIRED and Meteo-France)	We are coordinating with the earlier chapters and have reduced/deleted this material as appropriate. However, some is retained to provide context for Chapter 4. This point was also further addressed in the preparation of the final draft.
402	4	16	17	0	0	The scale of impact is also determined by the ability to recover and respond. (Ammann, Walter J., Global Risk Forum GRF Davos)	Agreed
403	4	16	17	16	32	These paragraphs would greatly benefit from being linked more closely to underlying literature. (IPCC WGII TSU)	References added
404	4	16	17	16	32	These issues have been treated earlier in 4.1--their discussion should be consolidated. (IPCC WGII TSU)	Agreed and done. The text has been reduced in length.
405	4	16	19	16	20	Mention is made of the political and social elements of vulnerability, whereas in chapter 2 the elements mentioned are far wider ranging, including cultural, institutional, educational etc. I would imagine that we need some short hand statement of what are the generic elements without the detail, but given "social" is used apart from education, health etc in chapter 2, using social as a generic type here would not be consistent, even if correct. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	We have tried to be consistent with earlier chapters, in the context of topics treated within our chapter.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
406	4	16	26	16	28	Changes to exposure and to vulnerability are here considered risk reduction actions, instruments or strategies . So what is the difference between these seen as "adaptation" actions or as DRR actions, if the tools are the same and the ends the same? Here as in many other places in this and other chapters we come up against the critical question as to whether there is any real difference in many cases between what is being called in this report at times adaptation and at times risk reduction and prevention or prevision? And if so, why? Or should we from the beginning make very clear what is what, according to the collection of authors writing this study. For any potential reader of the report the distinction or difference is not going to be very clear. Here it also says that hazard is defined as the climate event cf chapter 1--in chapter 1 at the moment this is not so- hazard is there defined as the potential, latent threat associated with a future event, not the event as such. This is another debate still open to an overall consensual decision. But, the idea that hazard is a part of the risk equation leads to the conclusion that hazard is latent, as are risk and vulnerability in announcing probable future loss. If hazard was the event it could not be put in an equation for risk as risk and vulnerability are clearly not the disaster, just components of the potential for disaster to occur, and hazard is not the event just the potential for the event to occur. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	These important questions are more nearly under the purview of subsequent chapters in the report on adaptation and disaster risk reduction.
407	4	16	29	16	32	This sentence, in attempting to distinguish between adaptation to climate change and management of existing hazards, complicates things I feel. Firstly, because adaptation has been defined by IPCC as also including adjustment to already changed climate, so the "hazard" has already manifested itself. And, DRM is not only about dealing with physical events as they occur but anticipating future events that will probably occur, some under existing climate conditions and some under changed conditions. To make out that climate change adaptation deals with future change and DRM not so is, from our angle, one of the major follies around. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	These important questions are more nearly under the purview of subsequent chapters in the report on adaptation and disaster risk reduction.
408	4	16	34	0	0	In the context of direct property losses (first-order) as discussed in risk management contexts (insurance, risk modeling firms,others) vulnerability has a much narrower definition: it is the (mean) susceptibility to damage, but NOT ability to recover (there is no ability to recover for a building hit by a tropical cyclone and thus turning into a heavily damaged building). This concept of vulnerability is widely shared in industry and should be made mention of in this discussion. (Faust, Eberhard, Munich Reinsurance Company)	Such definitional considerations are treated in chapters 1 and 2, with definitions presented in the report glossary.
409	4	16	34	16	34	Should it not be that vulnerability is seen as susceptibility to harm and difficulty or inability to recover, not "ability to recover" which is completely misleading and would indicate capacity and not vulnerability. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	This is part of an ongoing debate over definitions and details. We cannot ignore how the term is used by major organisations. We have reduced the conceptual material and retain what is needed to provide context.
410	4	16	42	0	0	Does chapter 4 really need to again revisit the definitions and concepts of 'disaster' in this much detail? It would be much more effective to simply refer to the relevant sections of chapters 1 and 2 (particularly section 1.2), and if needed, clarify briefly where Chapter 4 might offer a different perspective. (Stocker, Thomas. IPCC WGII TSU)	Agreed - much reduced and limited to what is needed to give context
411	4	16	44	17	24	Starting with Fritz and including Quarantelli who wrote these things years ago and not including any other author or debate does not seem to resolve the problem, if it is definition and comprehensive coverage we are after. There are dozens of others so why pick on these two ideas alone?. Also the CRED definition is so out of place as a scientific definition that it is not really worth mentioning unless it is to show how they set limits to what they register as disaster-an actuarial definition as opposed to a scientific one. Here it seems necessary to recognise that definitions follow one of three or four paths--actuarial definitions where limits are put in terms of strict numbers or parameters as in the CRED definition; operational definitions whereby an organization determines what is a disaster in order to justify its intervention in the problem--may be actuarial or use other criteria; scientific definitions where an attempt is made to construct concept and rational limits; and significance definitions whereby the thing is defined by its significance to someone or some organization (see the quote from Handmer a little later on). Either we have a full and detailed discussion of this point or we go for a consensual definition that we will use in the report, with little discussion of who says what. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	We include them to show the long antecessors in this area. Regardless of what we feel about the CRED definition, their dataset is the probably the most widely used for international comparisons and we draw on studies based on it. More generally we try to limit our discussion on these issues as they are covered in earlier chapters.
412	4	16	52	16	53	See for full discussion of these criteria Bouwer et al. 2007, Supporting Online Information. (Faust, Eberhard, Munich Reinsurance Company)	We draw on Bouwer who has also both contributed and reviewed aspects of this chapter.
413	4	17	0	0	0	P17 all for chapter 1 or 2? (IPCC WGII TSU)	Agreed - much reduced and limited to what is needed to give context
414	4	17	19	17	20	This is a crucial point - and suggests that the term 'recover' is misleading (as used later on line 43). Maybe one of the main challenges climate change adaptation poses is the need to shift our understanding of 'normal' and introduce something far more dynamic? The idea of 'return to normal' can also imply a lack of learning. (Rickards, Lauren Amy, University of Melbourne)	Agreed that "recover" should include the idea of learning and improvement. Returning to the past may not be possible and may not be desirable, and the need to adapt to changing climate is key.This section has been substantially revised.
415	4	17	29	17	48	These paragraphs would greatly benefit from being linked more closely to underlying literature. (IPCC WGII TSU)	Agreed - done
416	4	17	29	18	4	Far more referencing to different authors is needed here if these terms are to be discussed. On vulnerability it is almost impossible one would suggest not to mention Wisner, Cannon, Kelman, Gaillard, Hewitt and many others in terms of the development of the vulnerability topic. Moreover, beyond the problem of definition of exposure and vulnerability, the question of duplication with chapter 1 and 2 comes up again. How much must this study, chapter to chapter, rest on things said and defined in other chapters and how much is it licit to redefine or retake up on the definitional aspect time and time again, with the dangers of contradictions with other chapters, as is now the case many times over? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Section has been significantly reduced.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
417	4	17	32	17	33	Exposure may not be a sufficient condition for impacts but in reality exposure leads to impacts, at least for some, if a sufficiently long period of time is considered. (Darch, Geoff, Atkins & University of East Anglia)	OK
418	4	17	50	17	52	do you use the term "refugee" as defined by the UN (e.g. only people outside their own country) or in a broader sense? (Wehrli, Andre, European Environment Agency)	Amended to clarify that its in a broader sense.
419	4	18	7	0	0	Section 4.2.3.3 -- Suggest to start the section with the key findings reported in WGII AR4, then assess new science and end with conclusions (see also general comment regarding the overall structure of sections in Chapter 4). Interestingly all of the references cited here are pre-AR4! What about more recent results? (Stocker, Thomas, IPCC WGI TSU)	yes, accepted, new information added in line with these suggestions.
420	4	18	7	0	0	4.2.3.3 first paragraph – need to acknowledge uncertainty in biodiversity loss estimates (IPCC WGII TSU)	The text has been revised in line with this point.
421	4	18	7	20	20	Although we know the study is about extreme events and disasters it seems to be a given fact that a consideration of these that leads to understanding of how to deal with them can not be undertaken without considering the changes in averages, norms and less extreme events, given extreme events are part of a totality and not something isolated and autonomous. In this section and others, in ignoring impacts of gradual change as such or of smaller disasters it is probable that important information or explicatory power is lost as regards an understanding of impacts, vulnerability and intervention options. If this was a consideration of human system impacts there would be no way a consideration of extremes, disaster etc could be achieved without a more total view. This problem of holism versus a singular treatment and consideration of only the extreme and only disaster will not work given that such a segregated approach leaves enormous gaps in understanding and knowledge. The fact that the title of the study alludes directly and precisely to extreme events and disasters does not mean that understanding the managing of risk associated with these does not require talking about societal normalcy, and other lesser scale non routine events, their impacts and the mechanisms for dealing with them accumulated over time. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (IPCC))	Given the focus of the report and space limitations, the focus of this chapter must be on the impacts of extreme events. Consideration of all impacts of climate change will be treated in the AR5.
422	4	18	9	18	33	Such formulation of statements suggests that changes in ecosystems can occur only in mentioned places, but it is not true. There are only examples. It would be better to present the types of impacts the climate change can exert on ecosystems and than present examples. (Wibig, Joanna, University of Lodz)	This section has been revised with an effort to improve framing along these lines.
423	4	18	11	0	0	Please specify the current rate and natural rate. (Kazama, So, Tohoku University)	This statement has been substantially revised, and this comment now is less relevant.
424	4	18	12	0	0	"May et al. 1995 is not really a actual citation for this sentence ("current rate of species extinction"). At least Sala et al. 2000 (science) shall be cited. However, as there is large uncertainty about the rate of extinction I suggest to modify the sentence to a more general form: "The current rate of species extinction is substantially enhanced by human activities." (Jentsch, Anke, University of Koblenz-Landau)	accepted
425	4	18	14	0	0	"habitat fragmentation" is not the only or even main reason for extinction at the global scale. Also it is just one aspect of "land use change" which preferably should be mentioned. However, all drivers of species loss should be listed: "Climate change will exacerbate the effects of accelerated land use and cover change, modified water regimes, deposition of anthropogenic nutrients (mainly nitrogen), release of toxic and even xenobiotic substances, hunting and exploitation." (Jentsch, Anke, University of Koblenz-Landau)	noticed, considered change
426	4	18	14	18	16	Such statements need to communicate the degree of certainty the author team has in them, based on available evidence and agreement. (IPCC WGII TSU)	Although this point was not explicitly incorporated in the 2nd order draft, clear communication of uncertainties was our focus in the preparation of the final chapter draft.
427	4	18	14	18	29	There are other examples of resilience of ecosystems to extreme events. Such as this article by VIRGINIA H. DALE, LINDA A. JOYCE, STEVE MCNULTY, RONALD P. NEILSON, MATTHEW P. AYRES, MICHAEL D. FLANNIGAN, PAUL J. HANSON, LLOYD C. IRLAND, ARIEL E. LUGO, CHRIS J. PETERSON, DANIEL SIMBERLOFF, FREDERICK J. SWANSON, BRIAN J. STOCKS, and B. MICHAEL WOTTON Climate Change and Forest Disturbances Climate change can affect forests by altering the frequency, intensity, duration, and timing of fire, drought, introduced species, insect and pathogen outbreaks, hurricanes, windstorms, ice storms, or landslides, in BioScience September 2001, Vol. 51, No. 9, Pages 723–734 Posted online on January 5, 2009. (doi:10.1641/0006-3568(2001)051[0723:CCAFD]2.0.CO;2) (GIROT, Pascal, IUCN)	Noticed, but we do not proposed to discuss "resilience" here. Such discussions are more nearly under the purview of other chapters.
428	4	18	19	0	0	"However, models based on bioclimatic envelopes do not consider differences of ecotypes within species ranges. Dispersal abilities are also widely ignored in actualistic models. As a matter of fact, also the potential ability of species to adapt to novel environments and perform even better than in their native range, which is proven by many successful invaders, is ignored. Thus, the projections on the consequences for biodiversity are connected with a large uncertainty." (Jentsch, Anke, University of Koblenz-Landau)	This point has been noted. The line referenced has been deleted.
429	4	18	19	0	0	"community invasibility (Kreyling et al. 2008 a), biomass production (Kreyling et al. 2008b), flower phenology (Jentsch et al. 2009). References: Jentsch A, Kreyling J, Böttcher-Treschkow J, Beierkuhnlein C (2009): Beyond gradual warming - extreme weather events alter flower phenology of European grassland and heath species. Global Change Biology 15: 837-849; Kreyling J, Ellis L, Beierkuhnlein C, Jentsch A (2008): Biotic resistance and fluctuating resources are additive in determining invasibility of grassland and heath communities exposed to extreme weather events. Oikos 117: 1524-1554; Kreyling C, Wenigmann M, Beierkuhnlein C, Jentsch A (2008): Effects of extreme weather events on plant productivity and tissue die-back are modified by community composition. Ecosystems 11: 752-763." (Jentsch, Anke, University of Koblenz-Landau)	The line referenced has been deleted.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
430	4	18	24	0	0	"In Central Europe, where forest fires are known mainly from lowland anthropogenic conifer plantations but are naturally rare or even absent in natural deciduous and conifer forests, extended periods of drought might change this leading to large scale not previously experienced disturbances. The effects for ecosystem functioning and biodiversity are unclear, because evolutionary adaptation and resilience mechanisms are missing." (Jentsch, Anke, University of Koblenz-Landau)	This point has been considered in the revision of the text.
431	4	18	26	18	26	Throwaway expressions such as 'Greater storminess' are problematic if compared to the more conservative statements provided by chapter 3. Need to be more specific - something like 'More intense storms projected for some regions...' (Stocker, Thomas, IPCC WGI TSU)	We have worked to ensure consistency with chapter 3.
432	4	18	31	18	33	Not sure why this final paragraph is included. Please keep focus on climate related impacts. (Stocker, Thomas, IPCC WGI TSU)	accepted, deleted
433	4	18	31	18	33	This paragraph should be noted in detail on every topics such as land use, nitrogen deposition, etc. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	accepted, deleted
434	4	18	31	18	33	The explanation given here can be omitted. Besides, the first and second paragraphs can be combined. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	accepted, deleted
435	4	18	31	18	33	this section is not very good connected to the rest of this chapter. Additionally, the wording might need to be adapted (e.g. in line 9 you talk about threats, here you talk about changes...) (Wehrli, Andre, European Environment Agency)	deleted
436	4	18	33	0	0	Sentence is incomplete. Human influence on natural disturbance regimes and extreme events: Alteration, suppression and even enforcement of natural disturbance regimes including extreme events by human activities are current issues in science and politics. A major way humans affect biological diversity is through direct influences on the disturbance rate and intensity. Changes in fire and hydrology, including the dynamics of flooding, are nearly universal influences caused by people. For the purpose of economic exploitation or the protection of civilization, humans often strive to eliminate natural disturbances and the impacts of extreme weather events. We thereby allow succession and lengthen the return intervals of disturbance events. However, this may result in increased magnitudes and severities of subsequent events, because ecosystem susceptibility to disturbances may be enhanced. Therefore, it is critical that we understand disturbance dynamics and build predictive models that will allow us to forecast future changes and better manage ecosystems for nature conservation and for human needs. In a broad sense, human management consists of managing disturbances and succession and includes creating, replacing or suppressing events. Reference: White PS, Jentsch A (2001): The search for generality in studies of disturbance and ecosystem dynamics. Progress in Botany 63: 399-449." (Jentsch, Anke, University of Koblenz-Landau)	deleted
437	4	18	36	18	36	It's awkward that "phenomenon" is singular and "lead" is plural in this section title. (IPCC WGII TSU)	change to Phenomena
438	4	18	36	19	20	In this chapter, you should carefully distinguish between the impacts on individuals, populations, ecosystems and ecosystem functions. It might be that an extreme event heavily affects e.g. a population, but still does only have a minor impact on the ecosystem as a whole. (Wehrli, Andre, European Environment Agency)	noticed
439	4	18	38	18	39	A correct statement most surely and when it comes to us, humans, it seems that we want to study impacts of extremes and not consider gradual change and its relationship to how extremes are dealt with. One more argument for getting back to the question of totality versus segregation and specialization in dealing with climate and its manifestations. (Lavelle, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The report is about extremes and references to gradual climate change have mostly been removed.
440	4	18	39	18	41	see no.11 (Wehrli, Andre, European Environment Agency)	No.11 said that "the text should be condensed and concise". This sentence is not wordy.
441	4	18	39	18	41	As in the executive summary, it is not clear what the assignment of "likely" is based on. There needs to be an explanation provided here. If the evidence on which this is based is not explicitly probabilistic, consider using a confidence term (see new uncertainty guidance). (IPCC WGII TSU)	this "likely" is a normal "likely" which is not the "likely" with IPCC conception.
442	4	18	41	18	47	This is a loose definition of 'extremes' - it would be good to put the definitions at the beginning so we all know where we stand. (Palutikof, Jean, Griffith University)	The revision of the chapter has aimed to make usage of the term extreme event consistent with that report glossary.
443	4	18	42	18	47	Whole paragraph on "variations of extreme events" is material that needs to be assessed in Chapter 3 on Climate Change Extremes and physical impacts -- remove here and refer to the relevant section in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	We have worked to reduce overlap and ensure consistency with chapter 3.
444	4	18	47	0	0	"See comment for page 42, line 25." (Jentsch, Anke, University of Koblenz-Landau)	It is unclear what is meant here by the reviewer.
445	4	18	47	0	0	I suggest to add a new sentences "Extremely hot temperature (more than 34 degrees Celsius) and associated increase of thickness of epilimnion during the summer season in Lake Biwa, a temperate lake located in Japan, is projected by coupling MRI-GCM and Biwa-3D integrated assessment model, which may induce catastrophic impact on lake water quality during that period (Yamashiki et al. 2010)." The English reference to be added is "Yamashiki, Y., M. Kato, K. Takara, E. Nakakita, M. Kumagai, and J. Chunmeng, 2010: Sensitivity analysis on Lake Biwa under the A1B SRES climate change scenario using Biwa-3D Integrated Assessment Model: part I – projection of lake temperature. Hydrological Research Letters, 4, 45-49." (Nakakita, Eiichi, Kyoto University)	The referenced sentence has been deleted. Thus, this text has not been added
446	4	18	51	0	0	Which short-term and long-term implications for vegetations can have heat-waves? (Wibig, Joanna, University of Lodz)	noticed, check. Long term is century-scale in Beniston's paper. This has been clarified in the text.
447	4	18	53	0	0	Please specify the current rate and background rate. (Kazama, So, Tohoku University)	This text has been deleted.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
448	4	18	53	0	54	We think that anonymous sources should not be referred to. (Asphjell, Torggrim, Climate and Pollution Agency (Norway))	This text has been deleted.
449	4	18	53	18	54	reference to "Anonymous, 2001"??? Delete! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
450	4	19	0	0	0	In the left column of the Table 4-2, heavy rain - heavy rain. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	checked and corrected
451	4	19	1	19	1	Definition of 'direct mortality events'? As opposed to ...? (Palutikof, Jean, Griffith University)	"direct mortality event" here means bats died of the hurricane. Also not revised in the second-order draft, the statement was eventually deleted in the final draft of the chapter.
452	4	19	3	0	0	"See comment for page 35, line 46 and for page 18, line 19." (Jentsch, Anke, University of Koblenz-Landau)	"species death" could be a absolute number, while "mortality" could be a relative number.
453	4	19	10	19	11	reference to "Bull 1980, Janzen 1994 cited in Easterling 2000" -- need to assess and reference original material. (Stocker, Thomas, IPCC WGI TSU)	Bull states that "the influence of temperature" is one of the two factors that determine reptile sex (see: Bull et al., 1980, The Quarterly Review of Biology © 1980 The University of Chicago Press).
454	4	19	12	19	22	The 2009 ISDR Global Assessment Report concludes that increase in loss over the last decades is more to do with exposure than vulnerability increases. Mention of this study may be warranted here despite certain reservations as to its conclusion as regards exposure as opposed to vulnerability. What is clear and explicit in this section is that social aspects and processes are more important than physical explanations. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	deleted the para.
455	4	19	13	19	15	this sounds pretty trivial. I think that it should be elaborated a bit, pointing i.a. out that even if we will have an immediate decrease in GHG release, some species might still have troubles... (Wehrli, Andre, European Environment Agency)	deleted the para.
456	4	19	13	19	20	paragraph with subtitle "Potential Solutions" -- this para is policy prescriptive and needs to either reformulated or removed. Sentences like "the only option is to mitigate..." need to be avoided. (Stocker, Thomas, IPCC WGI TSU)	deleted the para.
457	4	19	14	0	0	Need to be careful when talking about species adaptation; in an evolutionary or physiological sense, species adaptation involves a physical change in the species itself, which may be unlikely for many species over short time periods. (Darch, Geoff, Atkins & University of East Anglia)	deleted the para.
458	4	19	14	19	15	This so-called 'solution' implies that all the various climate phenomena/impacts discussed in the preceding paragraphs are being influenced negatively by GHG - such a link has clearly not been established for many extremes, eg, El Nino events, hurricanes. The effects of cold extremes were also discussed, for which this 'solution' is hardly relevant. Solutions/responses are probably best left for chapters 5-8 to address, and are not needed here. (Stocker, Thomas, IPCC WGI TSU)	deleted the para.
459	4	19	14	19	15	This sentence potentially reads as a prescriptive statement that is not supported by underlying literature. If the point is that there are species for which "no adaptation is possible," perhaps it is best to state that, without the second half of the sentence. There could be possible solutions, such as species relocation, in addition to mitigation. Finally, literature citation(s) would improve the sentence. (IPCC WGI TSU)	deleted the para.
460	4	19	14	19	20	This is the first mention of what can really be done about impacts on ecosystems as opposed to human systems and it is a very short mention. As we are really interested in knowing what is happening or likely to happen and then what can be done about it adaptation wise, it seems that at a very early point this question and the available intervention options should be raised or laid out on the table. But not just with two short statements which perhaps bely the complexity of the options and needs. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	deleted the para.
461	4	19	14	19	20	By reducing other (non-climatic) stressors the resilience of a species may be increased which may increase its chance of autonomous adaptation (Chambers, Lynda, Australian Bureau of Meteorology)	deleted the para.
462	4	19	23	19	23	Section 4.2.4: "List of Hazards in Terms of Hazards..." -- this is very confusing, title needs to be adapted. (Stocker, Thomas, IPCC WGI TSU)	Agreed, and section title removed.
463	4	19	28	19	31	Table 4.2 Should be revised the column regarding region consideration. For example in the 8th and 9th row the definition are very narrow and must be included a widely a widely view on this, Landslide, not only affect small islands and cyclones not only should be considered an open oceans. (Garrido Vazquez, Raul J. , Min. Science, Technology and Environment)	This table has been deleted.
464	4	19	29	19	29	What are "modest" events? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Clarified
465	4	19	32	0	0	Section 4.2.5 "Detection and Attribution of Climate Change" -- while an important topic, this section needs to be coordinated with Chapter 3 (e.g., section 3.2.2.3) in order to not duplicate the general background information provided on D&A. Most of this is already covered in Chapter 3. In addition to the between Chapter Coordination, the text provided needs to be consistent with the IPCC Guidance Paper on D&A resulting from the IPCC WGI/WGII Expert Meeting on D&A. While this Guidance Note is referenced, the terminology and definitions provided in that Guidance Paper are not followed. Those WGI/WGII-refined definitions given in the Guidance Paper should be strictly followed throughout both Chapters 3 and 4 and terms like "direct" and "joint" attribution should be avoided. (Stocker, Thomas, IPCC WGI TSU)	This is one of the most common questions re disaster impacts and the focus here is not on detection but on the attribution of impacts. Modified to use 2010 language. Coordination with chapter 3 has been improved, also in the preparation of the final chapter draft.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
466	4	19	34	20	30	Two comments: 1) Ch3 has some discussion on detection and attribution, there is a need to coordinate. 2) Even if there is a need to have a separate discussion on d&a for impacts, the discussion should be based on the Guidelines (Hegerl et al. 2010), the final recommendation from the workshop (IPCC 2010). (Zhang, Xuebin, Environment Canada)	We have modified the paragraph to use the latest IPCC guidance and language.
467	4	19	39	19	41	May need to revise or expand this argument. If the magnitude of flood captured under the notion of the 100 year flood today is going to occur every 50 years and not 100 on average then it is not clear why, if flood defences were built to deal with the 100 year one, we would need to strengthen or heighten them given it is the same intensity or magnitude of flood but now more frequent. Another thing is if the doubling of recurrence of such a flood puts more pressure on the protection system which requires it being strengthened or more often maintained, or if the past 100 year flood is now replaced with a new 100 year flood of greater intensity, in the same area but protected by the former 100 year flood dyke. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (ELACSO))	This point has been considered by the author team.
468	4	19	42	19	44	Please show the references. (Kazama, So, Tohoku University)	The statement has been deleted.
469	4	19	42	19	44	Statement needs a reference. (IPCC WGII TSU)	The statement has been deleted.
470	4	20	4	20	4	Key references within Rosenzweig et al. 2008 should be listed here as well. (IPCC WGII TSU)	Some have been added.
471	4	20	6	20	10	this para covers science assessed in Chapter 3; should be removed. (Stocker, Thomas, IPCC WGI TSU)	Limited detail is needed to assist in understanding the attribution of impacts.
472	4	20	6	20	9	According to some authors hazard is not constant as far as hurricanes go and new cases have occurred in typically non traditional areas--the Brazilian hurricane for example. Then it will not only be changes in intensities and frequencies that lead to greater change but also continued changes in human variables and also the appearance of hurricanes in areas where they were not a problem before. This phrase is an example of giving credit to human variables in explaining past impacts and then insinuating that in the future with changed physical patterns, it will be the events themselves that explain loss. This is a veiled physicalist argument and should be mediated with a more thorough starting statement . (Lavell, Allan, Programme for the Social Study of Risk and Disaster (ELACSO))	This point has been considered. It is especially pertinent to the assessment in chapter 3, which considers such changes in intensities and frequencies. Our assessment builds from the starting point of their chapter.
473	4	20	7	20	8	This is probably the worst example to give, with heatwaves/temperature changes actually being one of the few phenomena that have been clearly detected and attributed 'likely' to anthropogenic influence. (Stocker, Thomas, IPCC WGI TSU)	Agreed - clarified and changed.
474	4	20	8	20	9	Improvement of wording is recommended: risk (= exceedance probability) of event is BASED on relative frequency of occurrences! (Faust, Eberhard, Munich Reinsurance Company)	Ok
475	4	20	22	20	22	The reference "Changnon, 2009" is not included in the reference list. Note that the other two studies by the same author/year that are included in the reference list, Changnon, 2009a (hail losses) and Changnon, 2009b (wind storm damages), do not assess flood losses/extreme precipitation and hence are not relevant for the statement of lines 21 and 22. (Feyen, Luc, Joint Research Centre, European Commission)	References have been checked and completed.
476	4	20	24	20	32	references should be added. (Wibig, Joanna, University of Lodz)	Reference to chapter 3 is now provided. In this section in the final draft of the chapter, further citations have also been provided.
477	4	20	24	20	32	This section of the chapter has a good discussion of what can be said about trends in disasters. As commented in the ES, the conclusions in these lines should employ the new terminology for communication of the degree of certainty in these findings. What does "most likely" mean, is this a probabilistic statement? What do "no conclusive evidence" and "subject to debate" mean in terms of your level of confidence in the statement as an author team? (IPCC WGII TSU)	Done
478	4	20	35	0	0	As noted in the general comments: We are very uncomfortable with all the sections entitled "Comment on 4°C Rise". Commenting on one specific climate policy target is incomplete and may send an incorrect message to the public and the policy makers. It is clearly not a comprehensive assessment of the various options that exist (e.g., 2°C, 1.5°C which are mentioned in the Copenhagen Accord are equally valid). Therefore, an IPCC assessment cannot single out one "scenario" and therefore limit the assessment to 4°C. In doing so, this Chapter is moving the IPCC very close to being policy prescriptive. Here the authors seem to have decided to simply pick and compare whatever timeslice the 4oC target is reached in a given study, independent of scenario etc. Such a comparison is not appropriate, because, e.g., the conclusion for impacts drawn from a scenario stabilizing at 4oC by 2100 will be fundamentally different from a scenario just passing 4oC on the path to even higher T changes in, e.g., 2100. The whole section thus is scientifically more than questionable. (Stocker, Thomas, IPCC WGI TSU)	Deleted
479	4	20	35	0	0	We propose that reference to average rise is included in the heading. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Deleted
480	4	20	35	0	0	4.2.6: This section goes beyond of the scope of this report, and into more general climate impacts, as it is currently presented. The focus on 4 degrees C also is presented as arbitrary--the fact that it is simply chosen as symbolic of a world without effective mitigation is currently buried, and is very likely to be challenged. The discussion of impacts here needs to more clearly focus on extremes only, and on what can be said at a range of levels of potential temperature increase, rather than just one. (IPCC WGII TSU)	deleted
481	4	20	35	0	0	4.2.6 this paragraph will likely be treated as too policy prescriptive (IPCC WGII TSU)	deleted

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
482	4	20	35	20	35	The 4°C Section is really strange. Impacts for different levels of warming have not been summarized and reported in the report until this Section. Then, this section discusses the special case of a 4°C warming. I would merge all 4°C section at the end of the chapter. (Hallegatte, Stephane, CIRED and Meteo-France)	deleted
483	4	20	35	21	42	A difficult exercise, because there are few studies, and the some existing mainly refer to mean warming, without clearly addressing the extremes. The text could point out more clearly this limitation, even if it is frustrating. For agriculture, a contribution could be added with the following paper: Battisti D.S., Naylor R.L. (2009) Science, 323, 240-244 (Seguin, Bernard, INRA)	deleted
484	4	20	37	0	0	A comment or two on the studies not in favour of the 4 degree rise would be welcome here. (Ammann, Walter J., Global Risk Forum GRF Davos)	deleted
485	4	20	38	20	39	If this chapter insists on commenting on the impacts of a 4degree temperature rise, the likelihood of this rise should at least be assessed based on peer-reviewed literature, and not a single conference paper. Better still, this likelihood should be established based on AR4. (Stocker, Thomas, IPCC WGI TSU)	deleted
486	4	20	51	21	21	Figure 4-3 to 4-5: These figures copies from other pubs (or other IPCC reports) may be able to form the basis for compelling figures, but they should not be used as is. (IPCC WGII TSU)	The figures have been removed.
487	4	21	1	0	0	The five reasons for concern should be listed. Preferably the latest IPCC report (2007) should be used as reference. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	This material has been deleted.
488	4	21	10	0	0	Article 2 of the UNFCCC (not UN FCCC) should be explained. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	This material has been deleted.
489	4	21	24	0	0	State that this is fluvial flooding (Darch, Geoff, Atkins & University of East Anglia)	This comment cannot be understood.
490	4	21	35	21	37	Physical projections such as this should be left for Chapter 3 to include and appropriately assess, and there is no need to repeat projections here. It has been noted that chapter 3 failed to include this important Rahmstorf (2009) paper in their assessment, so this should be remedied for the SOD. (Stocker, Thomas, IPCC WGI TSU)	we have deleted discussion of a 4 degree rise.
491	4	21	36	0	37	The projected sea level rise in IPCC-AR4 should be mentioned. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Chapter 3?
492	4	21	37	0	0	Cross-reference text on impacts which follows (Darch, Geoff, Atkins & University of East Anglia)	This material has been deleted.
493	4	21	45	0	0	I think of adding here a third word after " Exposure and Vulnerability". The word might be " Potentialities".The example: Our delta - in Egypt- if it is going to be partially covered by sea level rise, we could benefit of the extreme by making "Fisheries for fish or Solar ponds for electriciy". (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	This should be covered by folowing chapters on adaptation.
494	4	21	45	22	41	A valuable contribution, but only devoted the case of water, which does not fit with the title of the section. Also, some parts concern more the future than observed trends (Seguin, Bernard, INRA)	A good point. Considerations of scope were addressed extensively in the preparation of the chapter final draft.
495	4	21	45	39	8	This subchapter 4.3 gathers a significant amount of valuable information, but it suffers from a strong flavour of quick addition of individual contributions, which need to be homogenized and synthetized. Also, a large part is considering future projections, which are not relevant in this chapter? (Seguin, Bernard, INRA)	The whole Chapter has been edited. We have separated observed and projected trends.Additionally, this point was carefully addressed in the preparation of the chapter final draft.
496	4	21	47	0	0	4.3.1 choppy comments on a number of important topics. Even where the human role is not established, the disaster trends need a solid treatment (IPCC WGII TSU)	OK
497	4	21	49	21	51	Is there any reference to support that? (Wang, Xiaoming, Commonwealth Scientific and Industrial Research Organisation (CSIRO))	References have been added.
498	4	22	1	22	4	This discussion needs reference support. (Zhang, Xuebin, Environment Canada)	References have been added.
499	4	22	1	22	4	This paragraph would be strengthened through addition of relevant citations. (IPCC WGII TSU)	References have been added.
500	4	22	1	22	41	Aggravating of flood losses through other factors (e.g. decrease in storage capacity) is described, but no description is provided on flood-reducing effect of water management and water engineering (dams,...). Those constructions presumably contributed substantially to a reduction of flood risk in many catchments and can mask climate change effects in loss statistics!! (Faust, Eberhard, Munich Reinsurance Company)	Agreed. We indicate that we do not take this into account as our resources and time are limited. Later chapters on adaptation may deal with this issue.
501	4	22	6	22	9	Agricultural land loss due to urbanization is much more severe in Asia, so it should be mentioned in detail. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	This point is more relevant to the regional section, and thus has not been included here
502	4	22	11	22	17	suggest to delete the para and to refer to IPCC AR4 in order to focus and shorten the Chapter. The para does not contribute substantial to the SREX, it's very generally summarizing changes in water resources and not assessing new science (reference to 2002 study). (Stocker, Thomas, IPCC WGI TSU)	Although not revised in the second-order draft, this paragraph was very carefully considered accordingly in the final chapter draft.
503	4	22	19	22	20	The sentense seems to be incomplete. (Kazama, So, Tohoku University)	It has been edited.
504	4	22	19	22	25	suggest to delete the first part of the para and to refer to IPCC AR4 in order to focus and shorten the Chapter. The SREX relevant part starts with "Water use has risen....", this second part should stay (Stocker, Thomas, IPCC WGI TSU)	Although not revised in the second-order draft, this paragraph was very carefully considered accordingly in the final chapter draft.
505	4	22	22	22	22	Instead of the numbers for the population, their ratios can be given for some specific years for better understanding. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Absolute numbers are clearest to understand
506	4	22	23	23	29	I assume that the chapter has to be completed. It would be good to have exposure to at least cyclones, floods, droughts, extreme sea-level rise and then see the same discussed in terms of hazard and vulnerability. (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	We take examples where the literature is solid.
507	4	22	25	22	26	Please explain by the numbers. (Kazama, So, Tohoku University)	Not sure what is meant here.
508	4	22	31	0	32	develop more? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Merged with appropriate material

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
509	4	22	31	22	32	what's this statement about the "ageing and more sensitive societies" based on? Add reference or delete it. (Stocker, Thomas, IPCC WGI TSU)	A reference has been added.
510	4	22	31	22	32	This sentence stands completely alone here, delete as it is also redundant. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	A reference has been added.
511	4	22	34	22	41	delete paragraph, general concept covered in Chapter 1, 2, and 3; the para summarizes in very general terms the recurrence of floods and thus better fits into Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Although this paragraph was not deleted in the second-order draft, it was removed in the chapter final draft.
512	4	22	37	0	0	Change 'latter' to 'former' (Darch, Geoff, Atkins & University of East Anglia)	The chapter has been edited.
513	4	22	48	0	53	We think that this is editorial text only - and should be labelled as such. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Correct - it has been changed.
514	4	22	48	22	53	Section 4.3.2.1.: we are assuming that this "Description" will be deleted in the next drafts? (Stocker, Thomas, IPCC WGI TSU)	This part was entirely rewritten
515	4	23	2	0	0	Section 4.3.2.1.1.: will there be text added with an assessment of what is/will be given in the tables? (Stocker, Thomas, IPCC WGI TSU)	Yes
516	4	23	11	23	28	Table 4-3 to 4-6. Can't this be a figure? (IPCC WGII TSU)	Yes, these tables might be based on another publication. This will be discussed in LAM4
517	4	23	18	23	18	How can the "Yearly average human exposure to tropical cyclones in 2010" be published in Peduzzi 2009? Will there be an update released? (Stocker, Thomas, IPCC WGI TSU)	This is based on models, not on observation
518	4	23	24	0	0	Section 4.3.2.1.2.: will there be text added with an assessment of what is/will be given in the tables? (Stocker, Thomas, IPCC WGI TSU)	Yes, this part has been rewritten
519	4	23	26	0	0	Comment on geographical variation (Darch, Geoff, Atkins & University of East Anglia)	The demographic changes impact on exposure is provided by IPCC region. For the variation on flood event, this is covered by chapter 3.
520	4	23	32	0	0	As indicated, this section requires coordination with Chapter 3; we propose to move the the coastal impacts section from Chapter 3 (section 3.5.5) to Chapter 4 (Stocker, Thomas, IPCC WGI TSU)	After discussion, this has indeed be moved to Chapter 3
521	4	23	32	0	0	Section 4.3.3: why just coastal impacts in this section? (Darch, Geoff, Atkins & University of East Anglia)	This will be discussed in LAM4
522	4	23	32	0	0	Section 4.3.3. Should this section include Cloud forests? Some references: Pounds JA, Fogden MPL, Campbell JH 1999 Biological response to climate change on a tropical mountain. Nature 398, 611-615. FOSTER P 2001 The potential negative impacts of global climate change on tropical montane cloud forests. Earth-Science Reviews 55, 73-106. (Chambers, Lynda, Australian Bureau of Meteorology)	Inclusion of cloud forest will be discussed in LAM4
523	4	23	32	23	32	Section 4.3. is entitled "Observed Trends in Exposure and Vulnerability". Subsection 4.3.3, however, deals with "Observed and Projected Trends..." -- it is inconsistent to also assess projections here if this an observations section. Either change the titles or move the projections out of section 4.3. (Stocker, Thomas, IPCC WGI TSU)	In the chapter final draft, this has been restructured to clarify the distinction, and we have addressed the point.
524	4	23	32	29	33	A well-written and complete contribution, with the question about the belonging to chapter 3: I should say yes for a large part, but also in favour of keeping here in chapter 4 all the elements which clearly adress the impacts. There is an other drawback with the large mixing between past observations and future, which is not at its right place in this subchapter: it will be necessary to check that and clarify the location of the contributing eelments (Seguin, Bernard, INRA)	Agreed and we have clarified this section.
525	4	23	32	29	33	This section deals mainly with hazards related to coastal areas. Could be expanded to include areas at flooding and drought risk? (see my comment above) (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	Have added some text on flood risk. Additionally, in the chapter final draft, the scope of this section was considered carefully.
526	4	23	37	23	54	The whole passage reads like a review, where and what is the assessment? (Zhang, Xuebin, Environment Canada)	There is a need to discuss this with the contributing author. It is not included in the SOD but will be redraft for the final version
527	4	23	40	23	40	Better to write - "...extremes of POTENTIALLY increasing frequency and intensity.." (Stocker, Thomas, IPCC WGI TSU)	done
528	4	23	51	23	51	"But future work is urgently required". The IPCC assessment does not have a mandate to identify research gap. (Zhang, Xuebin, Environment Canada)	Corrected
529	4	24	0	0	0	4.3.3.1.1 almost nothing on extremes: cut by 75% (IPCC WGII TSU)	Now changed
530	4	24	6	0	0	I would encourage that this section remains in Chapter 4. The current treatment of 'coastal impacts' given in chapter 3 compliments nicely the more 'ecologically' focussed assessment given here by chapter 4. (Stocker, Thomas, IPCC WGI TSU)	OK
531	4	24	6	0	0	4.3.3.1.1 hard to imagine that natural systems would be shifted to 3 (IPCC WGII TSU)	Agreed
532	4	24	8	0	0	Beaches: can be condensed (IPCC WGII TSU)	It was not possible to condense this section if comment 533 was to be responded to - while also taking account of new (2010) literature.
533	4	24	8	24	40	Some of the erosion described in this section seems more of a gradual change, as opposed to an extreme event Perhaps adjust (shorten?) descriptions so that they are focused on extreme aspects of erosion or on implications relevant to extreme events. (IPCC WGII TSU)	Section has been rewritten to address this comment. Now more focused on extremes with 30 additional references.
534	4	24	17	0	21	The geographic description of the coastal areas appears too unspecific (which southeastern?, which part of the US coast apart from California?) (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Corrected

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
535	4	24	27	24	30	In opposite to what is written (that changes in other climatic extremes as heavy precipitation events may be even more important than sea level rise in determining future beach morphodynamics in table 4.7 we can found that there are no trends in impacts of extreme rainfall on beaches. (Wibig, Joanna, University of Lodz)	Added
536	4	24	29	24	29	replace reference to Copenhagen Accord by reference to original peer-reviewed references and with reference to Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	citation deleted.
537	4	24	40	24	40	Further evidence of the effects of sea level rise on eroding coasts is provided in Dickson, M.E., Walkden, M.J.A. and Hall, J.W. Systemic impacts of climatic change on an eroding coast over the 21st century, Climatic Change, 81(2) (2007): 141-166. (Hall, Jim, Newcastle University)	Corresponding text deleted.
538	4	25	5	0	0	Estuaries: don't use likely informally (IPCC WGII TSU)	Corrected
539	4	25	5	26	29	What is the relevance of this long section on the response of estuaries and lagoons, and then coastal wetlands to climate change? Much is about the response to mean climate, not to extremes. Needs a rewrite to emphasise extremes. (Palutikof, Jean, Griffith University)	Section has been rewritten.
540	4	25	13	25	13	"Increases in the intensity of tropical cyclones and other storms ... are likely to..." -- Check consistency with Chapter 3 and make sure to highlight results from formal uncertainty assessments by using italics (likely). (Stocker, Thomas, IPCC WGI TSU)	Now in italics. New refs highlighting the difficulties with making learned assessments.
541	4	26	1	0	5	The system collapse risk (decline of mangrove forests due to sea level rise, see chapter 8, would add another dimension of risk here, the loss of coastal protection. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	Ref to chapter 8 added.
542	4	26	7	0	0	The role of changing pH is not mentioned - the link to CC drivers would be illustrative. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	Changing pH is not mentioned. Ocean acidification will be extensively assessed in the 5th assessment report.
543	4	26	7	0	17	Coral bleaching might also be dealt with in this paragraph. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	More relevant information added.
544	4	26	7	26	17	Extreme SST also exert an adverse impact on coral reefs. It should be also mentioned here. (Wibig, Joanna, University of Lodz)	Effects of SST now mentioned with many additional refs.
545	4	26	32	0	0	Section 4.3.3.1.2. This section could incorporate or mention Case Study 9.9, "Vulnerable Coastal and Mega Cities." (IPCC WGII TSU)	OK
546	4	26	34	26	34	This and other uses of acronyms causes confusion at times as one is not sure what is being talked about. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	removed
547	4	26	45	26	53	A revised version of Nicholls et al. (2008) has been accepted in Climatic Change as Hanson, S., R. Nicholls, N. Ranger, S. Hallegatte, J. Corfee-Morlot, C. Herweijer, J. Chateau, 2010, A Global Ranking of Port Cities with High Exposure to Climate Extremes, Climatic Change. It may be preferable to cite the peer-reviewed version. (Hallegatte, Stephane, CIRED and Meteo-France)	New ref added
548	4	26	45	26	53	One of the most interesting result of Nicholls et al. (2008) (or Hanson et al., 2010), is that 1/3 of the increase in exposure in 2070 arises from climate change and artificial subsidence (human related environmental issues) and 2/3 from population change, economic growth and urbanization. Of course, environmental reasons are more important in developed countries (because population and urbanization are largely stable and growth is slow) and very minor in developing countries (where socio-economic changes are extremely rapid). (Hallegatte, Stephane, CIRED and Meteo-France)	comment taken into account and text rewritten.
549	4	26	54	0	0	Even if mega refers to million, we think that in general language the term megacity is most commonly only used for even bigger cities. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Corrected
550	4	27	2	27	2	Analysis of the effect of extreme sea level rise (associated with ice sheet collapse) in London is presented by: Dawson, R.J., Hall, J.W., Bates, P.D. and Nicholls, R.J. Quantified analysis of the probability of flooding in the Thames Estuary under imaginable worst case sea-level rise scenarios, International Journal of Water Resources Development, 21(4) (2005) 577-591. (Hall, Jim, Newcastle University)	the citation was considered but not added.
551	4	27	2	27	5	Table 4.8 should provide the reliability. (Zhao, Zong-Ci, National Climate Center)	These data came from the underlying sources, and thus information can only reflect data in the sources. Additionally, it is not clear what the reviewer means by "reliability."
552	4	27	3	27	14	Please rephrase this paragraph, the grammar is wrong. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Although not extensively revised for the 2nd order draft, grammar throughout the chapter has been carefully considered for the final draft.
553	4	27	4	0	0	Table 4-8 - Can't this be a figure? (IPCC WGII TSU)	Although not developed into a figure for the 2nd order draft, this table became a figure in the final draft of the chapter.
554	4	27	5	27	6	Table 4.8 Should be presented in the line 4 on the table referring Latinamerica the especification of the Caribbean Countries and should be taken into account that SIS include few regions must be avoided the double accounting (Garrido Vazquez, Raul J. , Min. Science, Technology and Environment)	These data came from the underlying sources, and thus information can only reflect data in the sources.
555	4	27	5	27	6	Table 4.8 Should be cheked the reference to SIS states on the table but on the text is used SIDS regrading the multilateral organisation. (Garrido Vazquez, Raul J. , Min. Science, Technology and Environment)	corrected
556	4	27	17	27	18	"One of the most detailed studies..... According to the study..." -- which study is referred to? Provide unambiguous reference. (Stocker, Thomas, IPCC WGI TSU)	ref added

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
557	4	27	21	27	21	"Experts at a recent UNCTAD Expert Meeting" -- soon this meeting will no longer be "recent"; provide year or try to rewrite without directly reporting from one specific meeting. (Stocker, Thomas, IPCC WGI TSU)	corrected
558	4	27	39	27	39	"Section 1" -- provide correct section number (4.1)? (Stocker, Thomas, IPCC WGI TSU)	deleted
559	4	28	0	29	0	P28-29 floods: condense historical summary (IPCC WGII TSU)	This case study has been deleted.
560	4	28	1	0	0	Section 4.3.3.2. Case Study -- a large part of the material covered in this case study is about the changes in climate extremes and physical impacts on natural systems. However, the focus of this chapter should be on impacts on human systems and ecosystems. We suggest to substantially shorten the Section by referring as much as possible to Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This case study has been deleted.
561	4	28	1	0	0	Section 4.3.3.2. It would be good to link, to the extent possible, discussion of drought measurements to the text and findings of Chapter 3, Section 3.5.1. (IPCC WGII TSU)	This case study has been deleted.
562	4	28	1	0	0	4.3.3.2 Move W Med case study to chapter 9? This case study does not add much to the chapter. It can be dropped. (IPCC WGII TSU)	Removed this case study
563	4	28	1	28	54	4.3.3.2. Case Study – Long-Term Records of Flooding in Western Mediterranean [move to Chapter 3?]. This question by the authors stresses the potential confusion between the chapters 3 and 4 that I outlined in my previous comment (SERGI, SABATER, University Girona)	Removed this case study
564	4	28	1	29	33	This case study has a problem similar to other case study. There is no clear focus nor a clear message. It's more like text book. (Zhang, Xuebin, Environment Canada)	Removed this case study
565	4	28	1	29	33	We miss some conclusive statements in this chapter. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	Removed this case study
566	4	28	4	28	4	Why "cope with" and not "deal with" or "adjust to". Given the discussion as to when and why to use the notion of coping, its use here in a rather imprecise and undefined context may not be convenient or really accurate--given there are so many definitions and so much varying scope given to the term in all this SREX FOD one of these will most surely coincide with this usage but then enter into contradiction with other usages. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Removed this case study
567	4	28	4	28	4	Risk is being defined as the probability of future loss due to mixture of hazard, exposure and vulnerability, so to talk of "natural risk" introduces a dissonant element as does the term natural disaster. There really is no such thing as natural risk but rather there are natural factors that contribute to disaster risk. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Removed this case study
568	4	28	4	28	6	floods are hazards not risks. For a risk, you need vulnerability, exposure and a hazard. (Wehrli, Andre, European Environment Agency)	Removed this case study
569	4	28	7	28	8	I wonder whether these trends in flood and drought damages could not have been (partly) caused by external factors, such as increased attention of the media for flood and drought disasters, or the factor explained in Chapter 3, page 18, lines 51-52 (increased population density in floodplains, remote areas, ...) (Willems, Patrick, Katholieke Universiteit Leuven)	This case study has been deleted.
570	4	28	8	28	10	This statement ("being interpreted as a result of climate change") needs a reference. Such statements should always be supported by peer-reviewed literature. (Feyen, Luc, Joint Research Centre, European Commission)	Removed this case study
571	4	28	8	28	14	Please check grammar and spelling. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Removed this case study
572	4	28	10	0	0	"...being interpreted as a result of climate change." - References! (Faust, Eberhard, Munich Reinsurance Company)	Removed this case study
573	4	28	10	28	10	A reference is needed to support the statement 'being interpreted as a result of climate change'. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
574	4	28	10	28	12	This is not a completely finished sentence. Something is missing at the end. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Removed this case study
575	4	28	16	18	29	Section 4.3.3.2. Case Study -- this para could be substantially shortened, it deals with changes in climate extremes and physical impacts on natural systems assessed in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
576	4	28	41	28	53	Section 4.3.3.2. Case Study -- this para could be substantially shortened, it deals with changes in climate extremes and physical impacts on natural systems assessed in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
577	4	29	7	29	22	Section 4.3.3.2. Case Study -- this para could be substantially shortened, it deals with changes in climate extremes and physical impacts on natural systems assessed in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
578	4	29	28	29	33	Section 4.3.3.2. Case Study -- the case study is about floods; this paragraph on drought seems out of place here and should be deleted. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
579	4	29	39	0	0	As vulnerability trends are dealt with in chapter 2 as well as exposure, it is clearly necessary to ask why do this in two chapters and what differs one from the other? A thorough revision is necessary here to avoid unnecessary duplication. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	We have discussed this issue with chapter 2, and reduced overlap accordingly.
580	4	29	39	0	0	Section 4.3.4.1. Please provide citations in this section for statements that stem from underlying literature. (IPCC WGII TSU)	Material deleted.
581	4	29	39	0	0	4.3.4.1 This is introductory material for ch 1 or 2 (IPCC WGII TSU)	Material deleted.
582	4	29	39	30	15	At this stage, this paragraph seems to repeat some general statements already presented, and without any reference. Maybe that it could give something new with more detailed input (Seguin, Bernard, INRA)	The chapter has been edited to remove repetition.
583	4	29	41	29	41	"Section 3.3 shows that human exposure to climatic hazards is increasing" -- is this referring to the correct section? Section 3.3. is on "Observed and Projected Changes of Weather and Climate"... (Stocker, Thomas, IPCC WGI TSU)	We have reorganised material dealing with the future.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
584	4	29	45	0	0	Important point and one that has to be resolved. We should never accept outright the statement that increased risk can unilaterally be explained by increased exposure given that exposure is not risk. But in parts this conclusion is not adhered to and exposure is in fact equated with risk. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Exposure is part of the risk equation. It is difficult to see how there can be risk without exposure to the agent such as wind, water, fire, high temperature.
585	4	29	50	0	0	War: barely a mention of extremes (IPCC WGII TSU)	This section has been edited.
586	4	29	52	0	0	Urban poor: nothing on extremes (IPCC WGII TSU)	This section has been edited.
587	4	30	1	30	1	I would add "Education and health services" (Hallegatte, Stephane, CIRED and Meteo-France)	The section was greatly reduced and the detail has been deleted. Not added
588	4	30	1	30	15	Are those expert assessment or just speculations? There need literature support. (Zhang, Xuebin, Environment Canada)	We have edited and added references.
589	4	30	3	30	7	From impacts detected in normalised data (e.g. normalised loss data) no one can infer vulnerability trends. This is one of the important criticisms against R. Pielke's normalisation approach, because he uses constant vulnerability over time. So already normalisation suffers from unknown vulnerability trends. (Faust, Eberhard, Munich Reinsurance Company)	Agreed and have added a comment.
590	4	30	9	30	10	This type of suggestion that physical factors and also their interaction increase vulnerability is very controversial and repeated elsewhere in this and other chapters. Vulnerability is socially constructed in relationship to physical hazards when it comes to using the term in social system or human system contexts. What the hazards do is reveal or highlight vulnerability but they never cause it as such, although they can contribute to its existence indirectly--a flood that wipes out livelihoods obviously will affect future vulnerability but the option of wiping out livelihoods was originally a function of then existing exposure and vulnerability. This is a problem of causal attribution and what affects what as opposed to causing it. Expanded hazard patterns, new exposed areas means that social conditions existing in those areas, the product of existing social processes, are now revealed where once they were hidden or not relevant due to lack of exposure-this is not the same as saying that climate change "causes" vulnerability. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	This is an important part of the debate on vulnerability and should be covered in Chapter 2. The material in our chapter has been deleted.
591	4	30	18	0	0	Section 4.3.4.2 -- several of the subsections are not much more than direct quotes from presumably non peer-reviewed (UN?) reports, e.g., Prevention 2009. (1) Prevention, 2009 is not in the Chapter Bibliography, (2) authors should assess all available literature not just list statements from earlier (peer-reviewed?) reports, (3) providing multiple lines of evidence will strengthen the assessment. (Stocker, Thomas, IPCC WGI TSU)	Although these points were not thoroughly addressed in the second-order draft, they were carefully considered in the preparation of the final chapter draft.
592	4	30	18	0	0	4.3.4.2 Not relevant enough to extremes to include in present form (IPCC WGII TSU)	This is a good point. The preparation of the chapter final draft included careful consideration of the chapter scope along these lines.
593	4	30	20	0	0	How meaningful is this statement, when the review is focused on vulnerability to local-regional scale hazards (rather than global hazards such as large-scale volcanoes or meteorites)? (Darch, Geoff, Atkins & University of East Anglia)	fair comment - but that is the assessment for climate related hazards rather than the geo-physical hazards mentioned here.
594	4	30	20	30	21	What is "overall" vulnerability and how do we know it is fairly stable? This type of more general statement should be avoided. More so because vulnerability is always specific to location, social group, hazard or what ever such that general statements and conclusions are not really of very much practical or analytical use. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	the sentence has been deleted.
595	4	30	20	30	21	As in ES, it is not completely clear what "appears to be fairly stable" means. Determine what can be said more precisely and with what level of confidence. Also, not everyone may understand which direction a negative trend implies here. (IPCC WGII TSU)	Agreed and changed.
596	4	30	21	0	0	Change 'trends are negative' to 'vulnerability is decreasing' (Darch, Geoff, Atkins & University of East Anglia)	The chapter has been edited.
597	4	30	23	30	31	Nutritional shortfalls and lack of physical or/and mental incapacity are also common outcomes among warfare refugees, those are displaced for years (e.g. Sri Lanka). These people are therefore likely impacted easily and badly by extreme climate events. If it is appropriate, please do consider to include. (Kazama, So, Tohoku University)	Agreed that this is an important group and we feel that it is covered.
598	4	30	33	31	21	Besides the point that the reference should probably be to UNISDR, 2009, this section is very incipient and lacking in detail and content. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Edited and improved
599	4	30	34	30	34	Should this not be UNISDR, 2009 and not PREVENTION? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Indeed: UNISDR GAR 2009 is the reference here.
600	4	31	16	31	21	More should be written about the ecosystems analysed. Which of them were in decline and why? May be some examples could be described more detaily. (Wibig, Joanna, University of Lodz)	Further inputs will be discussed in LAM4, the issue being that the chapter is already too long, so any further development need to be further discussed.
601	4	31	17	0	0	Which ecosystem services does this refer to? (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	It refers to ecosystems globally consistent with the MEA.
602	4	31	21	0	0	"Surprisingly, experimental evidence from central European grassland suggests that annually recurrent 100-year and 1000-year extreme drought events might have no effect on primary productivity there, whereas other services such as gas exchange, nutrient cycling and water regulation are clearly stimulated (Kreyling et al. 2008, Jentsch et al. submitted). References: Kreyling C, Wenigmann M, Beierkuhnlein C, Jentsch A (2008): Effects of extreme weather events on plant productivity and tissue die-back are modified by community composition. Ecosystems 11: 752-763; Jentsch A, Elmer M, Gellesch E, Glaser B, Grant K, Hein R, Kreyling J, Mirzae H, Nadler S, Nagy L, Otieno D, Pritsch K, Rascher U, Schädler M, Schloter M, Singh B, Lara M, Walter J, Wellstein C, Wöllecke J, Beierkuhnlein C (submitted 16/08/2010 – invited for special issue): Climate extremes initiate plant physiological processes which serve to regulate overall ecosystem productivity. Journal of Ecology." (Jentsch, Anke, University of Koblenz-Landau)	This example has been incorporated in the section.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
603	4	31	24	0	0	4.3.4.3 water sector good (IPCC WGII TSU)	Good.
604	4	31	28	31	46	Please provide citations for these paragraphs to make clear which statements stem from underlying literature. (IPCC WGII TSU)	These are generic statements, which don't need specific references
605	4	31	31	0	0	Best to explicitly state sanitation or waste water treatment in this point or in the list (Darch, Geoff, Atkins & University of East Anglia)	This material was eventually dropped from the chapter, in the preparation of the final draft.
606	4	31	37	0	38	We think that discharge of pollution is more a stress than a demand, and propose that "demands" is substituted by "stress". (Asphiell, Torgrim, Climate and Pollution Agency (Norway))	OK
607	4	31	37	31	42	"Water sector" refers to the water technology and distribution industry. Unappropriate use here. Change to "Water provision and management" (SERGI, SABATER, University Girona)	We disagree with this point.
608	4	31	39	0	0	Propose to include the following ref: Mukherji, A., K.G. Villholth, B.R. Sharma and J. Wang (Eds.), 2009. Groundwater Governance in the Indo-Gangetic and Yellow River Basins: Realities and Challenges. Series: IAH – Selected Papers on Hydrogeology, Volume 15. CRC Press, Taylor & Francis Group. 325 pp. ISBN 978-0-415-46580-9. (Villholth, Karen G., GEUS, Geological Survey of Denmark and Greenland)	Not relevant
609	4	31	46	0	0	Explain 'security'. In water resources this means security of supply. In flood management 'standard of protection' is more appropriate. (Darch, Geoff, Atkins & University of East Anglia)	This point was considered, but not addressed until the preparation of the chapter final draft.
610	4	32	0	0	0	Impact of drought on agriculture and other primary industries is missing. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Discussed in food security section
611	4	32	5	32	45	In general this page and its content are very sketchy and imprecise. Needs more flow and verve. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The chapter revision has aimed to improve clarity of language.
612	4	32	6	32	7	The statement and Table 4-9 should acknowledge the deficiencies and bias of global databases of natural disasters (see e.g., Gall et al., 2009). The increase in the number of weather disasters in EM-DAT in recent decades is due (amongst other factors) to improvements in data collection. The same can be said for economic losses. This is defined as "temporal bias" by Gall et al. (2009). The statement and the table are misleading without acknowledging the drawbacks and bias of the underlying data. Reference: Gall, M., Borden, K. A., Cutter, S. L., 2009. When Do Losses Count? Bulletin of the American Meteorological Society, 90(6), 799-809. (Feyen, Luc, Joint Research Centre, European Commission)	Discussion on data bases now comes earlier in chapter
613	4	32	10	32	10	Change to 300000 in 1970 to 5000 people in 2007- 5000 casualties is already a massive toll. (SERGI, SABATER, University Girona)	So? It shows a massive improvement nevertheless.
614	4	32	21	0	0	Longterm droughts eventually force the affected people to depend more on groundwater, which can negatively affect for human health in countries like Bangladesh, where groundwater is largely contaminated by Arsenic. If it is appropriate, please do consider to include. (Kazama, So, Tohoku University)	Not relevant - too detailed
615	4	32	21	32	21	"For thinking about ..." -- this sentence is unclear, suggest to rephrase. (Stocker, Thomas, IPCC WGI TSU)	This point was considered, but not addressed until the preparation of the chapter final draft.
616	4	32	30	0	0	change in economy and infrastructures (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	OK
617	4	32	30	32	45	Economy & health: material not relevant to volume (IPCC WGII TSU)	Has been edited. These things are closely related to impacts.
618	4	32	31	32	37	This paragraph would benefit from citations. (IPCC WGII TSU)	OK
619	4	32	39	0	0	Human health . It is true that human health data on impact outcomes of specific events are poor in developing countries. Nevertheless the impacts due to climate change are for the largest part an exacerbation of existing well defined impacts. Lack of specific data do not hamper the possibility for action or implementation of specific adaptation programmes, which is our main concern. The same sentence is also repeated in page 48, lines 23-25 in another context (Bertolini, Roberto, World Health Organization)	The message on research gap was put at the last part of the new section and emphasis has been reduced.
620	4	32	40	32	40	But IPCC assessment is not about the identification of research gaps. (Zhang, Xuebin, Environment Canada)	The message on research gap was put at the last part of the new section and emphasis has been reduced.
621	4	32	40	32	45	This paragraph would benefit from citations. (IPCC WGII TSU)	The citations were added.
622	4	32	48	0	0	Section 4.3.4.4. Case Study -- this Case Study is very well written. Great! (Stocker, Thomas, IPCC WGI TSU)	Good
623	4	32	48	0	0	Section 4.3.4.4. This section overlaps with Chapter 9, Case Study 9.2, "Urban Heat Waves, Vulnerability and Resilience." Redundant factual information should be reduced or eliminated, and Case Study 9.2 could be referenced or discussed here. (IPCC WGII TSU)	This case study has been substantially revised to reduce overlap.
624	4	32	48	0	0	2003 heat wave: much of the material is already in the Europe chapter of the AR4 (IPCC WGII TSU)	The section has been edited.
625	4	32	48	33	53	again, what is the lesson? (Zhang, Xuebin, Environment Canada)	The case study has been substantially revised to provide an informative example.
626	4	32	48	39	13	It is very difficult to comment these pages as they are so unbalanced in detail and structure, going from detailed or very detailed cases, where the question is why are we going into so much detail and what does it add to understanding policy and decision making needs, and then vague phrases, or rather half hearted arguments etc. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The whole chapter has been edited
627	4	33	10	33	10	Refer also to chapter 3 here (section 3.3.1). (Stocker, Thomas, IPCC WGI TSU)	Although this point was not incorporated in the 2nd order draft, consistency with and reference to chapter 3 was insured throughout the chapter in the chapter final draft.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
628	4	33	34	33	35	"... the fact that MANY of the dead were elderly people, left alone while their families were on vacation." This statement may be true for France, but it depends strongly on the health care system. Klenk et al. (2010) analysed heat related mortality in nursing homes in South-Western Germany. They estimated an excess mortality of about 870 in August 2003. For the whole region of SW Germany (Federal State of Baden-Württemberg) an excess in mortality of around 1400 was estimated. These 1400 included the nursing homes, as well as hospitals and people living in private homes and refers to all age groups. So, the percentage of elderly dying during the heat wave and left alone was less than 50%. Reference: Klenk J, Becker C, Rapp K (2010): Heat related mortality in residents of nursing homes. Age and Aging, 39:255-252. DOI: 10.1093/aging/afp248. (Koppe, Christina, Deutscher Wetterdienst)	This is very complex topic with analyses varying greatly by country and institution. The text has been revised accordingly.
629	4	33	40	33	42	see also no.15: there is evidence that the death toll is much higher, see e.g. Robine, J.M., Cheung, S.L., Le Roy, S. et al., 2007. Report on excess mortality in Europe during summer 2003. EU Community Action Programme for Public Health, Grant Agreement 2005114. 2003 Heat wave project. Available under http://ec.europa.eu/health/ph_projects/2005/action1/docs/action1_2005_a2_15_en.pdf . Robine, J.M., Cheung, S.L.K., Le Roy, S., et al. (2008). Death toll exceeded 70,000 in Europe during the summer of 2003. Comptes Rendus Biologies, 331: 171-178. (Wehrli, Andre, European Environment Agency)	A citation is provided for the number given.
630	4	33	49	0	53	... and also because vulnerable people already died in the first event (in 2003)? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Authors are not aware of any reference to support this hypothesis
631	4	33	49	33	53	Why 6452 excess death predicted from observed temperatures is substantially less than 2065 observed? (Wibig, Joanna, University of Lodz)	This is explained in lines 52-53. Adaptation made a difference.
632	4	33	51	0	0	Don't you mean "more than" rather than "less than" (Wright, Richard, American Society of Civil Engineers)	Edited
633	4	33	51	33	51	Should this be "substantially more"? (Stocker, Thomas, IPCC WGI TSU)	Yes
634	4	34	0	0	0	Figure 4-9: Anomalies in northern hemisphere snow cover since 1965 are inappropriate to demonstrate glacier retreat in the Himalaya and the Andes. To be removed or replaced. (Kaser, Georg, University of Innsbruck)	Removed this case study
635	4	34	1	35	27	discussion about changes in glacial etc. should be combined with materials in Ch3. (Zhang, Xuebin, Environment Canada)	Removed this case study
636	4	34	2	0	0	There is indeed considerable overlap here with the material given in section 3.5.6 of Chapter 3 which we think is the more logical location for this subject (mostly dealing with physical impacts) to be covered, and they used the expertise of a relevant contributing author. We suggest to substantially shorten this case-study, or possibly remove completely, by referring as much as possible to the relevant section of Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
637	4	34	2	0	0	Title of 4.3.4.5 is odd; the Himalaya and Andes are not the only mountain ranges considered in this case study. (Cogley, J. Graham, Trent University)	Removed this case study
638	4	34	2	0	0	Section 4.3.4.5. Discussion of glacier retreat and glacier outburst floods should be compared against Section 3.5.6, with redundancies removed. (IPCC WGII TSU)	Removed this case study
639	4	34	2	0	0	4.3.4.5 glaciers – discuss with ch 3 (IPCC WGII TSU)	Removed this case study
640	4	34	2	0	0	Glacier section generally good (IPCC WGII TSU)	Removed this case study
641	4	34	2	35	29	Iceland is missing from the discussion. (Faust, Eberhard, Munich Reinsurance Company)	Removed this case study
642	4	34	4	0	0	Change "one of" to "among". (Cogley, J. Graham, Trent University)	Removed this case study
643	4	34	4	0	0	Section 4.3.4.5.: This section is well written, and provides a balanced overview. I have one general comment on the examples of numbers for glacier retreat rates provided (see below) (Huss, Matthias, University of Fribourg)	Removed this case study
644	4	34	4	34	12	Explaining glacier climate relations is not appropriate for this chapter. Besides, the content is not based on modern and physical process based studies. The repeatedly used reference WGMS (2008) is not cited in the reference list but given that WGMS is a data collecting service I cannot imagine that WGMS (2008) is a peer reviewed scientific research study. This part should be removed as a whole. (Kaser, Georg, University of Innsbruck)	Removed this case study
645	4	34	5	0	0	Delete "and public perception of temperature change in mountain regions", which is not relevant here. (Cogley, J. Graham, Trent University)	Removed this case study
646	4	34	5	0	0	Delete "IPCC in". (Cogley, J. Graham, Trent University)	Removed this case study
647	4	34	6	34	12	Glacier terminus retreat is an indirect and strongly filtered signal of climate change. The numbers provided here (retreat between 10m/a to 74 m/a) are not very informative because they strongly depend on the glacier geometry (e.g. debris-covered glacier tongue, steep and shallow tongue, small/large glacier). Glacier surface mass balance is a much more direct indicator of the effect on climatic variations on glacier health and water storage change (hydrological impact). However, changes in the glacier mass budget are barely discussed in the report. Therefore I suggest to also include some numbers on the changes in mass balance that are available for almost all regions of the world over many decades. (Huss, Matthias, University of Fribourg)	Removed this case study
648	4	34	6	34	8	According to Figure 4.9 the ice loss begins in mid 1970s not 1980s. (Wibig, Joanna, University of Lodz)	Removed this case study
649	4	34	8	0	0	Delete "; see Figure 4.9", and delete the figure. It has nothing to do with loss of glacier ice. (Cogley, J. Graham, Trent University)	Removed this case study
650	4	34	8	34	8	WGMS (2008) is missing in the reference list. (Kaser, Georg, University of Innsbruck)	Removed this case study
651	4	34	8	34	8	the here referenced Figure 4-9 is entirely inappropriate by showing anomalies in Northern Hemisphere snow cover. (Kaser, Georg, University of Innsbruck)	Removed this case study

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
652	4	34	9	0	0	I suggest deleting "due to a lag time in response of the latter". Response time is an awkward variable to handle accurately, and in this case it is not the only reason for faster retreat of smaller glaciers. (Cogley, J. Graham, Trent University)	Removed this case study
653	4	34	10	0	0	"shrink faster": the entire text of section 4.3.4.5 needs to be revised so that it distinguishes more carefully between retreat (reduction of length), shrinkage (reduction of area) and mass loss (that is, negative mass balance). (Cogley, J. Graham, Trent University)	Removed this case study
654	4	34	10	34	12	Given the recent controversy surrounding the IPCC and glacier retreat in the Himalaya's, it is very surprising to see retreat rates reported here from non-peer reviewed grey literature. Direct glacial observations from this region are severely lacking, so the usefulness and validity of reporting 'average rates of retreat' is questionable. At the least, a qualifying sentence needs to be added, saying that these values are estimates only that should be treated very cautiously, and that comprehensive observations from the Himalaya region are lacking. We raised this same comment in the ZOD review but are alarmed to see no action was taken! (Stocker, Thomas. IPCC WGI TSU)	Removed this case study
655	4	34	10	34	12	This sentence is inaccurate in more than one way. It should cite Bajracharya et al. 2007, not "Bajracharya 2007". Chapter 2 of Bajracharya et al. contains several tables of glacier retreat rates, but I cannot combine them in any reasonable way that yields an average rate of 10 m/yr. The data for Imja Glacier (Bajracharya et al. Table 2.5, clarified from the accompanying text) imply a retreat rate of 109 m/yr for 1962-1976, so the 74 m/yr (not "74 m") quoted for 2001-2006 is not exceptional. Either explain how the Himalayan average rate was obtained, or summarize just one of the Bajracharya et al. tables (mentioning which region the numbers come from). (Cogley, J. Graham, Trent University)	Removed this case study
656	4	34	10	34	12	Terminus of Imja Glacier is contacting Imja Glacial Lake so that it is NOT appropriate as an example of glacier retreat. In addition, measurement of the lake length by Bajracharya et al. (2007) is too arbitrary to be acceptable. See Fujita et al. (2009 in Environmental Research Letters) For terminus retreat in wide regions, Karma et al (2003) is helpful. (Fujita, Koji, Nagoya University)	Removed this case study
657	4	34	10	34	12	Mass balance or volumetric changes in Himalayan glaciers were reported by Fujita et al. (1997, 1998, 2001a, 2001b), Berthier et al. (200x) and Wagnon et al. (2005). These are better than glacier terminus retreat. (Fujita, Koji, Nagoya University)	Removed this case study
658	4	34	10	34	12	Fujita K, Sakai A, Nuimura T, Yamaguchi S, Sharma RR (2009) Recent changes in Imja Glacial Lake and its damming moraine in the Nepal Himalaya revealed by in-situ surveys and multi-temporal ASTER imagery. Environmental Research Letters, 4, 045205. doi:10.1088/1748-9326/4/4/045205. (Fujita, Koji, Nagoya University)	Removed this case study
659	4	34	10	34	12	Fujita K, Nakawo M, Fujii Y, Paudyal P (1997) Changes in glaciers in Hidden Valley, Mukut Himal, Nepal Himalayas, from 1974 to 1994. Journal of Glaciology, 43(145), 583-588. (Fujita, Koji, Nagoya University)	Removed this case study
660	4	34	10	34	12	Fujita K, Takeuchi N, Seko K (1998) Glaciological observations of Yala Glacier in Langtang Valley, Nepal Himalayas, 1994 and 1996. Bulletin of Glacier Research, 16, 75-81. (Fujita, Koji, Nagoya University)	Removed this case study
661	4	34	10	34	12	Fujita K, Kadota T, Rana B, Kayastha RB, Ageta Y (2001a) Shrinkage of Glacier AX010 in Shorong region, Nepal Himalayas in the 1990s. Bulletin of Glaciological Research, 18, 51-54. (Fujita, Koji, Nagoya University)	Removed this case study
662	4	34	10	34	12	Fujita K, Nakazawa F, Rana B (2001) Glaciological observations on Rikha Samba Glacier in Hidden Valley, Nepal Himalayas, 1998 and 1999. Bulletin of Glaciological Research, 18, 31-35. (Fujita, Koji, Nagoya University)	Removed this case study
663	4	34	10	34	12	Karma, Ageta Y, Naito N, Iwata S, Yabuki H (2003) Glacier distribution in the Himalayas and glacier shrinkage from 1963 to 1993 in the Bhutan Himalayas. Bulletin of Glaciological Research, 20, 29-40. (Fujita, Koji, Nagoya University)	Removed this case study
664	4	34	10	34	12	Wagnon P, Linda A, Arnaud Y, Kumar R, Sharma P, Vincent C, Pottakkal JG, Berthier E, Ramanathan A, Hanain SI, Chevallier P (2007) Four years of mass balance on Chhota Shigri Glacier, Himachal Pradesh, India, a new benchmark glacier in the western Himalaya. Journal of Glaciology, 53, 603-611. (Fujita, Koji, Nagoya University)	Removed this case study
665	4	34	10	34	12	Berthier E, Arnaud Y, Kumar R, Ahmad S, Wagnon P, Chevallier P (2007) Remote sensing estimates of glacier mass balances in the Himachal Pradesh (Western Himalaya, India). Remote Sensing of Environment 108, 327-338. (Fujita, Koji, Nagoya University)	Removed this case study
666	4	34	10	34	12	Bajracharya (2007) is a non peer reviewed report that needs comprehensive verification. Using some arbitrarily chosen numbers out of a data collection report can be entirely misleading. (Kaser, Georg, University of Innsbruck)	Removed this case study
667	4	34	15	0	0	A recent study showed that expansion of a Himalayan glacial lake is rather inconsistent with warming. See Sakai et al. (2009 in Journal of Glaciology) (Fujita, Koji, Nagoya University)	Removed this case study
668	4	34	15	0	0	Sakai A, Nishimura K, Kadota T, Takeuchi N (2009) Onset of calving at supraglacial lakes on debris covered glaciers of the Nepal Himalayas. Journal of Glaciology, 55(193), 909-917. (Fujita, Koji, Nagoya University)	Removed this case study
669	4	34	15	34	15	There is no need for 'accelerated' glacier melting for glacier lake to increase but just net mass/volume loss at a glacier's tongue. Besides, there is no scientific evidence of an accelerated glacier retreat in the Himalaya (see AR4, WG1 Ch 4.5) (Kaser, Georg, University of Innsbruck)	Removed this case study
670	4	34	17	0	0	Replace "or by" with ", enlargement of", and end with ", or a combination of these". (Cogley, J. Graham, Trent University)	Removed this case study
671	4	34	20	34	21	Delete the irrelevant Figure 4-9. (Cogley, J. Graham, Trent University)	Removed this case study

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
672	4	34	21	0	0	Figure 4-9 -- the Case Study is about Glacier Retreat, the figure shows Snow cover changes!! This figure is not relevant in this context, ie, a reduction in snow cover might be offset by cooler summer temperatures and less melting such that a glacier remains in positive mass balance. The use of this figure here raises many doubts about the level of expertise available for writing this case study. Why not include a figure from the WGMS 2008 report that actually deals with glacier mass balance and retreat? (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
673	4	34	23	34	24	The primary reason GLOFs are so threatening has been missed here. They are so threatening because they almost always transform rapidly into a hyperconcentrated sediment flow or debris flow. This is due to the large amount of unconsolidated moraine and other periglacial sediment located within the glacial lake dam and outlet area. This special characteristic and point of difference with other types of flood must be noted here. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
674	4	34	23	34	24	Delete "suddenly" and also ", and therefore floods are unexpected for riverine communities.". Change "usual rain or snowmelt floods" to "ordinary rain, snowmelt or glacial meltwater floods". (Cogley, J. Graham, Trent University)	Removed this case study
675	4	34	23	34	24	Such a statement can only be made on the basis of scientific findings. Either give an appropriate reference or remove the sentence. (Kaser, Georg, University of Innsbruck)	Removed this case study
676	4	34	25	34	27	This sentence is unclear. Change "Common" to "Observed"; delete "historically"; change "range" to "are commonly". But the real problem is the mention of two floods from Tam Pokhari Glacier Lake. I have not yet received a copy of Dwivedi et al. 2000, but only one flood is mentioned by Osti and Egashira 1999. The latter, which is more accessible and is already cited, might be a more suitable reference than Dwivedi et al. (Cogley, J. Graham, Trent University)	Removed this case study
677	4	34	25	34	27	Without doubting the findings presented here, I suggest to also include studies published in SCI journals and to mainly concentrate on them. (Kaser, Georg, University of Innsbruck)	Removed this case study
678	4	34	27	34	30	This case study is from a GLOF-kind event into an un-inhabited Fjord in Alaska which was caused by the advance of a tide water glacier. I do not see how it can be related to glacier retreat in the Himalaya and the Andes. (Kaser, Georg, University of Innsbruck)	Removed this case study
679	4	34	28	0	0	"have produced larger peak discharges". (Cogley, J. Graham, Trent University)	Removed this case study
680	4	34	30	34	31	Outbursts are only hazards because they affect human activities, and they are unlikely to have impacts up-valley. So delete the final words. But it would be better to delete the whole sentence, which is repetitive. (Cogley, J. Graham, Trent University)	Removed this case study
681	4	34	33	0	0	Delete "Areas susceptible to". Break the sentence at "lakes", and continue "(those in direct contact with a glacier margin). They have been recorded in many regions including the Himalaya ...". (Cogley, J. Graham, Trent University)	Removed this case study
682	4	34	37	0	0	"in the Himalayas shows potential high risks from ...". (Cogley, J. Graham, Trent University)	Removed this case study
683	4	34	37	34	40	references to an inventory of glacial lakes in Himalayas, Bhutan and Nepal are necessary. (Wibig, Joanna, University of Lodz)	Removed this case study
684	4	34	37	34	40	No criteria is shown for these potential high risk lakes. This is baseless assertion. (Fujita, Koji, Nagoya University)	Removed this case study
685	4	34	39	0	0	Delete "ICIMOD in". (Cogley, J. Graham, Trent University)	Removed this case study
686	4	34	40	34	42	The apparent increase in GLOF frequency reported in Richardson and Reynolds 2000 (fig. 4 of their paper) must be treated very cautiously, as it does not account for the improved monitoring that has occurred, particularly with the introduction of satellite based monitoring, ie, just because we are observing/recording more GLOFs now does not mean they are occurring more frequently. This trend can therefore not be considered as statistically significant, and a sentence eluding to this should be included. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
687	4	34	40	34	42	Delete "During the 1934-1998 period," and insert "recorded" before "glacial-lake outburst floods". Insert "the" before "1950s" and "1990s". Delete "in Rosenzweig et al. 2001" (and if this is an acknowledgement that Richardson and Reynolds 2000 has not been read then remedy the omission). Be aware that SREX Chapter 3 (at Page 75 Line 20) mentions that this increase in flood frequency is not statistically significant (and incidentally gives the dates as 1940 to 2000). (Cogley, J. Graham, Trent University)	Removed this case study
688	4	34	40	34	42	After the 1998 GLOF of Tam Pokhari (Dwivedi et al., 2000; Osti and Egashira, 2009), no GLOF has occurred in the Himalayas. This should be noted. (Fujita, Koji, Nagoya University)	Removed this case study
689	4	34	42	34	42	In the Andes region This only refers to Patagonia. This must be specified, else it misleads the reader. (Kaser, Georg, University of Innsbruck)	Removed this case study
690	4	34	42	34	46	Change "amount to over" to "include at least". At Line 45, say "change in the number", and change "dam conditions" to "dams" and "35 glacial lakes" to "35 cases". (Cogley, J. Graham, Trent University)	Removed this case study
691	4	34	44	34	46	Carey (2005) refers to the respective original papers from where he took the numbers. Please refer to the origin of the numbers given. (Kaser, Georg, University of Innsbruck)	Removed this case study
692	4	34	49	0	0	The year of Dussaillant et al. should be 2010. Complete the reference at Page 98 Line 43 (54(2), 469-481). (Cogley, J. Graham, Trent University)	Removed this case study
693	4	34	51	35	2	What does the "vice-versa" mean? Can catastrophic disasters cause emerging new lakes? (Wibig, Joanna, University of Lodz)	Removed this case study
694	4	34	52	0	0	GLOF explained only on p.53, l.49 (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Removed this case study

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
695	4	34	52	34	54	According to the reference list, Damen (1992) is a 'Draft Report'. I doubt that such a report can stand a serious scientific review. There exist a series of also more recent studies and publications on the Tsho Rolpa. Tsho Rolpa is a good example to be elaborated and presented in more detail. (Kaser, Georg, University of Innsbruck)	Removed this case study
696	4	34	53	0	0	"in contact with". (Cogley, J. Graham, Trent University)	Removed this case study
697	4	34	54	34	54	There are many more recent peer-reviewed papers that should be referenced here instead of this Damen 1992 draft report. For example, Papers by Huggel et al. 2002, 2003, and 2004; and McKillop and Clague 2007. In any case, should this not be rewritten as the "The highest potential for GLOF events is usually related to....". The highest GLOF hazard on the other hand is related to the characteristics of the flood path, and the amount of infrastructure located in this path. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
698	4	34	54	35	1	Cite also Suzuki et al. (2007 in Bulletin of Glaciological Research) and Sakai and Fujita (2010 in Journal of Glaciology) (Fujita, Koji, Nagoya University)	Removed this case study
699	4	34	54	35	1	Suzuki R, Fujita K, Ageta Y (2007) Spatial distribution of thermal properties on debris-covered glaciers in the Himalayas derived from ASTER data. Bulletin of Glaciological Research, 24, 13-22. (Fujita, Koji, Nagoya University)	Removed this case study
700	4	34	54	35	1	Sakai A, Fujita K (2010) Formation conditions of supraglacial lakes on debris-covered glaciers in the Himalayas. Journal of Glaciology, 56(195), 177-181. (Fujita, Koji, Nagoya University)	Removed this case study
701	4	34	54	35	1	The cited paper Quincey et al. (2007) is not on the topic of how glacier lake dynamics change with warming. If such statements are made, literature has to be cited which investigates these issues. The uncritical recycling of arbitrarily made statements can lead to great errors. (Kaser, Georg, University of Innsbruck)	Removed this case study
702	4	35	1	35	26	Fujita et al. (2008) evaluated a volume of GLOFed water and pointed out potential site of outburst using space-borne digital elevation model and in-situ differential GPS survey. (Fujita, Koji, Nagoya University)	Removed this case study
703	4	35	1	35	26	Fujita K, Suzuki R, Nuimura T, Sakai A (2008) Performance of ASTER and SRTM DEMs, and their potential for assessing glacier lakes in the Lunana region, Bhutan Himalayas. Journal of Glaciology, 54(185), 220-228. (Fujita, Koji, Nagoya University)	Removed this case study
704	4	35	2	0	0	Delete the unintelligible ", and vice-versa". (Cogley, J. Graham, Trent University)	Removed this case study
705	4	35	2	35	2	What is meant by 'vice-versa'? Apart from this, Osti and Egashira (2009) investigate the hydrodynamic characteristics of one lake and no general statements can be made from this. (Kaser, Georg, University of Innsbruck)	Removed this case study
706	4	35	3	0	0	"populations". Delete "event". (Cogley, J. Graham, Trent University)	Removed this case study
707	4	35	4	0	0	"satellite image analysis". (Cogley, J. Graham, Trent University)	Removed this case study
708	4	35	4	35	5	A paper that summarizes the state of the art at around 2003 (Huggel et al. 2004) can hardly be taken to refer to the 2010 state of the art in a highly developing field such as remote sensing technologies. The second reference given is missing in the reference list (WGMS, 2008). (Kaser, Georg, University of Innsbruck)	Removed this case study
709	4	35	5	35	5	WGMS do not specifically monitor glacial lake changes. Would be better here to refer to a range of remote sensing based observations from different alpine regions - eg, European Alps (Huggel et al. 2004), Himalayas (Quincey et al. 2007), New Zealand Southern Alps (Allen et al. 2009) - to name a few. (Stocker, Thomas, IPCC WGI TSU)	Removed this case study
710	4	35	7	0	0	"2007", not "207". (Cogley, J. Graham, Trent University)	Removed this case study
711	4	35	7	0	0	207 -> 2007 (Fujita, Koji, Nagoya University)	Removed this case study
712	4	35	11	35	11	Haerberli et al. (2001) is a single case study from the Alps. Here, case studies from the Himalaya or the Andes should be given. (Kaser, Georg, University of Innsbruck)	Removed this case study
713	4	35	12	35	12	Iceland et al. (2003) is not listed in the reference list. Probably it is a paper that deals with a case study in Iceland. If so, this is not appropriate for the chapter 4.3.4.5 (Kaser, Georg, University of Innsbruck)	Removed this case study
714	4	35	14	0	0	The change of habitat conditions for fauna and flora also affects livelihoods, in particular of the poor dependant on free access to ecosystem goods and services. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	Removed this case study
715	4	35	14	35	26	what is the assessment? "actions are needed ... line 16", but SREX is not able what actions should be taken now or in the future. (Zhang, Xuebin, Environment Canada)	Removed this case study
716	4	35	14	35	26	Only this paragraph is on the given tasks but it should be extended substantially on the basis of peer reviewed literature on both the Himalaya and the Andes. (Kaser, Georg, University of Innsbruck)	Removed this case study
717	4	35	16	0	0	Delete "potential". (Cogley, J. Graham, Trent University)	Removed this case study
718	4	35	17	0	0	"identify vulnerable zones downstream". (Cogley, J. Graham, Trent University)	Removed this case study
719	4	35	19	35	20	Delete "small". Change "the Dig Tsho Lake" to "Dig Tsho". ("Tsho" is Tibetan for "lake"). (Cogley, J. Graham, Trent University)	Removed this case study
720	4	35	22	0	0	"2010", not "2009". (Cogley, J. Graham, Trent University)	Removed this case study
721	4	35	28	0	0	I do not understand the logical structure of Table 4-10. Neither the row elements nor the column elements have any obvious unifying theme. (Cogley, J. Graham, Trent University)	The table has been deleted
722	4	35	32	0	0	The clarity of the English language in Section 4.3.5 needs some attention, eg, "An extreme flood event was punctuation perturbation that caused.....". In several subsections, the assessment is based on max. 2 references; providing multiple lines of evidence will strengthen the assessment. (Stocker, Thomas, IPCC WGI TSU)	most of the sub-sections have more than three references, 4.3.5.1 has 18; 4.3.5.2 has 3; 4.3.5.3 has 4; and 4.3.5.4 has 4.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
723	4	35	32	0	0	Section 4.3.5. This section has a strong emphasis on effects on plants, could be expanded to cover fauna as well. For example, drought and heat wave affect birds and bats as described in McKechnie AE, Wolf BO 2010 Climate change increases the likelihood of catastrophic avian mortality events during extreme heat waves. <i>Biology Letters</i> 6, 253-256. (Chambers, Lynda, Australian Bureau of Meteorology)	accepted, revised in the final draft.
724	4	35	32	0	0	4.3.5: This section seems to switch between information specific to the 2003 European heat wave and more general information or information from other locations. 2003-specific info should be moved to that case study, while this section should discuss these impacts more generally (and what can be said about sensitivity to a given category of extremes with what degree of certainty, rather than just a listing of research results without assessment). (IPCC WGII TSU)	noticed, revised in the final draft.
725	4	35	35	0	0	The statement "extreme climatic events have increased in frequency and magnitude" is not justified. It is not an outcome from chapter 3, because this chapter presents that frequency and/or intensity of some extreme events have increased and other not. May be some other form of the sentence will be better (If... , or some...). (Wibig, Joanna, University of Lodz)	accepted, revised in the final draft.
726	4	35	35	35	35	"Extreme climatic events have increased in frequency and magnitude" -- such general statements are to our knowledge not found in the assessment provided in Chapter 3; please make sure to be consistent with Chapter 3's assessment. Suggest to use wording given in Chapter 3 instead of reformulating (and changing) key conclusions. (Stocker, Thomas, IPCC WGI TSU)	accepted, revised in the final draft.
727	4	35	43	35	45	The first two sentences of this paragraph introducing the subsequent sections are awkward. Effects of drought and heat wave "were widespread"--widespread when, widespread where? Then, the second sentence provides a specific example that does not seem to support the asserted "widespread" effects. (IPCC WGII TSU)	accepted,deleted the first sentence in the final draft.
728	4	35	43	35	46	references are necessary (Wibig, Joanna, University of Lodz)	accepted,deleted the first sentence in the final draft.
729	4	35	43	35	46	Forests already "operating on the limit" like in the Mediterranean should BE more susceptible to drought because it is "easier" to undercut minimum thresholds (e. g. for water supply) that raise tree mortality. Insect pest outbreaks are also not mentioned here, but they can be one main contributor to tree mortality and growth decline in the year(-s) following the extreme event (please see: Rouault, G., J. N. Candau, F. Lieutier, L. M. Nageleisen, J. C. Martin and N. Warzee (2006): Effects of drought and heat on forest insect populations in relation to the 2003 drought in Western Europe <i>Annals Of Forest Science</i> 63(6): 613-624.) You should also consider Dobbertin, M. (2005): Tree growth as indicator of tree vitality and of tree reaction to environmental stress: a review. <i>Eur J Forest Res</i> (2005) 124:319-333, DOI 10.1007/s10342-005-0085-3 for tree growth-environmental stress interactions in general. . (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	accepted, revised in the final draft.
730	4	35	44	35	44	Why surprisingly? Not evident. (SERGI, SABATER, University Girona)	the author said so, consider deleted in the final draft.
731	4	35	46	0	0	"See comment for page 31, line 21." (Jentsch, Anke, University of Koblenz-Landau)	the comment for page 31, line 21 is talking about ecosystem service, but here about plant growth decline...
732	4	35	46	0	0	What is the difference between death and mortality here? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	death is absolute; mortality is relative.
733	4	35	49	0	0	Section 4.3.5.1.1 associates growth reduction exclusively with extreme events. Gradual changes increasing stress and driving species out of their optimal living conditions are not mentioned (see the plethora of publications on species migration, changing seasonal patterns, extending breeding seasons for parasites leading to two or more generations instead of one, with an exponential increase in numbers, ...) (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	yes, gradual changes are not included, and those species migrations could not be driven by climate change.
734	4	35	51	37	6	The text needs more differentiation and depth. Please refrain from simple attributions like "coniferous stands appeared less drought-sensitive". Have a look at Rennenberg et al. 2006 (Rennenberg, H., F. Loreto, A. Polle, F. Brilli, S. Fares, R. S. Beniwal and A. Gessler (2006): Physiological responses of forest trees to heat and drought <i>Plant Biology</i> 8(5): 556-571.), Rennenberg et al. 2004 (Rennenberg, V. H., W. Seiler, R. Matyssek, A. Gessler and J. Kreuzwieser (2004): European beech (<i>Fagus sylvatica</i> L.) - a forest tree without future in the south of Central Europe? <i>Allgemeine Forst Und Jagdzeitung</i> 175(10-11): 210-224.), be sure to also pay attention to the reply to the latter work made by Ammer et al. (Ammer, V. C., L. Albrecht, H. Borchert, F. Brosinger, C. Dittmar, W. Eilling, J. Ewald, B. Felbermeier, H. von Gilsa, J. Huss, G. Kenk, C. Kolling, U. Kohnle, P. Meyer, R. Mosandl, H. U. Moosmayer, S. Palmer, A. Reif, K. E. Rehfuess and B. Stimm (2005): Future suitability of beech (<i>Fagus sylvatica</i> L.) in Central Europe: Critical remarks concerning a paper of Rennenberg et al. (2004). <i>Allgemeine Forst Und Jagdzeitung</i> 176(4): 60-67.). (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	the text is not implying "attribution", it is just a normal description for a phenomenon.
735	4	36	1	0	0	<i>Pinus pinea</i> and <i>Fagus sylvatica</i> ; Scots Pine = <i>Pinus sylvestris</i> (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	accept,revised in the final draft.
736	4	36	6	36	6	You mean large? (SERGI, SABATER, University Girona)	not large but always existing.
737	4	36	7	36	7	Consequence not obvious (SERGI, SABATER, University Girona)	the following text explained obviousness
738	4	36	11	0	0	"Granier, Reichstein et al." is missing in the references' section (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Reference added in the preparation of the chapter final draft.
739	4	36	19	0	0	Section 4.3.5.1.2 associates species death exclusively with extreme events. Gradual changes increasing stress and driving species out of their optimal living conditions are not mentioned. However, in particular for (mutually) dependent species (pollinators/plants, predators,...) such effects have been documented, see Settele et al 2008. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	yes, gradual changes are not included, and those species migrations could not be driven by climate change.
740	4	36	22	0	0	France, not "French" (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	yes, revised

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
741	4	36	41	36	46	A rearrangement of wording - mentioning the geographical position earlier in the text - would make this paragraph more readable. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	accept, revised in the final draft.
742	4	37	10	37	13	Sentence not understandable. (SERGI, SABATER, University Girona)	the sentence will be changed accordingly in the final draft.
743	4	37	11	0	13	A geographical reference should be included. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	the sentence will be changed accordingly in the final draft.
744	4	37	11	37	11	"An extreme flood event was punctuational perturbations that..." -- unclear, please rephrase. (Stocker, Thomas, IPCC WGI TSU)	the sentence will be changed accordingly in the final draft.
745	4	37	11	37	21	The part about flood is surprising. It starts from definition(?) of extreme flood. Then an example without announcing the country is mentioned. It should be completely rearranged starting from enumerating the possible results of floods on ecosystems, followed by more detailly presented examples. (Wibig, Joanna, University of Lodz)	the sentence will be changed accordingly in the final draft.
746	4	37	17	37	17	the city of Huelva (SW Spain) (SERGI, SABATER, University Girona)	yes, add "Spain".
747	4	37	24	0	0	Section 4.3.5.3 describes past events, but does not mention their implications: on mountain tops in the centre of the country (not in the Alps), the last storm over Germany reached a top speed which are beyond what any moderate climate tree species can stand - forsters expect a change from tree to bushy vegetation on mountain tops, with ecological (water regulation) as well as economic impacts (reduced wood harvest) (pers. comm., not my core competence, experts should provide references). (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	prealpine and alpine (upper part of mountains)
748	4	37	26	37	26	Why are winter storms described as "key climate risks" and not other types of extremes? Justification is not provided. (IPCC WGII TSU)	added, "in Switzerland."
749	4	37	26	37	30	Comment similar to the previous. What about coastland communities? (Wibig, Joanna, University of Lodz)	check to see any more information.
750	4	37	33	0	0	Section 4.3.5.4 on ENSO -- ENSO per se is not an extreme event, please remember the focus of SREX on changes in extreme events. (Stocker, Thomas, IPCC WGI TSU)	deleted this para.
751	4	37	33	0	0	Section 4.3.4.4. There are many additional references on ENSO and ecosystems, particularly for seabirds but also for terrestrial systems. E.g. Wilson UW 1993 Responses of three seabird species to El Nino events and other warm episodes on the Washington Coast, 1979-1990. The Condor 93, 853-858. Jaksic FM 2001 Ecological effects of El Niño in terrestrial ecosystems of western South America. Ecography 24, 241-250. Ramos JA et al 2002 Influence of local and large-scale weather events and timing of breeding on tropical roseate tern reproductive parameters. Marine Ecology Progress Series 243, 271-279. Jaksic FM 2004 EL NIÑO EFFECTS ON AVIAN ECOLOGY: LESSONS LEARNED FROM THE SOUTHEASTERN PACIFIC. Ornithologia neotropical 15, 61-72. Roshier DA, Whetton PH, Allan RJ, Robertson AI 2001 Distribution and persistence of temporary wetland habitats in arid Australia in relation to climate. Austral Ecology 26, 371-384. Norman FI, Chambers LE 2010 Counts of selected duck species at Corner Inlet, Victoria: changes in relation to local and distant meteorological variations. Int. J. Biometeorology 54, 269-282 (Chambers, Lynda, Australian Bureau of Meteorology)	deleted this para.
752	4	37	39	37	0	References according to widespread coral bleaching are necessary. (Wibig, Joanna, University of Lodz)	Although references were not added in the second-order draft, this text was deleted in the final draft of the chapter.
753	4	37	50	38	2	This paragraph is poorly formulated, suggest to rewrite. For example "No information does not means that no problems of adverse impacts of extreme events and disasters on ecosystems in developing societies." Also, a reference to literature with "would include such information" seems very odd. (Stocker, Thomas, IPCC WGI TSU)	accepted, deleted
754	4	37	50	38	2	Please check grammar and spelling. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	deleted this para.
755	4	37	50	38	2	Shouldn't this be a general statement, not one specific to ENSO? This should appear in the introduction to the section. (IPCC WGII TSU)	deleted this para.
756	4	37	51	38	2	To attempt to explain why there is a lack of researches may lead to the actual source of the problem, rather than focusing mostly on the language problem. (Kazama, So, Tohoku University)	deleted this para.
757	4	38	5	0	0	Section 4.3.5.5 Case Study -- to what extent is the coral bleaching described in this Case study a consequence of an extreme event vs. the extreme consequence of a gradual climate change. Suggest to highlight this in the text. (Stocker, Thomas, IPCC WGI TSU)	The suggestion by the reviewer was not accepted in SOD due to the lack of evidences. (This case study was removed in FGD then.)
758	4	38	29	0	0	A span of costs (not only the maximum) would make this sentence more reliable. (Asphjell, Torgrim, Climate and Pollution Agency (Norway))	This case study was removed in FGD wholly.
759	4	39	4	39	8	Suggestion: Use forestry and forest-related ecosystem goods and services as an example? Long-lived system, immobile, reaction (adaptation, coping) limited, ... (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	These lines are placeholder only. Authors will decide how to move
760	4	39	4	39	8	Please give some examples such as, 1. Effect of long-term droughts on groundwater level and groundwater dominated eco-systems. 2. Low intensity but long duration rainfall effects on slope failure. (Kazama, So, Tohoku University)	See 759
761	4	39	11	0	0	Why would there be a section on 4C rise in the observed trends section? (IPCC WGII TSU)	Section removed
762	4	39	11	0	0	4.3.7 Probably not appropriate to select only a 4C rise as a target for special comment (IPCC WGII TSU)	Section removed
763	4	39	11	39	11	"Comment on 4 degrees Rise", have been mentioned before in page 20, line 35. It might be simple in a way, but in architecture and urban life it is complicated. Day temperature could be balanced by less teperature in the night. If that +4 deg. C. is accompanied by elevated heat by night, latent heat would not find escape out of the buildings, consequently buildings will not be livable edifices. May that part be invisaged when the chapter is completed. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	Section removed

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
764	4	39	11	39	13	difficult to understand how the reference to the potential impact of 4°C rise may appear in the subchapter 4.3 devoted to observed trends... except if we assume that some events like summer 2003 are representative of a mean future with such a mean warming (Seguin, Bernard, INRA)	Section removed
765	4	39	16	49	8	it is not explicit in the title, but it seems that this subchapter covers the future potential impacts: I suggest that it clearly appears in the title, as it has been the case within the executive summary. There are contributions given in 4.3 which do not address observed trends, but deal with future impacts: they will have to be moved. Conversely, some elements are given in 4.4 which refer to the past and could be given previously in 4.3 (Seguin, Bernard, INRA)	This is a good suggestion for the scope and focus of these 2 sections. It has been incorporated in the preparation of the final draft of the chapter.
766	4	39	18	0	0	Section 4.4.1: the purpose of this section is unclear. (Darch, Geoff, Atkins & University of East Anglia)	Section removed
767	4	39	24	39	25	last two sentences are unclear: "Exposure is being in the way of the climatic extreme"?... (Stocker, Thomas, IPCC WGI TSU)	Section removed
768	4	39	26	0	0	Table 4-11. Information density quite low. Is there a better way to present the key points? Claims to be on the links but is more of an annotated catalog. (IPCC WGII TSU)	Kept in SOD and deleted in FGD.
769	4	39	29	39	32	I find this a rather strange paragraph: what's the conclusion from these statements? That there is not enough data to provide a sensible assessment? (Stocker, Thomas, IPCC WGI TSU)	Deleted
770	4	39	29	39	32	Table 4.11 very useful and comprehensive. The comment in lines 29-32 of page 39 seems too pessimistic. Indeed these information are quite relevant. (Bertollini, Roberto, World Health Organization)	Table 4.11 was kept in SOD, but deleted in FGD.
771	4	39	31	39	32	This is a rather damning, if realistic statement, and it makes one ask why put this stuff in if that is the case—just warn the reader that there is not sufficient evidence to assert many things with certainty and that that is going to be a decision makers headache. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Deleted
772	4	39	35	49	11	This section is difficult to read, and the reader does not know whether the organization is by hazard, by system, or by sector. For instance, food security and water are strongly linked and could be in a single section. Human settlements, etc., summarizes many different hazards and sectors and could be separated into subsections. (Hallegatte, Stephane, CIRED and Meteo-France)	We have edited the sections.
773	4	39	37	39	46	This is the kind of intro every section needs to have. Well done. (IPCC WGII TSU)	Good
774	4	39	38	39	38	"surveyed" -- did you mean "assessed" (Stocker, Thomas, IPCC WGI TSU)	yes.
775	4	39	42	39	46	This needs to be expanded or, if covered in the adaptation chapters cross-referenced to them. (Darch, Geoff, Atkins & University of East Anglia)	Due to the page limitation, the paragraph could not be expanded.
776	4	39	49	0	0	we appreciate the references to other SREX Chapters. We however suggest to refer to specific Chapter 2 or 3 sections, not the full Chapters. (Stocker, Thomas, IPCC WGI TSU)	Done
777	4	39	49	0	0	Section 4.4.2.1. This section might reference Case Study 9.3., "Drought and Famine in Ethiopia in the Years 1999-2000," or Case Study 9.5, "Floods." (IPCC WGII TSU)	The SOD text did not explicitly refer to the case studies mentioned, partly because it was unclear whether or not those case studies would be retained in Chapter 9.
778	4	39	49	42	7	Shouldn't the problem of salt water intrusions in coastal aquifers due to an overpumping during droughts be discussed somewhere? (Koppe, Christina, Deutscher Wetterdienst)	Not really - it's not an extreme
779	4	39	51	39	51	What are "extreme aspects of fresh water resources"? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Sentence rephrased
780	4	39	51	39	51	"evidence for future changes", but there is NO evidence of future change as the future has not occurred yet. Need to adjust to proper words. (Zhang, Xuebin, Environment Canada)	Rephrased - we meant "literature"
781	4	39	53	39	53	Floods and water resource deficiencies are felt at the local level. As regards management one is not so sure this is the case and in fact many times these aspects are taken up on by centralised agencies or decentralized central government agencies, which is not the same thing as local. The governance case study in chapter 9 does in fact take up on the centralization-descentralization situation (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	What the comment means could not be understood well in writing SOD. However, finally, the sentence was deleted in FGD.
782	4	40	1	40	2	"challenges the ability of a water supply system to supply water" This is maybe a strange way of saying things. Challenge is something that has not had effect as such and is different to saying that something severely interrupts or compromises or reduces the water supply. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	The sentence was slightly rephrased in FOD following the reviewer's comment.
783	4	40	22	40	23	I suggest to change "(e.g. Fowler et al., 2003, Vanham et al., 2009)." to "(e.g. Fowler et al., 2003, Kim et al., 2009, Takara et al., 2009, Vanham et al., 2009)." The English references to be added are "Kim, S., Y. Tachikawa, E. Nakakita and K. Takara, 2009: Reconsideration of Reservoir Operations under Climate Change: Case Study with Yagisawa Dam, Japan, Annual Journal of Hydraulic Engineering, JSCE, Vol. 53, pp. 597-611." and "Takara, K., S. Kim, Y. Tachikawa and E. Nakakita, 2009: Assessing climate change impact on water resources in the Tone River Basin, Japan, using super-high-resolution atmospheric model output, Journal of Disaster Research, Vol. 4, No. 1, pp. 12-23." (Nakakita, Eiichi, Kyoto University)	References added - thanks
784	4	40	39	0	0	Important to state the length of the drought considered. (Darch, Geoff, Atkins & University of East Anglia)	It is a volume-based indicator, and not based on duration
785	4	41	2	41	3	This is not the definition of extreme event we are using elsewhere, but rather part of the definition of extreme impact or disaster. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Sentence removed

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
786	4	41	2	41	49	Although there is one mention of impacts associated with a 10 year flood as opposed to a 100 year flood in the future, almost all the information and argument is on extreme events. This may be considered normal given the emphasis of this report. But we are all conscious of the fact that it is not only extreme events that cause loss and the argument for jointly considering small and medium events is made all through this report. Moreover, impacts from extreme events may be dependent on what is happening with small and medium recurrent events in the same areas. So, is there anything that can be said about the probable changing frequency and intensity of smaller events and their impacts? One can imagine that if an extreme event hits an area typified by numerous smaller events then this is relevant and also the reverse argument. I really believe we have to be holistic if we are to produce fully relevant information for decision makers. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	There is no published evidence.
787	4	41	4	41	6	Evaporation is also important as it influences antecedent conditions, thus affecting the timing and severity of floods. (Darch, Geoff, Atkins & University of East Anglia)	This has been added
788	4	41	12	41	15	"forest and woodland" are mentioned twice (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	deleted.
789	4	41	15	41	23	It may be best to move the description of flood frequency to Chapter 3, Section 3.5.2. (IPCC WGII TSU)	Deleted from Chapter 4 and the frequency of flood is described in Chapter 3.
790	4	41	18	0	0	Specifically, it is the GCMs, rather than climate models in general, that are important (RCMs are much less important) (Darch, Geoff, Atkins & University of East Anglia)	Deleted from Chapter 4 and the frequency of flood is described in Chapter 3.
791	4	41	19	41	20	"changes may be small -- or ...may reduce" -- small does not imply a direction of change. Please adapt. (Stocker, Thomas, IPCC WGI TSU)	Deleted from Chapter 4 and the frequency of flood is described in Chapter 3.
792	4	41	25	41	42	The statement made in line 17 needs to be reflected in the review of the studies, particularly that early work tended to use only one GCM. (Darch, Geoff, Atkins & University of East Anglia)	Deleted from Chapter 4 and the frequency of flood is described in Chapter 3.
793	4	41	40	41	42	The statement about the Foresight project's approach to altering flood frequency curves is inaccurate. Replace with "The Foresight project represented the effect of climate change in flood frequency by altering the shape of the flood frequency curve using precipitation outputs from climate models and rainfall-runoff models for a sample of UK catchments." (Hall, Jim, Newcastle University)	Sentence rephrased
794	4	42	10	0	0	4.4.2.2 should have a crisper focus on extremes (IPCC WGII TSU)	accepted, revised accordingly
795	4	42	10	42	15	Considering your list of the most sensitive ecosystems, I wonder if there is any other ecosystem that is not sensitive (and which can not be allocated to one of the mentioned categories)? (Wehrli, Andre, European Environment Agency)	deleted this para.
796	4	42	10	43	12	Ecology could also be applied to human interest. So human ecology looks for human life, consequently settlements in fragile environment - as in desert - really deserve to get a spot light in research and report. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	noticed but in this sub-sub-sub section only natural ecosystems considered
797	4	42	12	42	15	This phrase seems to cover just about everything!! Also forest and woodland is repeated. How do "pets" influence things? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	deleted this para.
798	4	42	12	42	15	A lot of ecosystems are cited here as being the most sensitive: are there any more sensitive than others? (Darch, Geoff, Atkins & University of East Anglia)	deleted this para.
799	4	42	12	42	15	It should be focused on some specific cases in this sentence. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	deleted this para.
800	4	42	12	42	15	This list of "most sensitive" ecosystems seems to be nearly all-encompassing. Would it be more accurate to say "the ecosystems sensitive to extreme climate. . ." (IPCC WGII TSU)	deleted this para.
801	4	42	12	43	12	Same comment as made in Chapter 2 (sections 2.5.2, 2.6.5, 2.7.3): it may be added that changes in flood frequency due to climate change may change floodplain ecosystems (e.g. vegetation change along floodplains); more frequent inundations with polluted river water may contaminate the floodplain areas more frequently, hence affecting vegetation, groundwater resources, etc. (Willems, Patrick, Katholieke Universiteit Leuven)	deleted this para.
802	4	42	15	42	15	Am very confused as to why 'pets' and 'ENSO' are included in this list of ecosystems. (Stocker, Thomas, IPCC WGI TSU)	deleted this para.
803	4	42	17	42	24	Could also include lizard and bird heat related papers. Eg Huey et al. 2009 Why tropical forest lizards are vulnerable to climate warming. Proc R. Soc B (published online). McKechnie AE, Wolf BO 2010 Climate change increases the likelihood of catastrophic avian mortality events during extreme heat waves. Biology Letters 6, 253-256 (Chambers, Lynda, Australian Bureau of Meteorology)	notice, added.
804	4	42	25	0	0	"Further, experimental evidence has shown, that extreme drought events advance flower onset (the mid-flowering date) and extend the flowering period of Central European plant species (Jentsch et al. 2009). The magnitude of shift (around 4 days) is remarkable when compared with findings from long-term observational datasets accounting for gradual warming over recent decades warming has advanced the first flowering date of plants by 4 days 1C_1 on average in the temperate zone (Memmott et al., 2007). On short-term time scales, extreme weather events might be even more powerful than gradual warming in disturbing the synchronization between organisms (e.g. Both et al., 2006) and community organization, because their occurrence and return interval is much less predictable and the vigor of their effects may reach a decadal scale of warming. Furthermore, interaction effects of extreme weather events with plant diversity are emerging as a one of the most challenging research frontiers in studying shifts in plant phenology. Reference: Jentsch A, Kreyling J, Böttcher-Treschkow J, Beierkuhnlein C (2009): Beyond gradual warming - extreme weather events alter flower phenology of European grassland and heath species. Global Change Biology 15: 837-849." (Jentsch, Anke, University of Koblenz-Landau)	accepted,added

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
805	4	42	29	42	30	"likely to increase fire frequency and fire extent" -- check with Chapter 3? (Stocker, Thomas, IPCC WGI TSU)	Noticed, but what chapter 3 had is not the same. In the preparation of the chapter final draft, consistency with chapter 3 was insured throughout.
806	4	42	38	0	0	Climate change could trigger massive range contractions among amphibian and reptile species in the southwest of Europe. Araujo et al. 2006 projected distributions of 42 amphibian and 66 reptile species 20-50 years into the future under 4 emission scenarios proposed by the Intergovernmental Panel on Climate Change and 3 different climate models (HadCM3, CGCM2, and CSIRO2). They found that increases in temperature are not likely to constitute a major threat to amphibian and reptile species in Europe. Indeed, a global cooling scenario would be much worse. However, increases in aridity could trigger contractions in the distributions of nearly all species occurring in the southwest of Europe, including Portugal, Spain and France. Impacts in these three countries are not trivial because, together, they hold 62% of the amphibian and reptile species present in Europe. The high proportion of amphibian and reptile species occurring in these three countries is due to the key role played by the Iberian Peninsula as refugia against extinctions during past glacial periods. With projected climate changes these hotspots of persistence might be at risk of becoming hotspots of extinction. Source: Araujo MB, Thuiller W & Pearson RG (2006) Climate warming and the decline of amphibians and reptiles in Europe. Journal of Biogeography. Volume 33, Issue 10, pages 1712–1728, October 2006. (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	accepted, added
807	4	42	38	32	38	add references for DGVM studies (Stocker, Thomas, IPCC WGI TSU)	Text deleted
808	4	42	47	0	0	"Research has convincingly demonstrated the link between disturbance rates and year-to year, interdecadal and longer-term climate variations (Johnson and Larsen 1991; Johnson and Wowchuck 1993). For example, fire frequency in North America has been shown to track climatic changes since the Pleistocene (Clark 1988; Swetnam 1993), to vary with the Southern Oscillation in seasurface temperatures at roughly decadal time scales (Swetnam and Betancourt 1990) and to vary with other continental climate fluctuations (Nash and Johnson 1996). Thus, climate change will contribute to alterations in event regime, e.g. an increased flooding intensity due to altered precipitation patterns. Moreover, disturbances can remove the inertia represented by existing ecosystems, thus resulting in a relatively sudden response (or adjustment) to previous climate changes. Thus, successional pathways are continuously altered in composition and velocity when exposed to varying environmental conditions. Reference: White PS, Jentsch A (2001): The search for generality in studies of disturbance and ecosystem dynamics. Progress in Botany 63: 399-449. Nonlinear system dynamics are ubiquitous. For example, internal feedbacks of ecosystems, such as fuel-triggered fire regimes, can interact with large-scale external forces, such as global weather patterns or restoration efforts, and trigger shifts to either alternative regimes or to novel trajectories. Nonlinear system dynamics imply that a systems' retransformation leads to novel conditions instead of prior structures and functions (e.g., "hysteresis"; Beisner et al. 2003). This phenomenon has been documented, e.g., in Australia, where shifts of open dryland ecosystems to permanent woodlands occurred due to El Nino Southern Oscillation effects interacting with human land use dynamics (Holmgren et al. 2001). Often, nonlinearity of ecosystem dynamics or regimes shifts is neither very obvious nor dramatic. For example, factors that undermine resilience slowly, such as eutrophication in resource-limited systems (e.g., Jentsch et al. 2002b), disturbance mediated introduction of invasive species (Sharp & Whittaker 2003), or climate change (e.g., Jentsch & Beierkuhnlein 2003), can be responsible for altered successional trajectories. Reference: Jentsch A (2007): The challenge to restore processes in face of non-linear dynamics – on the crucial role of disturbance regimes. Restoration Ecology 15(2): 334-339." (Jentsch, Anke, University of Koblenz-Landau)	This comment seems mis-located. The text in chapter 4, page 42, line 47 is talking about forest fire, while the comment is about ENSO.
809	4	42	51	42	52	This sentence is too generic and should be rephrased. What is the interaction between rockfall and herbivory? What is the influence of climate on herbivory. There are certainly relations, but not so evident in any case -- so please elaborate... (Wehrli, Andre, European Environment Agency)	deleted this para.
810	4	43	0	0	0	P43: Important 2009 paper by Schlenker (PNAS) on crop temp sensitivity (IPCC WGII TSU)	this is about foodsystem
811	4	43	5	43	5	and seabirds (Chambers, Lynda, Australian Bureau of Meteorology)	accepted, and this example was added
812	4	43	7	43	9	logic of the first sentence this is unclear; e.g., "Ecological surprises include rapid and abrupt changes in temperature and precipitation..." (Stocker, Thomas, IPCC WGI TSU)	noticed, check. This sentence came from the book of "Carpenter, S., P. Pingali, E. Bennett and M. Zurek, Eds., 2005: Ecosystems and Human Well-being: Volume 2: Scenarios. Island Press, Washington, District of Columbia, 560 pp". We could understand as: the impacts of temperature and precipitation on ecosystems are out of our imagination, which could result in serious consequences.
813	4	43	9	0	12	The risk is correctly named, but neither before nor after are ist consequences spelled out or integrated into the assessment (Spangenberg, Joachim H., Sustainable Europe Research Institute SERI Germany)	noticed, revised.
814	4	43	13	0	0	"Understanding the factors governing the response of biodiversity to extreme weather events will increase our ability to predict the future behavior of ecosystems. This is one of the next great challenges in the life and environmental sciences. There is a lack of knowledge on how extreme weather events affect biodiversity and ecosystem functioning. Research gaps include (1) timing of events, (2) ecological memory, induced tolerance, and time lags in response, (3) hidden players, (4) quality of local climate data, including past records and future model predictions, and (5) a historical control. Reference: Jentsch A, Kreyling J, Beierkuhnlein C (2007): A new generation of climate change experiments: events not trends. Frontiers in Ecology and the Environment 6(6): 315-324." (Jentsch, Anke, University of Koblenz-Landau)	noticed, but research gaps would not be included, nor other topics, such as food and water.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
815	4	43	15	0	0	Section 4.4.2.3: suggest to strengthen the assessment by including more references and base the assessment on multiple lines of evidence. Some of the references should be reconsidered, e.g., ActionAide. (Stocker, Thomas, IPCC WGI TSU)	This section has been modified and some references of recent review articles added along with a statement that to cover all of these aspects in detail would add volumes to this report.
816	4	43	15	0	0	Section 4.4.2.3. This section might reference Case Study 9.3, "Drought and Famine in Ethiopia in the Years 1999-2000," or Case Study 9.12, "Least Developed Countries and Fragile States." (IPCC WGII TSU)	The section 4.4.2.3 was completely revised and in the final revision the focus was directed toward food security and this reference was no longer deemed critical to the discussion.
817	4	43	17	43	32	This section is an example of a very well put together piece as to impacts or effects but the question is if such detail is needed in a study where the objective is to see how managing the risk of such events and disasters can contribute to adaptation. It would seem to me here and in many other parts of this chapter and other chapters that the level of detail goes way beyond what can be used or what is needed to inform arguments as to how to use management of risk associated with extreme events and disasters to advance adaptation. Rather it would seem that such detail should be in the 5th evaluation report not here, where the objective is not purely a balance of scientific knowledge but rather information and analysis that promotes the application of knowledge, experience, opportunity in order to get things done and where the preferred readers will probably be policy and decision makers or others interested in promoting advance and change. As the section is on food security and food systems more direct reference to these concerns could be made. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	This section is developed to provide examples to support the general statements on the effects of temperature and variable precipitation on food production. We have used specific examples to support these statements and believe this is the appropriate approach.
818	4	43	28	43	29	Projected scenarios of changes of mean climate? projections do not include extreme event changes? (Wibig, Joanna, University of Lodz)	The original second paragraph which included this sentence was rewritten to show how the combinations of high temperature and variable precipitation affect plant growth and productivity
819	4	43	31	43	52	Please check grammar and spelling. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Statements have been modified to address grammar and spelling
820	4	43	41	43	42	A potentially useful reference about high temperature impacts: Morrison, J.M. & Stewart, D.W. 2002. Heat stress during flowering in summer Brassica. Crop Science 42: 797-803. (Seguin, Bernard, INRA)	Added a section cool season crops on Page 44, line 16.
821	4	43	44	43	46	are disrupted by daytime air temperature above 33C - It is also necessary to refer applicable articles. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	This section of the draft was revised to focus on temperature extremes and how these affected plant growth and reproduction. This reference was removed in the final version of the revision.
822	4	43	44	44	52	Possible higher temperature damages are well described. The fact that high temperature in winter may provide wheat with reduced production due to germination damage is recommended to be referred, while the exact reference is not attached with this comment and it could not be included. (Watanabe, Tsugihiko, Research Institute for Humanity and Nature (RIHN))	We recognize the fact that extreme events will impact crop development; however, soil temperatures will not respond as dramatically to rapid changes in temperature and since germination is driven by soil temperature more than air temperature, have kept the focus on the above ground portions of the plant during the growth cycle.
823	4	44	16	0	0	I suggest to add a new sentence "According to the prediction for the impact of global warming on crop yields from 1990s to 2090s using improved Agro-Ecological Zones model (iGAEZ) by projecting five GCM outputs for AR4 under SRES A1B scenarios, temperature rise will make many cultivated areas (eastern part of United States of America, India, eastern China, Africa) less productive, at the same time, the regions with cold weather under current climate condition (Canada, northern Europe, northeastern China) become suitable for crop productivity under future climate scenario (Tatsumi et al. 2010)." The English reference to be added is "Tatsumi, K., Y. Yamashiki, R.V. Silva, K. Takara, Y. Matsuoka, K. Takahashi, K. Maruyama, and N. Kawahara, 2010: Estimation of Potential Changes in Cereals Production under Climate Change Scenarios. Hydrological Processes, 24, accepted." (Nakakita, Eiichi, Kyoto University)	This report is about the extreme event impacts on food security. This study is more appropriate for the AR5 report. The reference which was indicated could not be found in Hydrological Processes, Vol 24.
824	4	44	20	44	32	The part to mention the rice yield in Japan should be separate from previous sentence about on China. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	This section was revised in the first-order draft in detail extreme temperature events and this paragraph was completely revised.
825	4	44	20	44	32	Iizumi, T., et al. (2009a: Parameter estimation and uncertainty analysis of a large-scale crop model for paddy rice: Application of a Bayesian approach. Agric. Forest Meteorol., 149, 333-348) is more suitable for the reference of the PRYSBI model (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	The overall approach to section 4.4.2.3 was redone to provide a different focus on extremes rather than climate change. In this revision these sections were eliminated.
826	4	44	20	44	32	Iizumi, T. et al. (2009b: Development of impact functions on regional paddy rice yield in Japan for integrated impact assessment models. J. Agric. Meteorol., 65, 179-190) should also be referred to mention the rice yield change in Japan. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	The overall approach to section 4.4.2.3 was redone to provide a different focus on extremes rather than climate change. In this revision these sections were eliminated.
827	4	44	37	44	37	Some references must be included here to support this link between glacial retreat and El Nino episodes. (Stocker, Thomas, IPCC WGI TSU)	There are additional references added on this particular aspect
828	4	44	42	44	43	Earthquakes are not normally considered a trigger of debris flows. The trigger is water - which in a glacial environment can come either from heavy rainfall, snow or ice melt. (Stocker, Thomas, IPCC WGI TSU)	The section on glacier melt in the Andean region was redone to provide greater clarity in the relationship between melting and El Nino events.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
829	4	44	48	45	13	Although ag is not as economically dominant in 'developed nations' their agricultural populations are still vulnerable to extremes and climate change - especially when their governments strongly pursue economic rationalist policies. Important also to note: complexity and uncertainties of modern farming means dealing with extremes is one stressor among many; economic and social role of agricultural populations among broader rural populations; the stress of dealing with extremes and other pressures means that rural health, including mental health, is a significant limitation to adaptive capacity in such populations. For more discussion, see McGuckian, N. and Rickards, L. (2009) The social dimensions of mixed farming systems: decision making, drought and implications for extension. In: P. Tow, I. Cooper, I. Partridge, and C. Birch (eds) Rainfed Farming Systems, Springer, Dordrecht Netherlands. (Rickards, Lauren Amy, University of Melbourne)	These paragraphs were redone in the revision to address the issues that developing countries face in being able to cope with extreme events and the disruption of production since their production is most likely consumed by the household rather than sold.
830	4	45	6	45	7	Please provide references to support this claim of increasing threats faced by Malawi. (Stocker, Thomas, IPCC WGI TSU)	These paragraphs were redone in the revision to address the issues that developing countries face in being able to cope with extreme events and the disruption of production since their production is most likely consumed by the household rather than sold.
831	4	45	19	45	21	last sentence: is this relevant in the context of climate extremes? Suggest to delete. (Stocker, Thomas, IPCC WGI TSU)	We believe that the context of weather and climate extremes reach far beyond the direct impacts on agriculture and are compounded when additional factors such as available credit is no longer available. We have chosen to keep this statement in the text.
832	4	45	24	0	0	Section 4.4.2.4. A number of the Case Studies in Chapter 9 could potentially be referenced in this section, e.g., Case Study 9.8, 9.9, 9.11, etc. (IPCC WGII TSU)	Done.
833	4	45	24	45	24	This section seems unbalanced, with too strong focus on tourism. Also, the UN/POP/EGM... report is cited several times. It would be better to cite also peer-reviewed papers (there are many of them on this topic). (Hallegatte, Stephane, CIRED and Meteo-France)	Agreed - changed
834	4	45	24	48	18	Section 4.4.2.4.: Amazingly a discussion of the storm hazard (winter storms, convective storms, tropical cyclones) is almost completely missing in this context of settlements, industry and infrastructure. But storms are by far the most important hazard in terms of damages and losses to property world wide (publications of Munich Re, Swiss Re, EM-DAT,...). Hence storms have to be prominent among hazards affecting human settlements, industry and infrastructure... (Faust, Eberhard, Munich Reinsurance Company)	Addressed.
835	4	45	26	0	30	two sentences with little connection between them (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Addressed in 4.4.9. Polar Regions
836	4	45	26	45	30	There is no direct link between part of contamination of urban floodwater and heat wave in Andhra Pradesh. Something more about this heat wave (year, were the mentioned deaths related to sanitation infrastructure ? (Wibig, Joanna, University of Lodz)	Moved to 4.4.3. Asia, temperature section
837	4	45	26	45	52	Maybe it is not convenient to abruptly start a section with specific reference to SubSaharan Africa and Asia as opposed to some more generic introduction that is inclusive of Latin America and rest of Africa. These lines and phrases are all very telegraphic as opposed to what follows on the next page, which is much more developed as an argument. These constant changes of detail and rhythm are notorious throughout the FOD. The statement that most urban centres in Africa and Asia have no sewers is incorrect--this is not the same as saying that important sections of the cities dont have sewers--the poorer, in particular. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Chapter organization has been changed.
838	4	45	26	45	52	Please rephrase, straighten out the text and organize it, please. In this current form it reads "jumpy" without any order. E.g., what do sewers and heat waves have in common (first paragraph)? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Chapter has been edited
839	4	45	28	45	29	starting from Line 32, you are starting to talk about heatwaves. Therefore, please move the description about heat wave impact in Line 28-30 to the Line 33. (Kazama, So, Tohoku University)	Moved to 4.4.3. Asia, temperature section
840	4	45	28	45	32	some times you used heat wave as two words (e.g., Line 28), but some times as "heatwaves". So please follow one unique method. (Kazama, So, Tohoku University)	Chapter has been edited
841	4	45	32	45	36	references according amount of people in formal and informal settlements are necessary (Wibig, Joanna, University of Lodz)	Reference added. UN-HABITAT, 2008
842	4	45	35	45	36	Please do consider to move the part " Worldwide, about.....formal settlements" to the beginning of the sentence in Line 26. (Kazama, So, Tohoku University)	OK
843	4	45	38	45	38	Here, as elsewhere, consider a confidence statement rather than "likely" if this statement is not based on explicitly probabilistic information. (IPCC WGII TSU)	Deleted.
844	4	45	38	45	40	The reference is not in the reference list; was this a study? (Darch, Geoff, Atkins & University of East Anglia)	Different refs are used. Satterthwaite, 2008; Douglas, 2009; MacDonald and Calow, 2009; Swiss Re, 2006
845	4	46	0	0	0	P46: no extremes in permafrost, delete? (IPCC WGII TSU)	ok
846	4	46	1	46	18	Coastal areas taken as a specific locus and context have been dealt with in another part of this and other chapters with a good deal of repetition of the types and content of argument on impacts. Comparison of the content here and that in the chapter 9 case study may be wise. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Revised, related to case study 9.3.1.5
847	4	46	1	46	18	This first paragraph repeats much of the same text already used in 4.3.3.1. (pg. 23). Please reduce repetition. (Stocker, Thomas, IPCC WGI TSU)	Section has been edited

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
848	4	46	1	46	18	parts of the paragraph on Coastal areas are copy/past from Ch4, page 23; avoid repetition and redundancies in order to cut down the overall length of Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	Section has been edited
849	4	46	1	46	2	Sea level rise itself is not an extreme event, but will exacerbate impacts of extreme events like storm surge. Need to keep this distinction clear in the discussion that follows. (IPCC WGII TSU)	Agreed and we have tried to do so
850	4	46	1	46	3	"The intensity and frequency of which is expected to increase" - this is the sort of generalised statement that is not helpful and will cause problems for SREX. This general statement can not be applied in relation to tropical cyclones. Need to reword to something like 'the intensity and/or frequency of which are projected to increase in some instances'. (Stocker, Thomas, IPCC WGI TSU)	The problematic part was deleted.
851	4	46	1	46	3	Sea level rise seems more of a gradual change than a "climate extreme," as it is described here. Then, Chapter 3 (e.g., Section 3.4.4) assesses the degree to which "intensity and frequency" are projected to increase; make text here consistent with Chapter 3 conclusions. (IPCC WGII TSU)	Rephrased such that SLR is not considered to be an extreme event
852	4	46	10	46	10	Again, sea level rise doesn't in itself seem an extreme event, as suggested in this phrase: "SLR and other extreme events" (IPCC WGII TSU)	Rephrased such that SLR is not considered to be an extreme event
853	4	46	20	46	21	Refer to chapter 3 here (section 3.3.2). (Stocker, Thomas, IPCC WGI TSU)	Rephrased such that it does not contain projection of slope failure
854	4	46	20	46	30	loss figures are missing (Faust, Eberhard, Munich Reinsurance Company)	There is no figure for slope failure.
855	4	46	20	46	30	The following UK study examines the effect of climate change on slope stability, including the significance of antecedent conditions and spatial correlation of extremes: Manning, L.J., Hall, J.W., Kilsby, C.G., Glendinning, S. and Anderson, M.G. Spatial analysis of the reliability of transport networks subject to rainfall-induced landslides. Hydrological Processes, 22(17): (2008) 3349 - 3360. (Hall, Jim, Newcastle University)	The related part has been deleted and the ref has become unnecessary.
856	4	46	32	0	0	State the correlation (presumably negative) in the first sentence (Darch, Geoff, Atkins & University of East Anglia)	The sentence on NAO has been deleted.
857	4	46	32	48	14	This part on NAO, and tourism in particular, is a case of information that in general is not relevant for the topic of the section-- urban centres, infrastructure and industry- unless tourism is considered an industry and not a service sector. Most of what is discussed has no reference to human settlements or infrastructure as such and is more about tourism demand. We have to be careful with what we put because we as authors at times get unfocused and go on, as in this case, about tourism as such and not the infrastructure and human settlement aspects of tourism that the section title implies. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (ELACSO))	The tourism was considered an industry activity. It was change the heading title of section 4.4.2.4 to Human settlements, infrastructure and tourism. It reflects better the contents of the section
858	4	46	39	0	43	worldwide? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Changed to specific region description in 4.5.9. Polar region
859	4	46	39	46	43	State the location (Darch, Geoff, Atkins & University of East Anglia)	Changed to specific region description in 4.5.9. Polar region
860	4	46	41	46	42	It is quite difficult to imagine any significant link between permafrost degradation and risk of disease. A reference is needed to support this proposed link. (Stocker, Thomas, IPCC WGI TSU)	The sentence on disease due to permafrost thawing has been deleted.
861	4	46	45	47	36	parts of the paragraph on tourism are a repetition from Ch4, page 27; avoid repetition and redundancies in order to cut down the overall length of Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	Page 27 text was moved to tourism sector text to reduce redundancies.
862	4	47	0	0	0	P47: little extremes in tourism, condense (IPCC WGII TSU)	Text condense and focus on extreme events and extreme impacts
863	4	47	10	47	26	Move this paragraph up, as it seems to be introductory with regards to tourism impacts (Darch, Geoff, Atkins & University of East Anglia)	Done
864	4	47	22	47	24	Also in Australia (Chambers, Lynda, Australian Bureau of Meteorology)	Yes, although Australian sky industry it doesn't be too strong
865	4	47	22	47	24	Other negative effects of artificial snowmaking should also be mentioned (Hama, Angela Michiko, United Nations International Strategy for Disaster Reduction)	energy mentioned
866	4	47	24	0	0	And energy consumption? (Darch, Geoff, Atkins & University of East Anglia)	added
867	4	47	24	0	0	'water' .. and energy consumption? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	added
868	4	47	38	0	0	Figure 4-12. Need more synthetic figures like this, especially figures that cut across sectors. (IPCC WGII TSU)	Ok
869	4	47	41	47	18	Consider shifting this to the regional section, 4.5. (IPCC WGII TSU)	No because illustrate impact figures
870	4	47	41	47	41	"A potential range...can pe pointed out" -- the use "range" is misleading here, as what follows is not a range of impacts, but a list of various impacts. Suggest to reformulate. (Stocker, Thomas, IPCC WGI TSU)	changed to "serie"
871	4	47	43	47	43	The value of "20%" given here is far outside the 3 - 11% global projected increase in tropical cyclone intensity provided by Chapter 3. This is not a problem, but the fact this projection has been taken from grey literature it should be treated cautiously and will be open to criticism. A sentence should be added, commenting that this value is significantly higher than the 3 - 11% global projected increase in tropical cyclone intensity provided in Section 3.4.4 of chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Text revised to promote consistency with chapter 3.
872	4	47	47	0	0	Please add relevant references with quantitative impact. (Kazama, So, Tohoku University)	Ok
873	4	48	1	48	4	This paragraph needs to be expanded. See, e.g. ski season simulation model "SkiSim" by Robert Steiger and further publications by Hans Elsasser (Hama, Angela Michiko, United Nations International Strategy for Disaster Reduction)	the section on tourism is already too large
874	4	48	2	0	4	indicate the percentage for Austria as well (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	No data
875	4	48	16	0	0	Table 4-13. Quite good mix of country and regional scale. Confidence in citing references for the entire table? How to deal with tables that go on for page after page. Could the actual tables be navigated via a map-based tool? (IPCC WGII TSU)	The table was shortened. Map-based navigation, although interesting, was not incorporated.
876	4	48	23	48	29	We suggest not to start the subsection with "The largest research gap..."; rather start what was known from AR4, what has changed since then, followed by conclusions incl. open research questions. (Stocker, Thomas, IPCC WGI TSU)	The paragraph was put to the last part of the section.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
877	4	48	23	49	8	This section, compared to the previous one, is very short and sketchy and rather vague. Also its spatial coverage is very limited with not a single example from Latin America. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Agreed. We moved the first paragraph at the end and deleted some sentences.
878	4	48	31	0	0	Why is the example of extreme weather covering both extremes? Surely could be either extreme too. (Darch, Geoff, Atkins & University of East Anglia)	Agreed. We added some more examples in wider areas.
879	4	48	31	48	33	There are four extremes mentioned, not three. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	The paragraph has been deleted.
880	4	48	33	48	33	Refer to chapter 3 here. (Stocker, Thomas, IPCC WGI TSU)	The sentence was modified such that three or four did not matter.
881	4	48	35	48	36	"Most people ... countries": A source is required. I'm not sure this statement is a consensus. (Hallegatte, Stephane, CIRED and Meteo-France)	Ref added, the sentence revised so will not be misunderstood.
882	4	48	35	48	36	"Most people do not think ..." -- suggest to delete this. The assessment should not be about what most people think or don't think. (Stocker, Thomas, IPCC WGI TSU)	Agreed. Modified the sentence.
883	4	48	38	48	39	Explaining how different are these patterns would help readers for better understanding (Kazama, So, Tohoku University)	Agreed. Modified the sentence.
884	4	48	42	48	43	Floods also have indirect impacts on mental health, disrupt health care services and have impact on vector and rodent borne diseases. (Koppe, Christina, Deutscher Wetterdienst)	Added the explanation.
885	4	48	42	48	49	There are some works indicating that there is a shift of malaria regions instead of increase. At least some comments on that probability is needed. (Wibig, Joanna, University of Lodz)	Agreed. The sentence for this matter by Jason Westrich was added (Jason Westrich was added as CA).
886	4	48	42	48	49	Please check grammar and spelling. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Checked the grammar and spelling.
887	4	48	42	48	49	The sentence repeats the statements of the corresponding data in table 4.11. This is not necessary. The table could be referred to and considerations on the data and their meaning include here. (Bertolini, Roberto, World Health Organization)	We revised the sentence.
888	4	48	45	0	0	The rest of the sentence: "In 2002 report: WHO assumed that countries with 6000+ US dollars of per capita GDP" is lost. (Wibig, Joanna, University of Lodz)	The sentence has been deleted.
889	4	48	45	48	45	I can not make sense of this sentence. (Stocker, Thomas, IPCC WGI TSU)	We revised the sentence.
890	4	49	1	49	8	Health impact of forest fires due to air pollution should be discussed somewhere. The forest fires in Summer 2010 in Russia and the air quality in Moscow could be an example. (Koppe, Christina, Deutscher Wetterdienst)	We revised the sentence.
891	4	49	4	49	8	Are you referring to a mean air temperature rise from 9.8 - 15.3? If so, please indicate this. References are also needed to support his paragraph. (Stocker, Thomas, IPCC WGI TSU)	The sentence has been deleted.
892	4	49	5	49	5	"will further increase by 80%" -- "is projected to increase..." (Stocker, Thomas, IPCC WGI TSU)	The sentence has been deleted.
893	4	49	5	49	8	Source? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	The sentence has been deleted.
894	4	49	11	0	0	Section 4.5: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. It is not necessary that chapter 4 provides their own mini assessment of observed and projected changes in droughts, heat waves, and precipitation in each region. This information should come directly from the maps and tables being created by Chapter 3. If chapter 3 are lacking the regional observations/projections that are needed, their authors should be notified of this. Currently it is confusing to have this information spread out over two chapters and there is a risk of inconsistencies. (Stocker, Thomas, IPCC WGI TSU)	The coordination with ch3 has been done.
895	4	49	11	0	0	This section introduces many observations and projections of weather extremes and hazards, that should be principally be covered by Chapter 3. Therefore they should be removed. Probably, a rethinking of the role and focus (on impacts?) of this section is needed. (Bouwer, Laurens, Institute for Environmental Studies)	It has been removed to CH3.
896	4	49	11	0	0	In Section 4.5, The Alpine area should also be considered as a vulnerable region which mentioned very briefly in Page 48; line 1. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	We are using standard IPCC regions
897	4	49	11	0	0	4.5: is there real value in taking a separate regional cut? (IPCC WGII TSU)	Given by the IPCC at the start of the project.
898	4	49	11	49	11	This section is really difficult to read. To make it more efficient, I would suggest to use the same structure for all regions (even if some paragraphs are empty because a hazard does not exist in a region). It would also help be consistent (for instance, landslides are mentioned in Europe but not in Asia and Africa, even though it is a real problem there too). Also, each subsection for each region should distinguish clearly between past and observed trends and expected future trends. Finally, it is unclear whether this section also discuss economic consequences, or if these consequences are detailed in Section 4.6.3. (Hallegatte, Stephane, CIRED and Meteo-France)	Some regions such as Africa do not have enough data to fully cover all the extreme events. Some re-arrangements have been made in this section.
899	4	49	11	69	49	My reading is that the whole thing is about changes in climate, not about vulnerability, exposures, and impacts. The text does not address what is defined in the title. Most of text should be removed (e.g. those related to changes in the mean) or combined with Ch3 (e.g. those related to changes in extremes). Discussion directly addressing what is implied in the title should be expanded and strengthened. (Zhang, Xuebin, Environment Canada)	Deleted references to climate and physical extremes
900	4	49	11	69	49	This subchapter is already satisfying in terms of collected information, but needs more work for a valuable SOD, especially in terms of homogeneity. It is necessary for events like droughts: the impact on agriculture is given for some regions, but is lacking in Europe. Also, it is necessary to make sure that the text is well focused on extremes, and not on mean changes (especially for the open oceans and partly the polar regions) (Seguin, Bernard, INRA)	Only considered important items have been addressed. Sections are too long. Focusing the section on extremes was also very much the focus for the preparation of the final draft of the chapter.
901	4	49	15	49	16	opening statement is incomplete. The sections are not just "about climate change and climate-related disasters" but should primarily focus on Weather and Climate -related extreme events. (Stocker, Thomas, IPCC WGI TSU)	Sentence has been revised accordingly.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
902	4	49	15	49	23	This seems more like indications or instructions to authors, not part of a scientific text.. The concept of "regionally based" aspects should be thoroughly developed here as for many people the question will come up as to why and what do we hope to achieve looking at things regionally as opposed to sector or nationally or locality wise--we know there are virtues in the regional approach but those are not laid out here, only a short statement is provided as to looking at things regionally "within the context of other issues and trends" without us really knowing what that statement signifies. Regional based approaches must start from the premise that policy interventions are colored by regional context and the playing off of multiple differentiated, relevant social and economic issues. And, if that is so we can also ask the question as to whether a regional approach is also needed within different individual countries and not just continent by continent--in fact, is there much to be gained from continental approaches when all is locally or nationally, contextually determined? Does the concept of regional approach on a continental level hold up in this type of concern and analysis? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Regional approach is needed because many readers would expect this section to be compared to an equivalent section in chapter 3.
903	4	49	18	49	23	These sentences read more as instructions to authors than as an introduction to the section. (IPCC WGII TSU)	Deleted
904	4	49	23	49	23	Structure of the subsections: we think that the overall Section 4.5. would benefit a lot from a bit more harmonized structure of the subsections. While we appreciate that "Each region will likely have its own priorities" we think that a common structure will make the text more easily accessible to readers. (Stocker, Thomas, IPCC WGI TSU)	The ranking has been done accordingly
905	4	49	26	0	0	Section 4.5.2: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	Yes, agree
906	4	49	26	51	21	Not a single mention is made in this section to "climate change and climate related disasters within the context of other issues and trends" as is the stated aim of the section, proposed in lines 15 and 16 page 49. That is to say, other issues and trends are not touched on at all. The adaptation section is so specific location wise as to be discriminatory to the rest of the region. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Changes made.
907	4	49	26	69	28	Try to keep th description of regional cases symmetric. E.g. Introduction for all of them, not just for one or two. (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	The introduction has been added
908	4	49	28	49	41	is this very general introduction for, in this case, Africa needed? Most of it seems like text-book style material or refers back to IPCC AR4. Suggest to shorten substantially and refer to Chapter 3 where appropriate. (Stocker, Thomas, IPCC WGI TSU)	Shortened
909	4	49	51	50	16	These paragraphs could reference Case Study 9.3, "Drought and Famine in Ethiopia in the Years 1999-2000." (IPCC WGII TSU)	Ok, it was referred to that case study in chapter 9
910	4	50	4	50	5	Please add relevant references with quantitative numbers. (Kazama, So, Tohoku University)	Done
911	4	50	7	50	14	These sentences on 'adaptation strategies' are repeated again on the next page (lines 11 - 18). Please remove repetition. (Stocker, Thomas, IPCC WGI TSU)	It has been removed.
912	4	50	18	50	53	This section could reference Case Study 9.5, "Floods." (IPCC WGII TSU)	It has been done
913	4	50	19	50	25	The content of this paragraph may be more appropriate in Chapter 3, Section 3.3.2, given overlap with Section 3.3.2, Table 3.2, and Figures 3.1 and 3.2. (IPCC WGII TSU)	It has been settled
914	4	50	32	50	32	This correlation between ENSO and rainfall needs supporting references. (Stocker, Thomas, IPCC WGI TSU)	The references were sent for admission
915	4	51	1	51	9	This section could reference Case Study 9.4, "Sand and Dust Storms." (IPCC WGII TSU)	Done
916	4	51	10	51	18	the subsection on Adaptation seems inconsistent with the previous subsections; it only deals with drought, but none of the other extremes laid out before. (Stocker, Thomas, IPCC WGI TSU)	Adaptation subsection was removed
917	4	51	10	51	18	Why here an adaptation paragraph? Is there any redundancy with later chapters on adaptation? - Applies also to other regional sections. (Faust, Eberhard, Munich Reinsurance Company)	Adaptation subsection was removed
918	4	51	20	51	21	Sentence "African women...": is this relevant in the context of climate extremes? Suggest to delete. (Stocker, Thomas, IPCC WGI TSU)	This paragraph was removed
919	4	51	24	0	0	Section 4.5.3: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	This issue has been settled
920	4	51	24	0	0	4.5.3: Unnecessary repeats of changes in physical conditions (IPCC WGII TSU)	It was settled with CH3

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
921	4	51	24	54	20	Here again no mention is made of other issues and trends as announced in the brief introduction to the regional section. All is purely on climate impacts. The question here and in other subsections on other continents is what is the value added in dealing with this at a continental scale, but where all the examples are in fact national--that is not a regional approach as such, but rather, an aggregated national approach. Little comparative or generalised information is given that would provide these sections with a "regional" as opposed to national, even if, different continent approach. The notion of region and regional approach should not be inductive, but rather deductive, and there is a good deal written on regional approaches which is simply not discussed or reflected here and in other regional sections. Moreover, in most continents the differences between north and south, east and west are very large, so what gives them unity? Mexico and Argentina, or China and Malaysia are so different that the issues we are dealing with are more nationally resolved than regionally determined--so why a regional approach? Reasons there are for a regional approach but they are not taken up on and resolved here in these sections. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (LASSO))	The physical impacts were removed to CH3
922	4	51	30	51	46	The content of these paragraphs may be more appropriate in Chapter 3, Section 3.3.1. (IPCC WGII TSU)	It has been removed to CH3
923	4	51	36	0	0	"at 143 stations across ten APN countries" should be added to the sentence starting with " During 1955-2007 averaged over the Asia-Pacific Network (APN) region at 143 stations across ten APN countries, annual frequency of (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Deleted.
924	4	51	52	52	3	Discussion of drought that does not involve its impacts on ecosystem, humans, etc. could be eliminated or moved to Section 3.5.1. (IPCC WGII TSU)	Deleted with followin the comment.
925	4	51	52	52	34	Asian wetlands provide many rsources to peple in inundation areas. Droughts threaten those people. Kazama et al., 2009 (Ch.4, page 107, 16th line) described this influeces. Smaller inundation also affects local people life. (Kazama, So, Tohoku University)	Added the paragraph based on the suggested article. Thanks.
926	4	52	16	52	29	Articles referred in this parts are too past, so please review the latest isures. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	We have added references.
927	4	52	18	52	19	Please explain the trend of precipitation shortage in different seasons. (Kazama, So, Tohoku University)	This chapter focuses more on trends in impacts, as opposed to assessing the physical science of changes in extreme events. Thus, this sentence has not been expanded accordingly.
928	4	52	31	52	34	Because Japan islands get enough precipitation from the summer Monsoon, the paddy rice yield is strongly controlled only by the temperature. Iizumi et al. (2009) has developed the impact function on regional paddy rice yield and foud that thing. Though, we still need to concern on extremes, because the plants have vulnerability on the extreme temprarute. Ref.: (1) Iizumi, T., M. Yokozawa and M. Nishimori, 2009. Development of impact functions on regional paddy rice yield in Japan for integrated impact assessment models. J. Agric. Meteorol. 65 (2): 179-190. (Takayabu, Izuru, Meteorological Research Institute)	Impacts of extreme high temperature on rice production is additionally stated. For the statements, the section on agricultural impact in this chapter is refered.
929	4	52	37	52	45	Articles in this paragraph are not listed in 'References'. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Deleted.
930	4	52	37	53	10	Discussion of precipitation trends could be moved to Section 3.3.2. (IPCC WGII TSU)	Deleted with following the comment.
931	4	52	41	0	0	Kanai et al. 2004 - actually, Kanae et al. 2004 (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Deleted with following the comment from other reviewers.
932	4	53	12	53	14	Does 30 billion US\$ applies to material losses and more than 3500 (billion US\$??) applies to material damage? What is the difference between materiall loss and damage? (Wibig, Joanna, University of Lodz)	Deleted.
933	4	53	27	53	33	Other works do exist. For instance, Ranger et al. (2010) [Ranger N., S. Hallegatte, S. Bhattacharya, M. Bachu, S. Priya, K. Dhore, F. Rafique, P. Mathur, N. Naville, F. Henriet, C. Herweijer, S. Pohit, J. Corfee-Morlot, A Preliminary Assessment of the Potential Impact of Climate Change on Flood Risk in Mumbai, Climatic Change, accepted] apply the risk analysis approach to the city of Mumbai and the risk from heavy rainfall, concluding that that total losses (direct plus indirect) associated with a 1-in-100 year event could rise by up to 200% (i.e. triple) in the 2070's compared with current situation (to \$690 – \$1890 million USD, including \$100-\$400 million USD of indirect losses), and that adaptation could significantly reduce future losses; estimates suggest that by improving the drainage system in Mumbai, losses associated with a 1-in-100 year flood event today could be reduced by as much as 70%, and by extending insurance to 100% penetration, the indirect effects of flooding could be almost halved. (Hallegatte, Stephane, CIREN and Meteo-France)	Added the paragraph based on the suggested article. Thanks.
934	4	53	35	53	43	Parts from the second sentence of this paragraph onward, it is too ideal to note the results section. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Deleted.
935	4	53	41	53	41	In Japan, we also have Nagoya-area as one of the mega-cities other than Tokyo or Osaka. (Takayabu, Izuru, Meteorological Research Institute)	Deleted.
936	4	53	45	53	50	Where are the scientific references for this paragraph? How were two dozen glacial lakes considered potentially dangerous? Why would these glaciers become dangerous in two decades? This paragraph is very vague and lacks any scientific basis. (Stocker, Thomas, IPCC WGI TSU)	Deleted
937	4	53	46	53	47	No criteria is shown for these potential high risk lakes. This is baseless assertion. (Fujita, Koji, Nagoya University)	Deleted
938	4	53	46	53	50	Few reference was cited here. (Fujita, Koji, Nagoya University)	Deleted.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
939	4	53	47	53	50	Outburst volume of Lugge GLOF in 1994 should be addressed. Some numbers were given but that by Richardson and Reynolds (2000) may be typo. Fujita et al. (2008) summarized and re-evaluated the volume and then pointed out the potential site of outburst. (Fujita, Koi, Nagoya University)	Deleted.
940	4	53	52	54	11	Much of this discussion of tropical cyclone intensity and frequency could be moved to Section 3.4.4. (IPCC WGII TSU)	Deleted.
941	4	53	52	54	11	This section might reference Case Study 9.1, "Tropical Cyclones," and/or Case Study 4.2.1.1.1, "Sidr (2007) in Bangladesh versus Nargis (2008) in Myanmar." (IPCC WGII TSU)	References to case studies have been considered and added throughout this section.
942	4	53	53	54	11	As previously noted, we don't agree that chapter 4 should be providing any assessment of regional climate projections or observations as this is the role of chapter 3. The few selected references cited here are not recent and don't provide a basis for an assessment. For example, it is weak to report a projected 10 - 20 % increase in tropical cyclone intensity from a 2004 paper, when several other more recent studies are now available and assessed in chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Tried to follow the point of this comment at maximum and deleted the relevant paragraphs.
943	4	53	53	54	3	Instead of qualitative descriptions such as increased or decreased, please try to explain with quantitative numbers. (Kazama, So, Tohoku University)	Deleted.
944	4	54	11	0	0	In order to overcome small number of realizations in model projections, stochastic TC models are developed to evaluate coastal hazard risks in Yasuda et al. (2010): Tomohiro Yasuda, Hajime Mase and Nobuhito Mori: "Projection of future typhoons landing on Japan based on a stochastic typhoon model utilizing AGCM projections", Hydrological Research Letters, Vol. 4, pp.65-69, (2010) . (Nakaegawa, Toshiyuki, Meteorological Research Institute)	Assessment of studies on physical change will not be done in this chapter but in Chapter 3. Thank you for the suggestion of the literature.
945	4	54	23	0	0	Section 4.5.4: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	The 2nd order draft was revised to some extent along these lines, with further perfection of linkages to chapter 3 insured in the final draft of the chapter.
946	4	54	23	0	0	Section 4.5.4. The main hazards described for Europe are unbalanced reported to their frequency and consequences. I refer to the extension granted here to avalanches comparing to heat waves, for example. Cold waves are completely forgotten, although they have already led not only to "classic" consequences like casualties, but also to dramatic political developments, mainly among Russia, Ukraine and EU. (Cheval, Sorin, National Meteorological Administration)	Only those extremes considered more relevant are addressed
947	4	54	23	57	30	Section 4.5.4: Missing hazards: summery convective events such as hail, downburst winds, tornado. See for instance: Kuntz, M. & Sander, J. & Kottmeier, C. (2009): Recent trends of thunderstorm and hailstorm frequency..., International Journal of Climatology 29:2283-2297. Also rockfalls in the Alps might be mentioned in addition. (Faust, Eberhard, Munich Reinsurance Company)	Only those extremes considered more relevant are addressed
948	4	54	26	54	27	There is no automatic relationship between decreasing population and ageing population. This of course occurs but you can have decreasing population of a country with a trend to a younger profile overall. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Deleted trend on decreasing population.
949	4	54	38	54	44	For urban inhabitants, more should be said about the fabric of the city affecting the formation of heat islands: open spaces, green areas, streets and roofs implantaion, asphalt areas, and so forth. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	Inserted reference to urban fabric
950	4	54	38	54	44	This section might reference Case Study 9.2, "Urban Heat Waves, Vulnerability and Resilience," or Case Study 4.3.4.4, "Extraordinary Heat Wave in Europe, Summer 2003." (IPCC WGII TSU)	Cited
951	4	54	39	54	40	This sentence could reference Section 3.3.1. (IPCC WGII TSU)	Referred
952	4	54	46	0	0	"Impacts of extreme events within a single geographical region can also have variable effects at different times. For example, fire burns at a higher intensity during parts of the year that have low humidity." (Jentsch, Anke, University of Koblenz-Landau)	This point was considered in the revision of the chapter.
953	4	54	46	55	14	The works of Lehner et al. (2006) and Feyen and Dankers (2009) assessing changes in hydrological droughts for Europe are relevant here and need to be included. (Feyen, Luc, Joint Research Centre, European Commission)	Deleted all text and references about physical impacts
954	4	54	46	55	14	The works of Lehner et al. (2006) and Feyen and Dankers (2009) assessing changes in hydrological droughts for Europe are relevant here and need to be included. References: Feyen, L., and R. Dankers, 2009. Impact of global warming on streamflow drought in Europe. Journal of Geophysical Research, 114, D17116, doi:10.1029/2008JD011438. Lehner, B., P. Döll, J. Alcamo, T. Henrichs, and F. Kaspar, 2006. Estimating the impact of global change on flood and drought risks in Europe: A continental integrated analysis. Clim. Change, 75, 273-299, doi:10.1007/s10584-006-6338-4. (Feyen, Luc, Joint Research Centre, European Commission)	Deleted all text and references about physical impacts
955	4	54	46	55	8	This section could reference Case Study 9.2, "Urban Heat Waves, Vulnerability, and Resilience," especially the "Fires in Europe" paragraph. (IPCC WGII TSU)	OK
956	4	54	47	55	2	Much of this description of drought might be more appropriate in Section 3.5.1. (IPCC WGII TSU)	Deleted all text and references about physical impacts
957	4	54	49	54	50	But can be related to the combined effect of higher water demand and climate change. There is a likely situation that this is true. (SERGI, SABATER, University Girona)	This has been deleted.
958	4	55	0	0	0	P55:Netherlands sea level!!! (IPCC WGII TSU)	The sentence has been revised appropriately.
959	4	55	10	55	14	this section should be starting on line 3 (i.e. before the section on forest fires) (Wehrli, Andre, European Environment Agency)	OK, changed
960	4	55	16	55	32	This section could potentially reference Case Study 9.9, "Vulnerable Coastal and Mega Cities." (IPCC WGII TSU)	We have considered this reference but not added it

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
961	4	55	17	55	17	there are no natural disasters. Please do not use this term. See also no. 2 (Wehrli, Andre, European Environment Agency)	changed
962	4	55	17	55	21	Further evidence of coastal flood risk in the UK in a changing climate is provided by: Hall, J.W., Sayers, P.B., Walkden, M.J.A. and Panzeri, M. Impacts of climate change on coastal flood risk in England and Wales: 2030-2100. Phil. Trans. Royal Society, A 364 (2006) 1027–1049. (Hall, Jim, Newcastle University)	No need to refer more on physical impacts on this section. We briefly discuss the occurrence of coastal flooding, but our focus must be on impacts beyond this.
963	4	55	17	55	21	The context of this paragraph on coastal flooding might be more appropriate in Section 3.5.2. (IPCC WGII TSU)	Several sentences on physical impacts were deleted.
964	4	55	29	55	32	this para on costs could be merged with Section 4.6 which deals with Cost etc. (Stocker, Thomas, IPCC WGI TSU)	OK
965	4	55	34	55	45	This chapter almost exclusively touches some effects of storms on forests. There exists, however, more literature on projected changes of storm damage to residential buildings, for example Leckebusch, G. C., U. Ulbrich, L. Fröhlich, and J. G. Pinto, 2007: Property loss potentials for European midlatitude storms in a changing climate. Geophys. Res. Lett., 34, L05703, doi:10.1029/2006GL027663. or Pinto, J.G., L. Fröhlich, G.C. Leckebusch, U. Ulbrich, 2007: Changing European Storm loss potentials under modified climate condition according to ensemble simulations of the ECHAM5/MPI-OM1 GCM. Natural Hazards and Earth System Sciences, 7, 165–175. For central Europe, ensemble mean changes are in the order of 30% from the end of the last century to the end of this century according to A1B scenario simulations. (Ulbrich, Uwe, Freie Universitaet Berlin)	Cited literature on projected changes on damage in buildings
966	4	55	42	55	42	What does "private" refer to in this sentence? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	delete private
967	4	55	43	55	45	In other parts of this chapter/the report it is pointed out that an increase in damage is not necessarily directly linked to more extreme events (but also to other rather socio-economic factors). This sentence is a contradiction to this and in my eyes, it is wrong to say that and increase in wind damage is not predicted ...as can be extracted from lacking evidence of increasing wind speeds (Wehrli, Andre, European Environment Agency)	sentence changed
968	4	55	47	56	4	It is not correct, and in contradiction with other statements in this report (see e.g., Chapter 3, Section 3.5.2.1, page 65, lines 61-62: "In summary, except for the abundant evidence for an earlier occurrence of spring peak river flows in snow-dominated regions (likely), no clear and widespread observed evidence is found in the AR4 and research subsequent to the AR4."; or Chapter 4, Section 4.2.5, page 20, lines 24-26: "There is no conclusive evidence that anthropogenic climate change has lead to increasing losses, and increasing exposure of people and economic assets is most likely the major cause of the long-term changes in economic disaster losses.") to state that climate has contributed to the considerable increase in flood losses. This is not supported by evidence. Also, the study of Luger et al. (2010) does not involve any analysis of past flood events that justifies the study to be cited in relation with observed trends of flood damages. It is really striking that in this respect the study of Barredo (2009) on normalized flood losses in Europe is not mentioned, but rather the paper of Luger et al. (2010) is taken as a reference. References: Barredo, J.I., 2009. Normalised flood losses in Europe: 1970-2006. Natural Hazards and Earth System Sciences, 9, 97-104. (Feyen, Luc, Joint Research Centre, European Commission)	sentence changed. Barredo 2009 cite included in text
969	4	55	48	55	48	flooding is a hazard, not a risk, see eg. no. 18 (Wehrli, Andre, European Environment Agency)	changed
970	4	55	53	55	53	I think that you should introduce/use the term pluvial floods/flooding here (Wehrli, Andre, European Environment Agency)	The term "pluvial floods" is thought to be overly technical
971	4	56	6	0	0	There are two papers Kundzewicz et al., 2010. They should be somehow distinguishable. (Wibig, Joanna, University of Lodz)	OK
972	4	56	6	56	14	This paragraph on floods might be moved to Section 3.5.2. (IPCC WGII TSU)	Paragraph deleted
973	4	56	6	56	19	With regard to the projection of future floods I have several comments: I find it striking, and scientifically questionable, that in the discussion of changes in flood hazard the work of Kundzewicz et al. (2010) is cited, whereas, again, it does not include any analysis that justifies it to be cited in relation to changes in recurrence intervals. Rather, studies that have assessed these issues for Europe are those of Lehner et al. (2006) and Dankers and Feyen (2008, 2009), and they should be cited instead. Having said this, this discussion on changes in flood hazard (i.e., the physical aspect) and flood recurrences, including Figure 4-14, does not relate directly to vulnerability, exposure and impacts, so it is more appropriate in Chapter 3 of the report. For projections of flood risk (combination of the hazard with exposure and vulnerability, which is more appropriate in this section) the works of Hall et al. (2005) and Feyen et al., (2009; 2010) should be cited. The first article assesses changes in flood risk in England and Wales, the latter two evaluate changes in flood risk at the European scale. References: Dankers, R., and L. Feyen, 2008. Climate change impact on flood hazard in Europe: An assessment based on high resolution climate simulations. Journal of Geophysical Research-Atmospheres, 113(D19105). Dankers, R., and L. Feyen, 2009. Flood hazard in Europe in an ensemble of regional climate scenarios. Journal of Geophysical Research-Atmospheres, 114(D16108). Lehner, B., P. Doll, J. Alcamo, T. Henrichs, and F. Kaspar, 2006: Estimating the impact of global change on flood and drought risks in europe: A continental, integrated analysis. Climatic Change, 75(3), 273-299. Feyen, L., R. Dankers, K. Bódis, P. Salamon, J.I. Barredo, 2010. Climate warming and future flood risk in Europe. Climatic Change (submitted – reviews received on September 17, 2010, paper quasi accepted). Feyen, L., J. I. Barredo and R. Dankers, 2009: Implications of global warming and urban land use change on flooding in Europe. Water and Urban Development Paradigms - Towards an Integration of Engineering. In: Design and Management Approaches [Feyen, J., K. Shannon and M. Neville (eds)] CRC Press, 217-225. Hall J.W., Sayers P.B., Dawson R.J., 2005. National-scale assessment of current and future flood risk in England and Wales. Natural Hazards, 36, 147-164. (Feyen, Luc, Joint Research Centre, European Commission)	We have considered all of the papers indicated in this list. Most of them deal with physical impacts more appropriate for chapter 3. Some papers are not even published, and others are already cited.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
974	4	56	13	56	14	several issues: (1) reference EEA 2004b is missing, (2) the risk will not increase but rather the frequency or probability and/or intensity; so I would rather write: The increase of frequency of short-duration precipitation in large parts of Europe are likely to increase the probability of flash floods and pluvial floods. (Wehrli, Andre, European Environment Agency)	Cited added. Sentence changed
975	4	56	21	0	0	really th emost important? There is also soil instability and rockfall due to retreat of glaciers (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	Sentence was changed to more moderate statement regarding GLOFs
976	4	56	22	56	24	There are many more recent peer-reviewed papers that should be referenced here instead of this Damen 1992 draft report. For example, Papers by Huggel et al. 2002, 2003, and 2004; and McKillop and Clague 2007. In any case, should this not be rewritten as the "The highest potential for GLOF events is usually related to...". The highest GLOF hazard on the other hand is related to the characteristics of the flood path, and the amount of infrastructure located in this path. (Stocker, Thomas, IPCC WGI TSU)	Sentence changed. Reference added.
977	4	56	39	56	40	This average fatality rate (120 per year) seems very high, and I could not find where this is reported in McClung and Schaerer. Please be sure this number is correct. (Stocker, Thomas, IPCC WGI TSU)	OK, 25 per year in Switzerland. It was 120 per year for the whole Europe, but I cannot find the cite now. We have updated the text accordingly.
978	4	56	44	56	46	This sentence reads like the impacts of avalanches on human activities and mountain forests are alike, namely adverse. This is, however, not necessarily the case for an ecosystem as a forest, since the very same article you cite (Bebi et al) also highlights the influence of avalanches on biodiversity etc. Thus I would suggest to rephrase this sentence to give the full picture. (Wehrli, Andre, European Environment Agency)	OK, it was added this point.
979	4	57	1	57	27	It should be pointed out, that most of the points listed refer to EU-Europe (Koppe, Christina, Deutscher Wetterdienst)	OK
980	4	57	14	0	0	The EU also published in 2008 a Communication on Drought and Water Scarcity (Darch, Geoff, Atkins & University of East Anglia)	OK added
981	4	57	14	57	15	The EU Floods Directive is not only about flood preparedness but about Flood Risk Management as a whole. (Wehrli, Andre, European Environment Agency)	OK
982	4	57	17	57	17	"it is recommended" should be avoided in order not to appear policy prescriptive. (Stocker, Thomas, IPCC WGI TSU)	OK
983	4	57	18	0	0	For example, in the UK there is a 20% indicative sensitivity range for peak river flows (Defra (2006) Flood and Coastal Defence Appraisal Guidance FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts October 2006) (Darch, Geoff, Atkins & University of East Anglia)	Yes, this is one example of national recommendations (also in: Germany, the Netherlands)
984	4	57	18	0	0	The same as previous note (Wibig, Joanna, University of Lodz)	Reference has to be modified accordingly
985	4	57	25	57	27	Even if the title of Schelhaas et al's paper also mentions forestry, I think it should rather be forests or forest management, since forestry is too narrow (Wehrli, Andre, European Environment Agency)	OK
986	4	57	25	57	27	This chapter almost exclusively touches adaptation forests. For residential buildings, adaptation is also important, as it can drastically reduce projected damages. See for example Leckebusch, G. C., U. Ulbrich, L. Fröhlich, and J. G. Pinto, 2007: Property loss potentials for European midlatitude storms in a changing climate. Geophys. Res. Lett., 34, L05703, doi:10.1029/2006GL027663. or Pinto, J.G., L. Fröhlich, G.C. Leckebusch, U. Ulbrich, 2007: Changing European Storm loss potentials under modified climate condition according to ensemble simulations of the ECHAM5/MPI-OM1 GCM. Natural Hazards and Earth System Sciences, 7, 165–175 (Ulbrich, Uwe, Freie Universität Berlin)	Reference added
987	4	57	29	0	0	Table 4-14: Tables that are basically built around hazard, extreme, vulnerability, impact have a number of different arrangements, and it is difficult to move from one to the other. The layout extreme, hazard, exposure, vulnerability, impact makes sense to me. (IPCC WGII TSU)	Good proposal, but the Table has to be largely modified anyway
988	4	57	33	0	0	Section 4.5.5: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
989	4	57	33	0	0	4.5.5 watch for repetition of climate information in ch 3 (IPCC WGII TSU)	As 988
990	4	57	33	58	33	Since this section only describes examples from South America, It should be called: Section 4.5.5 South America. It is misleading to call it Latin America !! However, this section would benefit if several examples from Latin America are really included. If this could be done I suggest the following readings that include extremes from Mexico, the Caribbean Islands, and Central America. I will put each reference in a separate line. (Cavazos, Tereza, CICESE)	Now Central and South America
991	4	57	33	58	37	This is not a section on Latin America but rather a few selected important Amazonian and Brazilian examples accompanied by some general statement of little use to understanding the diversity of the region. There is no reason to have a regional section if this is all we are going to include in it. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Section substantially extended by a CA

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
992	4	57	33	58	37	A peer-reviewed report that includes all types of extreme events in North America including Mexico, and the Caribbean Islands is: CCSP, 2008: Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [Thomas R. Karl, Gerald A. Meehl, Christopher D. Miller, Susan J. Hassol, Anne M. Waple, and William L. Murray (eds.)]. Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C., USA, 164 pp. ALSO, Chapter 2, from this report: Kunkel, K.E., P.D. Bromirski, H.E. Brooks, T. Cavazos, A.V. Douglas, D.R. Easterling, K.A. Emanuel, P.Ya. Groisman, G.J. Holland, T.R. Knutson, J.P. Kossin, P.D. Komar, D.H. Levinson, R.L. Smith, 2008: Observed Changes in Weather and Climate Extremes in Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. T.R. Karl, G.A. Meehl, C.D. Miller, S.J. Hassol, A.M. Waple, and W.L. Murray (eds.). A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC. NOTE: The report is freely available at: http://downloads.climate-science.gov/sap/sap3-3/sap3-3-final-all.pdf (Cavazos, Tereza, CICESE)	Missing section on North America is added
993	4	57	33	58	37	Alexander et al., 2006: Global observed changes in daily climate extremes of temperature and precipitation. J. Geophys. Res., Vol. 111, D05109, doi: 10.1029/2005JD006290, 2006. (Cavazos, Tereza, CICESE)	This citation is more relevant to the scope of chapter 3.
994	4	57	33	58	37	Aguilar et al., 2005: Changes in precipitation and temperatures extremes in Central America and northern South America, 1961-2003. J. Geophys. Res., Vol. 110, D23107, doi: 10.1029/2005JD006119, 2005. (Cavazos, Tereza, CICESE)	Chapter 3 reference
995	4	57	33	58	37	Arriaga-Ramirez, S. and T. Cavazos, 2010: Regional trends of daily precipitation indices in northwest Mexico and southwest United States. J. Geophys. Res., Vol. 115, D14111, doi: 10.1029/2009JD013248, 2010. (Cavazos, Tereza, CICESE)	Chapter 3 reference
996	4	57	33	58	37	Cavazos, T., C. Turrent, and D. Lettenmaier, 2008: Extreme precipitation trends associated with tropical cuclones in the core of the North American monsoon. Geophys. Res. Lett., Vo. 35, L21703, doi:10.1029/2008GL035832, 2008. (Cavazos, Tereza, CICESE)	Chapter 3 reference
997	4	57	33	58	37	This section on Latin America is limited in scope. There is no mention of southern South America (Argentina, Chile), the High Andes (with glacier retreat) and Central America and the Caribbean. This needs to be expanded. (GIROT, Pascal, IUCN)	Section ustantially extended by a CA
998	4	57	44	57	45	Instead of using the word "enormous," it would be better to give a quantitative indication of the linkage or to use a more precise term to describe it. (IPCC WGII TSU)	Editorial commnet
999	4	58	8	58	15	This description of precipittation trends and projections could be moved to Section 3.3.2. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1000	4	58	19	58	25	This description of precipitation trends and projections might also be moved to Section 3.3.2. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1001	4	58	40	0	0	Section 4.5.6: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1002	4	58	46	0	0	Section 4.5.7: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1003	4	59	0	0	0	P59: conflating climate and demographic effects criticized in Dutch review of IPCC (IPCC WGII TSU)	We agree that it is essential to clearly communicate the contribution of changes in vulnerability, exposure, and extreme events themselves. Here we provide an illustration of a multi-factor (climatic, non-climatic) case.
1004	4	59	1	59	22	Some of this material might be more appropriate in Section 3.3.1. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1005	4	59	1	59	4	These sentences could reference relevant sections in Chapter 3. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1006	4	59	2	59	3	This is a very generalised statement. In each case, references should be cited to support the claims that heat waves, fires, floods, landslides, droughts and storm surges are projected to increase in frequency and intensity. (Stocker, Thomas, IPCC WGI TSU)	More nuanced, Chapter 3 based, wording needed
1007	4	59	12	0	0	Please explain if it is the same regions in Australia and New Zeland are affected by LaNina as affected by El Nino. (Kazama, So, Tohoku University)	We have to cut on words rather than giving more and more technical details
1008	4	59	18	59	31	Information could be updated? Eg Bureau of Meteorology 2009, Special Climate Statement (as per Chapter 9, case study 9.6) (Chambers, Lynda, Australian Bureau of Meteorology)	yes
1009	4	59	28	59	37	The number of deaths in the first part is in absolute numbers on relative (per 100 000)? In the second part 82 per 100000 of all citizens or people above 65 and is these numbers related to deaths caused by heat waves or deaths at all? (Wibig, Joanna, University of Lodz)	These lines accurately reflect cited reference
1010	4	59	46	59	50	No references have been given for this section. (Kazama, So, Tohoku University)	Further references were included in the final draft of the chapter.
1011	4	60	0	0	0	P60 Watch informal use of likely (IPCC WGII TSU)	Yes
1012	4	60	6	60	17	This section could reference Case Study 9.6, "Drought, Heat Wave, and Black Saturday Bush Fires in Victoria" or Box 4-2 on the Melbourne fires. (IPCC WGII TSU)	Cross-chapter referencing would help throughout (editorial matter)

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1013	4	60	7	60	17	Update to include 2009 event, e.g. using information from box 4.2 (Chambers, Lynda, Australian Bureau of Meteorology)	Cross-chapter referencing would help throughout (editorial matter)
1014	4	60	20	60	22	These sentences could be linked to Section 3.3.2. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1015	4	60	42	60	43	Links to Section 3.4.4 should be considered and perhaps made explicit. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1016	4	61	14	0	0	Section 4.5.8: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. We acknowledge, however, that the Open Ocean is currently not well covered in Chapter 3 and this needs to be added there in order to allow Chapter 4 to use Chapter 3 as the basis of its assessment. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1017	4	61	14	0	0	4.5.8 need to think about meaning of extreme impact (IPCC WGII TSU)	Yes, agreed. Especially in the preparation of the final draft of the chapter, we altered the scope this section accordingly.
1018	4	61	16	66	39	These sections on polar and ocean areas although rich in detail dont seem to take up particularly on the impact of extreme events, but rather on impact in general. One constantly asks oneself with this section and other regional sections and elsewhere, how this information contributes to the final goal of the study--seeing how management of risk associated with extremes and disasters can advance adaptation. I see little in these sections that would give me a notion as to that central aim. Most is just information divorced from the central DRM and adaption debate and needs and could be in another type of evaluation report, but not necessarily or obligatorily in this one. (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	Attempt to focus on impacts undertaken
1019	4	61	25	61	32	This is to bring your attention on another significant impact of surface warming of the oceans. The freshwater and seawater within coastal aquifers are separated by a transition zone within which there is mixing between freshwater and saltwater. Seawater intrusion to the inland in a fresh water aquifer is therefore alters the aquifer thermal regime. This is because, seawater and groundwater are generally two different temperatures, and therefore, the degree to which waters mix in the transition zone decides the pattern of temperature distribution (Gunawardhana & Kazama, 2009; Journal of Hydrology Vol 377, 377-390). Therefore, surface warming of the oceans can have direct impact for the groundwater dominated coastal ecosystems. Please do consider to include if appropriate. (Kazama, So, Tohoku University)	Yes, but the comment does not refer to opean oceans
1020	4	61	25	61	32	It might be worth making more explicit how the described warming and its impacts can be viewed as extreme--or are they more nearly gradual? (IPCC WGII TSU)	Gradual trend and variability (with extremes) superimposed
1021	4	62	14	62	31	paragraph on MOC shutdown assesses mostly Chapter 3-type science. We suggest that (1) Chapter 4 needs to refer back to WGI AR4 and discusses with Chapter 3 the need for projections of MOC changes, (2) there may need to be a MOC discussion included in Chapter 3, and (3) Chapter 4 should not go into the details of projections, uncertainties, physical mechanisms of these changes, but focus on the impacts on human systems and ecosystems. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1022	4	62	14	62	31	The idea of collapsing of the MOC in response to climate change is rather pessimistic. Cited paper of Keller et al. 2010 is not present in reference list. In the paper of Urban and Keller, 2010 (Probabilistic hindcasts and projections of the coupled climate, carbon cycle and Atlantic meridional overturning circulation system: a Bayesian fusion of century-scale observations with a simple model, Tellus A, DOI: 10.1111/j.1600-0870.2010.00471.x) authors wrote "Our hindcasts show considerable skill in representing the observational constraints. We show that robust AMOC risk estimates can require carefully sampling the parameter pdfs. We find a low probability of experiencing an AMOC collapse within the 21st century for a business-as-usual emissions scenario. The probability of experiencing an AMOC collapse within two centuries is 1/10. The probability of crossing a forcing threshold and triggering a future AMOC collapse (by 2300) is approximately 1/30 in the 21st century and over 1/3 in the 22nd. Given the simplicity of the model structure and uncertainty in the forcing assumptions, our analysis should be considered a proof of concept and the quantitative conclusions subject to severe caveats." In paper of Brennan et al 2008 it is stated "The North Atlantic meridional overturning circulation (MOC) may weaken or even collapse in response to anthropogenic climate forcing, with potentially nontrivial socioeconomic impacts. One currently implemented MOC observation system uses temperature and salinity (as well as other) observations along a zonal transect in the North Atlantic. The resulting MOC estimate has, however, a relatively low signal-to-noise ratio due to large internal variability and observation errors." It is really difficult to predict collapsing of MOC on such base. The paper of Laurian et al 2009 analyses only the result of MOC collapsing without any proof that such collapsing is probable or not. So the paragraph should be reedited in the less panic way reflecting our actual knowledge about the problem. (Wibig, Joanna, University of Leeds)	More nuanced, Chapter 3 based, wording needed
1023	4	62	49	63	20	It would be beneficial to make clear how changes in ice cover and associated impacts are extreme, and not just gradual, events. (IPCC WGII TSU)	Authors seek impact related background material (but - very recent events)
1024	4	63	0	0	0	P63: most of the material in 4.5.8 thinly connected to extremes (IPCC WGII TSU)	Yes, agreed. Especially in the preparation of the final draft of the chapter, the scope of this section was greatly revised.
1025	4	63	30	63	31	A reference is needed to support this 30 % assessment. (Stocker, Thomas, IPCC WGI TSU)	Although a source was not added in the 2nd order draft, this material was deleted in the final draft of the chapter.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1026	4	63	37	0	0	Section 4.5.9: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Large parts of the assessment given here deals with Chapter 3-type science. In particular, each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. Also please note: The quality of the scientific referencing in this 'Polar region' section needs attention. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1027	4	63	37	0	0	Section 4.5.9 Opening paragraph includes the Antractic and around the South Pole, yet this is not discussed in the rest of the section. Needs to be included. Could start with Steig EJ et al 2009 Warming of the Antarctic ice-sheet surface since the 1957 International Geophysical Year. Nature 457, 459-462 (Chambers, Lynda, Australian Bureau of Meteorology)	Antractic included
1028	4	63	42	63	42	"north of Europe, Asia and North America" change by "north of Europe, north Asia and North America (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	it is edited
1029	4	63	42	63	43	Permafrost territory is not necessarily treeless. (Stocker, Thomas, IPCC WGI TSU)	Polar region not same permafrost
1030	4	63	45	0	0	a sentence "Permafrost threatened by rapid retreat of Arctic sea level" can be added. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	it is deleted
1031	4	63	45	63	45	Where is the reference to support this statement regarding Arctic temperature rise? AR4? (Stocker, Thomas, IPCC WGI TSU)	it is deleted
1032	4	63	45	63	52	In the last century air temperature in Arctic region has risen one and a half as fast as the global temperature (0.09degree/decade over Arctic in comparison with 0.06 degrees/decade for the global temperature : ACIA, 2005; Polyakov, I.V., G.V. Alekseev, R.V. Bekryaev, U. Bhatt, R.L. Colony, M.A. Johnson,V.P. Karklin,A.P. Makshtas, D.Walsh and A.V.Yulin, 2002; Observationally based assessment of polar amplification of global warming. Geophysical Research Letters, 29(18):1878, 0.1029/2001GL011111. Polyakov, I.V., G.V. Alekseev, R.V. Bekryaev, U.S. Bhatt, R. Colony, M.A. Johnson,V.P. Karklin, D.Walsh and A.V.Yulin, 2003a. Long-term ice variability in Arctic marginal seas. Journal of Climate, 16(12): 2078–2085; Polyakov, I.V., R.V. Bekryaev, G.V. Alekseev, U.S. Bhatt, R.L. Colony, M.A. Johnson,A.P. Makshtas and D.Walsh, 2003b.Variability and trends of air temperature and pressure in the maritime Arctic, 1875–2000. Journal of Climate, 16:2067–2077.) It is less than twice mentioned in the text (line 45). In the same papers it possible to find references to observational data. (Wibig, Joanna, University of Lodz)	it is deleted
1033	4	63	45	63	52	Described climate changes and physical events could be linked to relevant sections in Chapter 3 (e.g., Section 3.3.1 and 3.5.7). (IPCC WGII TSU)	physical events are deleted
1034	4	63	49	63	49	..., Sherstyukov, 2009) chngs by ..., Sherstyukov A.B, 2009) (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	technical error-corrected
1035	4	64	7	64	7	(Sherstyukov, 2007) <input type="checkbox"/> change i Hydrometeorological Information - World)	technical error-corrected
1036	4	64	9	65	22	This section could reference Case Study 9.11, "Vulnerable Regions: Case Study: The Arctic." (IPCC WGII TSU)	I do not agree
1037	4	64	10	64	11	Where are the references to the studies that have observed these significantly faster rates of change? (Stocker, Thomas, IPCC WGI TSU)	Stroeve, J., M.M. Holland, W. Meier, T. Scambos and M. Serreze, 2007: Arctic sea ice decline: Faster than forecast. 30 Geophysical Research Letters, 311(5763), 986-990, DOI: 10.1029/2007GL029703.
1038	4	64	10	64	30	Some of this description of gradual physical changes might be moved to Sections 3.5.6 and 3.5.7. (IPCC WGII TSU)	To Exclude
1039	4	64	17	0	0	How the paper from 2001 can mention about the event which happened in 2002 (extreme melting). (Wibig, Joanna, University of Lodz)	Reference is added
1040	4	64	19	64	19	Recent changes' should be supported by citing some 'recent' studies, eg, Velicogna 2009. (Stocker, Thomas, IPCC WGI TSU)	it is added
1041	4	64	23	64	24	Acceleration of what? Flow speed? Discharge? Unclear. (Fujita, Koji, Nagoya University)	Acceleration of ice discharge
1042	4	64	29	64	30	This 40 - 80 cm thawing and northward shift of the isotherm is specific to the Russian Arctic only, and should be noted as such. (Stocker, Thomas, IPCC WGI TSU)	it is noted
1043	4	64	29	64	53	As previously noted, there is much repetition here with the 'About Permafrost' section (4.2.2.1). For example, the same sentences which refer to a 40 - 80 cm increase in thawing, and increase risk of disease from permafrost thawing have appeared now in three different sections of Chapter 4! (page 14-15, page 46, and page 64). Please remove this repetition!. (Stocker, Thomas, IPCC WGI TSU)	page 46 - remove?
1044	4	64	30	64	30	(Sherstyukov, 2009) change by (Sherstyukov A.B., 2009) (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	technical error-corrected
1045	4	64	41	64	41	"Anisimov and Belolutsky, 2002" change by "Anisimov and Belolutskaya, 2002" (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	technical error-corrected
1046	4	64	44	64	49	Repetition - see page 15, lines 5-10 (Hama, Angela Michiko, United Nations International Strategy for Disaster Reduction)	I is excluded from 4.2.2.1
1047	4	65	6	65	10	Discussion of trends in snow cover could be linked to similar sections in Chapter 3. (IPCC WGII TSU)	I do not agree
1048	4	65	8	0	0	A publication of the year 2002 cannot tell us something about "the past three decades" (written in 2010/11). (Faust, Eberhard, Munich Reinsurance Company)	It is corrected "the past three decades till 2002"

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1049	4	65	9	65	10	Where are the references to studies that have made these projections? (Stocker, Thomas, IPCC WGI TSU)	Reference added
1050	4	65	25	65	28	The described trends in river flows (also from lines 39 to 42 on this page) could be linked to Section 3.5.2. (IPCC WGII TSU)	Chapter 3 / Chapter 4 issues need a systemic solution. We partly resolved this issue of linkages across the chapters in the 2nd order draft, and in the final draft we perfected the linkages.
1051	4	65	30	65	32	Statements like this concerning large scale physical climate interactions-feedbacks should be found in Chapter 3, and not Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	OK
1052	4	65	30	65	32	Very strong changes with strong impact on future climate on 3 lines and without any reference. It is not possible in any credible report. (Wibig, Joanna, University of Lodz)	Reference is added
1053	4	65	44	0	0	Figure 4-17: What are 1, 2 & 3? (IPCC WGII TSU)	Figure is excluded
1054	4	65	54	66	5	To exclude from "in Altai, Transbaikalia. . ." till 66-5. (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	Technical error, corrected
1055	4	66	6	66	6	To include "An increased number of damage-causing floods was recorded in the Arkhangelsk Region. Assessment Report, 2008)." (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	Technical error
1056	4	66	7	66	13	To exclude (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	Technical error, corrected
1057	4	66	12	66	13	Where are the references to these modelling studies? (Stocker, Thomas, IPCC WGI TSU)	Reference added
1058	4	66	12	66	13	You could add to this sentence " as illustrated by the catastrophic wild fires in Siberia during the summer of 2010". (GIROT, Pascal, IUCN)	in polar region was not a fire
1059	4	66	16	66	18	This statement concerning a doubling of the coastal erosion rate and the possible causes, MUST be supported with reference to scientific papers. (Stocker, Thomas, IPCC WGI TSU)	it is deleted
1060	4	66	33	0	0 Kara Sea "which is part of the Arctic ocean north Sibera" should be added for better understanding. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	this is known
1061	4	66	42	0	0	Section 4.5.10: there is quite a lot of general background given here, often the text is verbose, more like in a text book than in an assessment of the most recent science (e.g., section on Demography and Geography on page 67, the section on Changing Vulnerabilities on page 68, or the historical account of the Disaster Risk Management on page 69). (Stocker, Thomas, IPCC WGI TSU)	This section was revised to some extent in the second-order draft. Revision along these lines was completed more extensively also in the preparation of the final draft of the chapter.
1062	4	66	42	0	0	Section 4.5.10: Furthermore the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Large parts of the assessment given here deals with Chapter 3-type science. In particular, each of the subsections dealing with particular climate extremes starts with Chapter 3 - type statements where it would be better to refer to the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	Chapter 3 / Chapter 4 issues need a systemic solution
1063	4	66	42	0	0	Section 4.5.10. Redundancies between this section and Case Study 9.10, "Small Islands Developing States," should be minimized. It may be appropriate for Case Study 9.10 to feature specific examples, while this Chapter 4 section describes broader trends in extreme events and impacts. (IPCC WGII TSU)	Cross-chapter referencing would help throughout (editorial matter)
1064	4	66	42	0	0	4.5.10: Too much background on vulnerability (IPCC WGII TSU)	This section was revised accordingly to some extent in the second-order draft. Revision along these lines was completed more extensively also in the preparation of the final draft of the chapter.
1065	4	66	42	69	28	This section is a complete misnomer. The title refers to small island states and in the first line these are referred to in Indian, Atlantic and Pacific Oceans. But, after that the world is reduced to PICTS and there is nothing on any other part of the world.. In other sections dealing with other continents the authors deal with and refer to adaptation in the region but here they dont, dealing rather with disaster management--again, we need to ask the question, what are we dealing with and how does DRM differ from and link to CCA when the object of intervention may be seen in many cases to be basically the same? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (ELACSO))	New CA Hied from the Indian Ocen to improve the coverage
1066	4	67	20	67	32	If the citation supporting the content of this paragraph is Campbell (2006), the citation should be given in the text of the chapter, in addition to in Table 4-16. (IPCC WGII TSU)	Yes
1067	4	67	38	67	54	These paragraphs would be strengthened by the addition of supporting citations. (IPCC WGII TSU)	Some citations added.
1068	4	68	18	68	36	These paragraphs would be strengthened by the addition of supporting citations. (IPCC WGII TSU)	Sourcing required for this section was insured in the preparation of the final draft the chapter.
1069	4	69	1	69	7	References are necessary. A lot of per cents are mentioned, but it is not clear in relation to what. If 690 000 gives 97 per cent how 66 000 can be 56 per cent? (Wibig, Joanna, University of Lodz)	Sourcing required for this section was insured in the preparation of the final draft the chapter.
1070	4	69	10	69	23	Not all acronyms in this paragraph are explained e.g. SOPAC, SREP (Darch, Geoff, Atkins & University of East Anglia)	Some acronyms were deleted, with clarity insured in preparation the final draft of the chapter.
1071	4	69	10	69	23	These paragraphs would be strengthened by the addition of supporting citations. (IPCC WGII TSU)	Some citations were added, and sourcing required for this section was insured in the preparation of the final draft the chapter.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1072	4	69	31	69	33	Neither am I, as I dont know what it will deal with, but something is needed that links some things to others, tells us why an approach through so called regions is valid and offers another level of analysis and policy information not given by local level or national level analysis. What contextual aspects make one region different to another even if impacts in direct terms are seen to be the same? Why is an approach through regions more valid than a comparative approach looking at similar socio economic, ecosystemic or whatever other types of geographical or functional regions around the world? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	taken away
1073	4	69	33	0	0	This should consider knock-on effects e.g. population movement, flow of goods etc. (Darch, Geoff, Atkins & University of East Anglia)	Section taken away
1074	4	69	36	0	0	Section 4.5.12 Comment on 4oC Rise: see general comment etc. -- We suggest to delete this entire section. (Stocker, Thomas, IPCC WGI TSU)	Deleted
1075	4	69	36	0	0	Section 4.5.12 Comment on 4oC Rise: see general comment etc. -- We suggest to delete this entire section. Interestingly, this particular "comment" explicitly refers to some of the issues related to such an approach: "In general, few studies have specifically applied a scenario of the impact of a global average 4oC warming..." (page 83, line 14). or "Some 4 degree studies are not focused on extremes but rather on slower onset changes in average climate" (page 83, line 17).... (Stocker, Thomas, IPCC WGI TSU)	Deleted
1076	4	69	36	0	0	4.5.12: Again, not clear why this is here. Suggest removal. (IPCC WGII TSU)	deleted
1077	4	69	36	0	0	4.5.12: advise against separate section on 4C rise (IPCC WGII TSU)	deleted
1078	4	69	36	49	49	The comment in this section is too shallow. A much nicer (in depth) comment on the 4oC rise is presented by New et al. This article and the references there in could help improve section 4.5.12: New, M., D. Liverman, and K. Anderson, 2009: Mind the Gap. Commentary. <i>Nature Reports on Climate Change</i> , Vol. 3., December 2009. (Cavazos, Tereza, CICESE)	deleted
1079	4	69	36	69	36	Again, a Section of 4°C seems odd. (Hallegatte, Stephane, CIREN and Meteo-France)	deleted
1080	4	69	38	0	49	Whether included in this section or elsewhere, there really needs to be an acknowledgement that societies may well develop beyond today's standard of living, therefore improving their corresponding capacity to cope. Projecting a 4 degree rise into the future and assessing the likely impact of that rise against today's standard of living is too linear in logic to be of credible use. (Ammann, Walter J., Global Risk Forum GRE Davos)	deleted
1081	4	69	39	69	40	Please explain the range of higher warming for the comparison with 4 °C rise. (Kazama, So, Tohoku University)	deleted
1082	4	69	40	0	0	Regions 'specially' affected - does this mean by 4 degrees warming? (Darch, Geoff, Atkins & University of East Anglia)	deleted
1083	4	70	1	0	0	4.6 could be reorganized to some extent. As a decision was made at the SREX chapters drafting meeting to keep the cost discussion separate from the rest of the chapter, the flow of this section is not as good.To improve it and avoid redundancies, some economics discussion could be integrated with 4.2 and 4.4, where economic issues are mentioned already. Then, 4.6 could replicate the flow of the rest of the chapter by first taking a systems and sector perspective, then a regional one, while distinguishing observations from projections each. Also, "total" in the section heading is a bit redundant, and simply "cost of climate extremes and disasters" may sound better. (Mechler, Reinhard, INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS)	The title is given, but sub-titles and content have been extensively revised.
1084	4	70	1	0	0	Section 4.6: I think this section reads rather well. However, the fact that some of the sections are lacking a parts of the material (e.g., page 79, section 4.6.3.6) or are lacking single references "[references forthcoming]" is very unsatisfactory and makes a sensible review of these sections and the Section overall very difficult. (Stocker, Thomas, IPCC WGI TSU)	added more literatures
1085	4	70	1	0	0	Section 4.6: need to coordinate with Chapter 1 and 2 when introducing key definitions of the conceptual framework (section 4.6.1.1) and when presenting the framework itself (section 4.6.1.2). (Stocker, Thomas, IPCC WGI TSU)	will take linkage of concepts and key findings from former chapters
1086	4	70	1	0	0	Section 4.6: the section needs to closely coordinate with Chapter 3 in order to avoid duplication of the Chapter 3 assessment of the changes in climate extremes and the impacts on natural systems. Each of the subsections dealing with costs of particular climate extremes should refer to the relevant Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	agree and accepted
1087	4	70	1	0	0	If we speak here of "Cost", should not we speak of "Benefit" of some aspects? (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	agree and revise the definition of economic impacts, losses, etc
1088	4	70	1	0	0	Chapter 4.6 includes a substantial section on definitions and methodology. I am not sure this needs to be inserted here. Perhaps definitions could be referred to in chapter 1 and methodological aspects could be included in an appendix to make the main text lighter. The chapter should include general considerations rather than detailed academic discussions and refer directly to the regional data on costs which are very informative. (Bertollini, Roberto, World Health Organization)	this section keeps most relevant concepts of cost/economics here
1089	4	70	3	0	0	4.6.1: informal use of likely (IPCC WGII TSU)	accepted
1090	4	70	24	70	25	Here, as elsewhere, consider a confidence statement rather than "likely" if this statement is not based on explicitly probabilistic information. (IPCC WGII TSU)	agree and will use this
1091	4	70	32	70	33	The paragraf says absolutely "Disaster impacts can be devastating, particularly in heavily exposed low- and middle-income countries, and especially to the vulnerable within those countries." and it is not exactly, not only developing suffer , there are few examples tha disaster may be related with the absence of policy will in some developed states. Example Catrine New Orleans US. (Garrido Vazquez, Raul J. . Min. Science, Technology and Environment)	revised the description, added cases of US
1092	4	70	39	0	0	4.6.1.1 key definitions to ch 1 or 2 (IPCC WGII TSU)	Considered, but we have retained here definitions integral to this section that are overly specific for chapters 1 and 2.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1093	4	70	39	70	39	The Section on Concept and Economic cost needs to be expanded and refined. There are several definitions, depending on the purpose of the assessment, and confusion may arise if the multiplicity of definitions is not recognized. I have text on this question if it can help the authors. A review on that point: Hallegatte S., Przulski, V., 2010, The Economics of Natural Disasters, CESifo Forum 2/2010, July 2010, pp. 14-24 (Hallegatte, Stephane, CIRED and Meteo-France)	revised the description with more literature
1094	4	70	39	71	51	Are those definitions used in Ch4 only, or they shall cover the whole report? These should perhaps be part of the glossary. (Zhang, Xuebin, Environment Canada)	considered
1095	4	70	41	70	44	It is not so much that the impacts become a disaster but rather that the impacts are the disaster! (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	accepted
1096	4	70	46	70	46	"in terms of avoided and reduced losses": I do not think there is much avoided loss of a disaster. This definition seems to be adequate for a policy or a measure. (Hallegatte, Stephane, CIRED and Meteo-France)	accepted
1097	4	70	46	70	47	It would be useful to add the level at which the estimation/assessment is done to this definition as now the reader understands that the estimations are done at a very general society-level. It is difficult to see the usefulness of estimates of net losses and benefits at a theoretical society's level. Costs of climate extremes and disasters are always allocated to someone and losses of climate extremes often focus on the local level or the individual. Also, adaptation is almost always a local action. If the discussion is on a theoretical society's level the valuable information of who bore the costs and who received the benefits will be lost.	revised the relevant description
1098	4	70	50	71	2	The limitations of conventional economics and the misleading character of many 'return on investment' (in disaster response and adaptation) calculations, need to be more strongly emphasised. The impact on nature (even reduced to the idea of ecosystem services) and social goods is critical. (Rickards, Lauren Amy, University of Melbourne)	revised the relevant description
1099	4	70	52	0	0	here market and non-market are distinct from tangible and intangible, but at line 21 they seem the same thing. I would simply talk about market and non market OR about tangible and non tangible (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	considered the issue and focus on mainly on direct and indirect, tangible and intangible impacts.
1100	4	71	4	71	11	The direct impact costs should include not only the business interruption, or changes but social and public non marketable infrastructures, are direct impacts. It represents an economic asset too. (Garrido Vazquez, Raul J., Min. Science, Technology and Environment)	accepted and revised the sentence
1101	4	71	4	71	20	ECLAC has developed (ECLAC, 2003, Handbook for the evaluation of the socioeconomic impact of disasters, http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/4/12774/P12774.xml&xsl=/mexico/tpl-i/p9f.xsl&base=/mexico/tpl/top-bottom.xslt) a stock and flow analysis where damage is quantified as the stocks (assets) impacted and losses are the flows affected that may have either a negative (diminished production, incomes, higher costs, reduced yields, productivity losses, reduced fiscal inflows vs increased fiscal disbursements or transfers etc.) or a positive sign (increased sales, increased resource allocation, donations received, insurance payments, etc.) (Zapata-Marti, Ricardo, United Nations Economic Commission for Latin America and the Caribbean (ECLAC))	added this literature in 4.6.1
1102	4	71	19	71	19	References on indirect losses are reviewed in Hallegatte S., Przulski, V., 2010, The Economics of Natural Disasters, CESifo Forum 2/2010, July 2010, pp. 14-24. I can provide text if helpful. (Hallegatte, Stephane, CIRED and Meteo-France)	accepted
1103	4	71	35	71	40	If risk is defined in terms of the potential losses of lives, conditions of health, means of livelihood, etc.; and in turn the vulnerability for the threat explains risk to me, the following expositions can show up: 1) Risk = Probability of the threatening event * vulnerability; 2) probability is a value between 0 and 1; 3) Therefore, vulnerability is a value of the potential losses of lives, conditions of health, means of livelihood, etc. In other words, if I want to hold the consistency in the units of measurement, losses should be appraised in comparable units of measurement (\$, relative quantities, ordering for categories, etc.). Consequently, risk is not a probability, it is a value and the enunciate would have to be corrected. Seeing the comment Number 4 with the documentation there referred. (Lamprea Quiroga, Pedro Simon, Ideam - Advisor (Colombian institute of hydrology, meteorology and environmental studies))	accepted and revised/deleted the sentences
1104	4	71	35	71	43	This discussion could be unpacked a bit. Readers may not understand what "fat tails" are being referred to. Assuming you mean that the distribution of impacts from extremes are broad particularly with a fat tail on the high end of damages, this could be spelled out more clearly. (IPCC WGII TSU)	accepted and delete the sentences
1105	4	71	50	71	51	This is an interesting definition. However, assessing it seems to be a very difficult task as how would one determine the optimal level of adaptation? For example, there is great uncertainty concerning the future sea level rise in the Baltic Sea. Even if the sea level in 2030 would be known with certainty, it would still be very difficult to determine the optimal level of adaptation at the coastal areas. If a levee high enough was built to protect the houses at the increased flood risk areas, the homeowners could still complain about the loss of scenery. They might prefer having their cellars flooded every 10 years to losing the sea scenery. In this case, what would be the optimal level of adaptation and who would get to decide on it? (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	agree but keep this concept as a descriptive idea
1106	4	72	1	0	0	4.6.1.2 framework to chapter 1 or 2 (IPCC WGII TSU)	accepted, take reference of chapter 1-2

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1107	4	72	5	72	6	This statement is rather short and inaccurate. DRM has never been predominantly about dealing with disasters--that was DM or Emergency Management. DRM was developed as a notion and practice because of the predominant growing interest in risk reduction and prevision or prevention, topics that did not fit comfortably in the traditional organizational structures associated with disaster management as such. Unless we get this straight we will only be perpetuating a myth. This inaccuracy with the interpretation of what DRM is all about, the nature of its time scales and dynamism is also recorded in lines 15 to 19. CCA as defined by IPCC also deals with today and already existing climate change, so what is so particularly dynamic and future oriented about that? Whilst, on the other hand, DRM deals with the 10000 year earthquake while dealing with nuclear plant construction, or the 200 year hurricane when deciding building needs in some areas, and what is so short term and static about that? (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	revised and deleted some overlaped sentences.
1108	4	72	7	72	10	"The residual damage cost is the cost that would be not avoided even with a very high adaptation investment" and "may be feasible but not economically efficient" : these definitions do appear problematic to me: with these definition, there is most of the time zero residual damage since all damages can potentially be avoided thanks to a (totally unrealistic) migration of all population out of the risk areas. For me, the residual damages is the damage when all desirable adaptation actions have been implemented (not when all possible adaptation actions have been implemented). (Hallegatte, Stephane, CIRED and Meteo-France)	revised as the suggestion
1109	4	72	15	72	29	This topic is the basis of Chapter 8. A link to Chapter 8 might be useful to the reader. (Hallegatte, Stephane, CIRED and Meteo-France)	add a linkage sentence
1110	4	72	34	72	35	I do not think it is adequate to say that the economic causes and repercussions of disasters are well understood. It is a topic on which data and models are hardly available, and our understanding of indirect and secondary impacts are very limited. (Hallegatte, Stephane, CIRED and Meteo-France)	accepted with revision
1111	4	72	34	72	35	This is surely an inaccurate statement. First because Wisner, OKeefe, Baird et al in the 70s were on to this and secondly because even today many dont seem to understand the causes and consequences!! (Lavell, Allan, Programme for the Social Study of Risk and Disaster (FLACSO))	accepted with revision
1112	4	72	43	72	48	The presented Key determinants of economic impacts are not completed should be added a new determinant regarding to the National capacities of prevention material and informational too (Garrido Vazquez, Raul J. , Min. Science, Technology and Environment)	accepted with adding this point
1113	4	72	43	72	48	Another key determinant is institutional capacity which influences sensitivity and ability to adapt. (Bosello, Francesco, Fondazione Eni Enrico Mattei, Milan University \)	accepted with adding this point
1114	4	73	7	73	15	In the paragraph on macroeconomic and development impacts: I would also refer to Chapter 8, which discusses this point at some lenght. I would also mention the discussion on the existence of macroeconomic poverty traps created by disasters (Benson, C., Clay, E., 2004. Understanding the Economic and Financial Impact of Natural Disasters. The International Bank for Reconstruction and Development. The World Bank, Washington D.C.; S. Hallegatte ; J.-C. Hourcade ; P. Dumas, 2007, Why economic dynamics matter in assessing climate change damages : illustration on extreme events, Ecological Economics, volume 62(2), 330-340; Hallegatte, S., P. Dumas, 2008: Can natural disasters have positive consequences? Investigating the role of embodied technical change, Ecological Economics, 68(3), pp.777-786) (Hallegatte, Stephane, CIRED and Meteo-France)	accepted
1115	4	73	48	73	48	On the discussion on creative destruction, much more papers have been written, with contradictory results that need to be presented in a balanced way. [Okuyama, Y., 2003. Economics of natural disasters: a critical review. Research Paper 2003-12, Regional Research Institute, West Virginia University, USA.] and [Skidmore,M., Toya, H., 2002. Do natural disasters promote long-run growth? Economic Enquiry 40, 664-688] defend this idea. [Benson, C., Clay, E., 2004. Understanding the economic and financial impact of natural disasters. The International Bank for Reconstruction and Development. The World Bank, Washington D.C.] and [Hallegatte, S., P. Dumas, 2008: Can natural disasters have positive consequences? Investigating the role of embodied technical change, Ecological Economics, 68(3), pp.777-786] support the idea that this effect is not present or negligible. (Hallegatte, Stephane, CIRED and Meteo-France)	accepted , deleted the paragraph
1116	4	74	9	0	0	Section 4.6.2: the section is kept rather general and seems to lack recent references. Most of the cited studies are dated pre-AR4. (Stocker, Thomas, IPCC WGI TSU)	revised the paragraphs more concisely
1117	4	74	9	0	0	4.6.2: interesting and well written but too general and background-focused (IPCC WGII TSU)	revised
1118	4	74	9	74	9	This section does not summarize the literature on the methodologies for disaster cost assessments. Here is what I can propose on this topic: Disaster consequences on the economic system have been the topic of intense research and many studies investigate the	We have added a comment about the uncertainty issue raised in this paper and added the reference.
1118	4	74	9	74	9		
1119	4	74	15	74	22	CGEs have also been used by the DRM communities (e.g., Rose et al., 1997; Rose et al., 2007). (Hallegatte, Stephane, CIRED and Meteo-France)	accepted and delete the sentences
1120	4	74	34	74	38	The usage of word consumer surplus for indicating the damage to property and others is not understandable. Rather the word Willingness to Pay to avoid the damage is recommendable. (morisugi, Hisayoshi, Nihon University)	accepted and revised the sentence
1121	4	74	38	74	38	These approach are not rooted in a cost-benefit analysis framework. Most of them only focus on the cost of disasters (and do not touch upon mitigation measures and policy benefits). (Hallegatte, Stephane, CIRED and Meteo-France)	Agreed. Changed.
1122	4	75	0	0	0	Can all of the regionally specific impacts and costs be summarized compactly, perhaps with upgraded tables that do not require text, or perhaps as boxes (IPCC WGII TSU)	considered, could try to make it better

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1123	4	75	20	75	29	Recent studies have done more than focusing on past events, and some have even considered future risks, linked to climate change [Hallegatte S., N. Ranger, O. Mestre, P. Dumas, J. Corfee-Morlot, C. Herweijer, R. Muir Wood, 2010, Assessing Climate Change Impacts, Sea Level Rise and Storm Surge Risk in Port Cities: A Case Study on Copenhagen, Climatic Change, accepted] [Ranger N., S. Hallegatte, S. Bhattacharya, M. Bachu, S. Priya, K. Dhore, F. Rafique, P. Mathur, N. Naville, F. Henriet, C. Herweijer, S. Pohit, J. Corfee-Morlot, A Preliminary Assessment of the Potential Impact of Climate Change on Flood Risk in Mumbai, Climatic Change, accepted] (Hallegatte, Stephane, CIRED and Meteo-France)	accepted and added this literature
1124	4	75	46	0	0	4.6.3: recommend integrating the economic aspects of impacts with the ecological and biophysical effects (IPCC WGII TSU)	accepted, could need cases of literature to clarify
1125	4	75	46	75	46	This section could be merged with section 4.5 to avoid repetition and simplify the chapter structure. In particular, this section includes results on loss trends and trend attribution that have been discussed several times in the chapter. (Hallegatte, Stephane, CIRED and Meteo-France)	considered and would improve the linkage
1126	4	76	20	0	0	Table 4-17 why present this kind of information in a snapshot only (IPCC WGII TSU)	considered
1127	4	76	49	76	50	It may be useful also to cite relevant sections in Chapter 3 for this introductory sentence on climate extremes. (IPCC WGII TSU)	accepted
1128	4	76	52	76	54	I cannot understand the message of this sentence. (Faust, Eberhard, Munich Reinsurance Company)	revised the sentence
1129	4	77	8	77	9	This statement "Some studies project....." can not be based on a single 2004 study. Please note, this citation is also missing from the reference list. (Stocker, Thomas, IPCC WGI TSU)	accepted
1130	4	77	22	0	0	It is not appropriate to talk about tourism industry in the content of Ecosystems unless you have explain how the impact on ecosystems going to affect the tourism industry. (Kazama, So, Tohoku University)	accepted
1131	4	77	30	0	0	"Section 4.6.3.3." - Strongly recommend to refer on Japan, that is one of the largest developing countries. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	agree and will add the case
1132	4	77	40	77	41	The first sentence in this paragraph might benefit from being linked to supporting text in Chapter 3. (IPCC WGII TSU)	agree
1133	4	77	53	0	0	Check the date '2015' (Darch, Geoff, Atkins & University of East Anglia)	accepted
1134	4	78	7	0	0	Re-word '2000 dollars' (Darch, Geoff, Atkins & University of East Anglia)	accepted
1135	4	78	15	78	16	The original peer-reviewed scientific paper should be cited here (ie, Cook et al. 2010) and not the web-based report announcing this paper!. It would also be a more accurate reflection of this paper to rewrite this sentence as "... which has been linked with other climate phenomena" because El Nino on its own is not an extreme weather event. (Stocker, Thomas, IPCC WGI TSU)	accepted
1136	4	78	15	78	16	The first sentence of this paragraph should be supported by related text in Chapter 3 or by peer-reviewed journal citations. (IPCC WGII TSU)	accepted
1137	4	78	23	0	0	Health 'infrastructure' or impacts? (Darch, Geoff, Atkins & University of East Anglia)	it means medical services and public hygien infrastructures
1138	4	78	32	78	33	Please clarify and explain how or why understanding vulnerability is important to analysis of economic impacts. Please explain what is meant by vulnerability to extreme events at different scales. (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	it would be discussed in adaptation chapters and chapter 1-2
1139	4	78	43	78	44	Please clarify who is and will carry the annual expected loss burden from surge events - are the costs estimated at the European level (EU?) or do the costs accrue to the countries situated by the coast of the Atlantic? (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	the literature did not clarify this
1140	4	78	47	79	51	The changes in forest management Schelhaas et al. refer to are not to be understood in total as changes that deteriorate the forest! The majority of changes consisted of increasing forest area, increasing growing stock per unit of area, thus raising the assets that could be affected. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	considered this suggestion
1141	4	78	51	79	1	These two sentences should be rephrased, they are difficult to understand (Wehrli, Andre, European Environment Agency)	accepted and revised the sentence
1142	4	78	53	78	53	Please write out the abbreviation FEEM (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	accepted
1143	4	78	53	79	1	Please clarify the welfare impacts of the ecosystem sector that were estimated at 145 - 170 billion dollars. For what area were the costs estimated? Were they welfare impacts of climate change? What was meant by welfare impacts and whose welfare was estimated? (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	the literature did not mention this, but will try to clarify
1144	4	79	1	79	3	The statement should be supported by peer reviewed literature. Please, include references. (Feyen, Luc, Joint Research Centre, European Commission)	accepted with added literatures
1145	4	79	3	79	4	Please clarify what is meant by well-planned adaptation strategies? How should the planning of adaptation strategies be improved and would they need to be improved in relation to the current adaptation strategies? (Kankaanpää, Susanna, HSY Helsinki Region Environmental Services Authority)	considered
1146	4	79	7	79	20	Cavallo and Noy (2010, p. 10) analyzed global direct disasters associated to natural phenomena using the EM-DAT database for the period 1970-2008, and found that hydro-meteorological events have the greatest impact on people in all regions of the world (Fig. 7). The exception is that in Latin America and the Caribbean geological events are reportedly responsible for more fatalities (see Fig. 8). I recommend to use this source (available online) for some parts of Chapter 4: Cavallo, E. and I. Noy, 2010: The economic of natural disasters: A survey. Inter-American Development Bank, Research Dept. 49 pp. (Cavazos, Tereza, CICESE)	accepted with adding the literatures

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1147	4	79	7	79	20	This section also needs expanding. A report by the UN-ECLAC on the economic impacts of climate change is to be published by the end of the year, and there are already significant preliminary findings. A 2009 report by the World Bank also provides data on the potential economic impacts of climate change in Latin America. (GIROT, Pascal, IUCN)	accepted with adding the literatures
1148	4	79	23	79	23	The references mentioned in the line 11 above (Karl et al., 2008; Kunkel et al., 2008) could also be used in Section 4.6.3.6, which includes Mexico and the Caribbean Islands. (Cavazos, Tereza, CICESE)	accepted
1149	4	79	41	0	0	Has the normalisation not worked or are impacts just focused on areas of population and capital concentration? (Darch, Geoff, Atkins & University of East Anglia)	considerd and will clarify this point
1150	4	79	51	79	51	"Similarly, there are indications that flood losses in the USA have not increased since 1926" should be replaced by "Similarly, there are indications that normalized flood losses in the USA have not increased since 1926". (Feyen, Luc, Joint Research Centre, European Commission)	accepted this revision
1151	4	80	23	80	27	The study of Crompton et al. (2010) is worth to be included. The study evaluates the history of building damage and loss of life due to bushfire in Australia since 1925. Historical records were normalized in order to estimate the building damage and fatalities had events occurred under current societal conditions. The authors found no discernable evidence that the normalized data is being influenced by climate change due to the emission of greenhouse gases. These findings would also complement the information of Box 4-2 on page 13 since the period studied by Crompton et al. (2010) includes the Melbourne fires of 7 February 2009. Reference: Crompton, R. P., K. J. McAneney, K. Chen, R. A. Pielke Jr., and K. Haynes, 2010 (in press). Influence of Location, Population and Climate on Building Damage and Fatalities due to Australian Bushfire: 1925-2009. Weather, Climate, and Society. (Feyen, Luc, Joint Research Centre, European Commission)	added the literatures
1152	4	81	3	0	0	4.6.4: Use treatment in adaptation chapters (IPCC WGII TSU)	accepted
1153	4	81	21	0	0	Benefit valuation is another area where there are weaknesses. (Darch, Geoff, Atkins & University of East Anglia)	considered this point
1154	4	81	48	0	0	When it is considered about the "Uncertainty in assessing the Economic loss", it is extremely important to mention about the biases in different data bases. I suggest you to look at the classic report of "WHEN DO LOSSES COUNT? Six Fallacies of Natural Hazards Loss Data" by Melanie Gall et al., 2008. There, they explained that the lack of a full-cost accounting system of losses leaves the nation with no clear understanding of the costs of natural hazards to communities, the environment, or the economy. Please do consider to add such discussions if appropriate. (Kazama, So, Tohoku University)	added the full-cost analysis as one uncertainty issue
1155	4	81	48	0	0	4.6.5 Trend information is more or less the core of the chapter. Isn't this where the chapter should be starting? (IPCC WGII TSU)	added a paragraph and literatures, but the trend of future losses are inadequate
1156	4	81	52	81	54	need to add the the lack in mechanistic understanding of the relevant processes, feedbacks etc. in this list (Stocker, Thomas, IPCC WGI TSU)	do you mean systemetic risk? If so accepted
1157	4	82	3	82	3	its not just the "inadequate resolution" of climate models that hinders the modelling of climate extremes, but sometimes also the lack in physical understanding of the relevant processes (both of which are of course not entirely unrelated). (Stocker, Thomas, IPCC WGI TSU)	accepted and revised the sentence
1158	4	82	6	0	0	Drought length is important. Changes in multi-year droughts, which are the important ones for some regions, are not well simulated by GCMs. (Darch, Geoff, Atkins & University of East Anglia)	accepted and revised the sentence
1159	4	82	8	82	14	See Dawson et al (2009) for a comprehensive analysis of the joint economic effects of climate change, changing vulnerability and adaptation actions: Dawson, R.J., Dickson, M.E., Nicholls, R.J., Hall, J.W., Walkden, M.J.A., Stansby, P., Mokrech, M., Richards, J., Zhou, J., Milligan, J., Jordan, A., Pearson, S., Rees, J., Bates, P., Koukoulas, S., Watkinson, A. Integrated analysis of risks of coastal flooding and cliff erosion under scenarios of long term change, Climatic Change, 95(1-2) (2009): 249-288. (Hall, Jim, Newcastle University)	added the lieterature
1160	4	82	14	0	0	However, there remain technical challenges in developing robust risk assessments due to use of emissions scenarios that are not probabilistic, and because many studies apply the mean change to baseline extremes largely because information on future extremes is lacking. (Darch, Geoff, Atkins & University of East Anglia)	accepted and revised the paragraph
1161	4	82	16	0	0	Section on attribution: comment on the value of attribution exercises, given the uncertainties, in delivering useful information for future risk management. (Darch, Geoff, Atkins & University of East Anglia)	accepted and revised the sentence
1162	4	82	16	83	3	This discussion of attribution should be consolidated with the earlier discussion in 4.2.5. (IPCC WGII TSU)	accepted
1163	4	82	42	82	42	"The IPCC WG2 AR4 discussed a study" -- cite the original reference only, no need to indirectly cite it via the IPCC AR. (Stocker, Thomas, IPCC WGI TSU)	accepted as suggestion
1164	4	82	42	82	43	The is no need to include this sentence referring to the IPCC AR4. Why not simply write - "Miller et al. (2008) analysed a normalized record of global weather losses, but did not find sufficient evidence for....." (Stocker, Thomas, IPCC WGI TSU)	accepted as suggestion
1165	4	82	48	83	3	I think that also water management and water risk reduction measures (dams, levees, ...) have to be accounted for in this considerations - they had strong risk-reducing effects. So without these measures the losses most likely would have been much higher. It seems necessary to look for studies on these effects. (Faust, Eberhard, Munich Reinsurance Company)	considerd , would add this if the subsection needed
1166	4	83	6	0	0	Again, it is not clear why this section focuses on 4C and not other levels of temperature increase as well. (IPCC WGII TSU)	deleted the subsection

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1167	4	83	6	83	38	This section could also use the reference cited in line 16 above (New et al. 2009) related to the possible impacts of a 4°C rise. (Cavazos, Tereza, CICESE)	deleted the subsection
1168	4	83	8	84	34	The comments on the 4 degree rise in temperature and the likely effects are transposed onto society today. It would be more balanced to include a note to the likely probability of drought resistant crops, for example, or new measures to combat health effects. If technology is not to be the complete panacea, it is likely to contribute significantly to a further ability to cope. (Ammann, Walter J., Global Risk Forum GRF Davos)	deleted the subsection
1169	4	83	17	83	22	This paragraph conflates drought (a temporary condition) with long-term drying (Darch, Geoff, Atkins & University of East Anglia)	deleted the subsection
1170	4	83	35	0	0	This scenario would be more usefully related to a SRES scenario or the Transient Climate Response should be stated. (Darch, Geoff, Atkins & University of East Anglia)	deleted the subsection
1171	4	83	36	83	36	Chapter 4.6.6 please check data on line 35 (2210 ?) (Bertolini, Roberto, World Health Organization)	deleted the subsection
1172	4	83	40	84	32	These studies predicting future risk from weather disaster surely do not belong under this same section heading 4.6.6? The listed studies in many cases do not project beyond 2040, so are hardly related to a 4degree rise. A new section heading is needed. before line 40. (Stocker, Thomas, IPCC WGI TSU)	deleted the subsection
1173	4	83	43	83	51	I am not sure that these results are for a +4°C world only. (Hallegatte, Stephane, CIREC and Meteo-France)	deleted the subsection
1174	4	83	43	84	32	As a nice way to link chapter 4 and chapter 3, each of these paragraphs (tropical storms, extraT storms, floods, other weather extremes) could have a sentence added at the end summarising the projections given in Chapter 3 (Table 3.1). Thereby, the reader can see what the projected change is in terms of risk, and compare this to what chapter 3 projected in terms of only the physical event itself. (Stocker, Thomas, IPCC WGI TSU)	considered the good suggestion
1175	4	83	53	84	7	how does this paragraph on extra-tropical storms in Europe fit to p.55, l.34-45? (Faust, Eberhard, Munich Reinsurance Company)	considered the linkage
1176	4	84	0	0	0	P84 case study on Dafur: Writing is too conversational, but material is very interesting. This should almost certainly be considered a multi-chapter case study, presented in ch 9 (IPCC WGII TSU)	It has been removed
1177	4	84	6	0	0	Explain how the economic model incorporated future changes in climate (Darch, Geoff, Atkins & University of East Anglia)	deleted the subsection
1178	4	84	14	0	0	But presumably the absolute numbers remain low? (Darch, Geoff, Atkins & University of East Anglia)	deleted the subsection
1179	4	84	37	87	54	The case study on Darfur conveys insightful findings, but the style of wording is not adequate and more like an essay. The text should be shortened and condensed. (Faust, Eberhard, Munich Reinsurance Company)	It has been removed
1180	4	84	39	0	0	This final case study needs to be removed, or completely rewritten if it is to remain in the Chapter. It currently reads like a media article, and obviously it has in large part been directly taken from the Scientific American column. As a case-study for SREX it should only be included if its serves a specific purpose, the text needs to be shortened considerably, it needs to be based on a range of robust literature, and should not be written with the personal, often emotive writing style that is currently used. (Stocker, Thomas, IPCC WGI TSU)	It has been removed
1181	4	84	39	87	54	All this part of the section 4.6 must be reellaborated. For few reasons. :1st.The target of the section is to analyse the costs of the climate extreme and disasters, and the Case Study – Darfur Conflicts and the Role of Climate Change dis not gives nothing on the matters. 2nd The Target of the section 4.6 is the cost and is not the politicas conflicts, that may arrise. 3rd The study case is very politicized and will not well received in a significantly part of the developing countries. 4th. Only analnise one side of the problem and avoid the point of views from the south. (Garrido Vazquez, Raul J. , Min. Science, Technology and Environment)	Has been removed
1182	4	84	39	87	54	This case study would benefit from tightening and shortening of the text. The writing style also differs from other sections of the chapter, adopting a more "journalistic" method of describing references and also using "I" in one place (p. 85, line 45) even though the identity of the author is not clear. (IPCC WGII TSU)	Has been removed
1183	4	84	49	84	53	Conflicts due to elevated temperature are very likely to happen also in urban areas. In 217 cities in Egypt, specially the capital Cairo, very expected conflicts to happen in every day life unless "Quality of Urban Life" is taken care of. (Yasseen, Adel, Ain Shams University - Institute of Environmental Research and Studies)	It has been removed
1184	4	85	44	86	2	Please avoid to write in first person narrative. The whole section seems to be taken from another manuscript by copy-and-paste, please cite properly or rephrase! (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	It has been removed
1185	4	85	45	0	0	What does it mean "I argue"? Who is "I" ? (Wibig, Joanna, University of Lodz)	It has been removed
1186	4	86	0	0	0	P86: conflict case study needs to switch from journalistic to scientific tone (IPCC WGII TSU)	It has been removed
1187	4	86	17	86	25	references are necessary (Wibig, Joanna, University of Lodz)	It has been removed
1188	4	86	17	86	41	These paragraphs lack citations, and it is not clear if they reflect assessed literature. (IPCC WGII TSU)	It has been removed
1189	4	87	0	0	0	P87: advance of the edge of the Sahara: based on recent work, the statement about a mile per year advance of the Sahara is incorrect (IPCC WGII TSU)	It has been removed
1190	4	87	0	0	0	P87 forewarned is forearmed: this section is way policy prescriptive (IPCC WGII TSU)	It has been removed
1191	4	87	7	87	10	A scientific reference is needed in relation to this 30% rainfall decrease and Sahara growth figure that is reported here. (Stocker, Thomas, IPCC WGI TSU)	It has been removed

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1192	4	87	12	87	19	You may consider clarifying that migration and environment are only two of many factors that together may trigger conflict. Migration in itself may be both good and bad. For a general overview see Future Floods of Refugees in comment no 1, Gleditsch in comment no 3 and for a case study from the Horn of Africa see "Climate change, disasters and displacement - initial evidence from Africa" in comment no 3. (Kolmannskog, Vikram, Norwegian Refugee Council)	It has been removed
1193	4	87	12	87	27	These paragraphs require citations. (IPCC WGII TSU)	It has been removed
1194	4	87	30	87	30	What does "This article" refer to? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	It has been removed
1195	4	87	45	87	45	April of what year? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	It has been removed
1196	4	87	54	87	54	No conclusions? (Palutikof, Jean, Griffith University)	It has been removed
1197	4	98	42	98	43	Complete the reference, now published. Year is 2010, volume is 54(2), pages 469-481. (Cogley, J. Graham, Trent University)	References have been edited
1198	4	110	0	0	0	The following authors at the end of Luterbacher et al. 2006 are missing: E. Garnier, E. Le Roy Ladurie (Luterbacher, Juerg, Justus Liebig University)	References have been edited
1199	4	117	51	118	3	These references are identical, delete one. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	References have been edited
1200	4	123	0	0	0	Reference: Shär and Jendritzky, 2004 ist missing but cited in the text (Koppe, Christina, Deutscher Wetterdienst)	References have been edited
1201	4	125	25	125	26	To exclude (Sherstyukov, Boris, All Russian Research Institute of Hydrometeorological Information - World)	References have been edited
1202	4	133	0	0	0	Table 4-2. The entries in this table need some serious attention. GLOFs - ocean systems? - Australia???. Bush fires - polar regions? (Stocker, Thomas, IPCC WGI TSU)	This table has been deleted.
1203	4	133	0	0	0	Table 4-2: What system is behind this? It should be stated that in this table one should not look at rows, only at columns. (Faust, Eberhard, Munich Reinsurance Company)	This table has been deleted.
1204	4	133	0	0	0	Table 4-2: Table is not really informative and a bit confusing. It might be better to put a list of the factors considered directly in the text. (Koppe, Christina, Deutscher Wetterdienst)	This table has been deleted.
1205	4	133	0	0	0	Table 4 - 2: How is security affected by hazards to the cryosphere? Why are cyclones mentioned only for open oceans? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table has been deleted.
1206	4	133	0	0	0	Table 4 - 2: landslides are a problem in mountainous areas, too, as stated in the text. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table has been deleted.
1207	4	133	0	0	0	Table 4 - 2: please explain "GLOF" (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table has been deleted.
1208	4	134	0	0	0	It would be much more effective to summarise the data shown in Tables 4.3 - 4.5 in one table (perhaps using % change values comparing the 3 different years) or, probably even better if this information is instead presented as a single graph showing change over time. The chapter proposes many tables, so the alternative use of a graph would be welcomed. (Stocker, Thomas, IPCC WGI TSU)	This will be discussed in LAM4
1209	4	134	0	0	0	Table 4-6: define West Asia or merge with Asia (Darch, Geoff, Atkins & University of East Anglia)	Was merged with Asia
1210	4	134	0	0	0	Table 4-6: Plse, explain the meaning of "HE" (Koppe, Christina, Deutscher Wetterdienst)	HE was used for Human exposure in this previous version. The new version is clear and explicit.
1211	4	134	0	0	0	Tables 4 - 3 to 4 - 6: Giving these exact numbers is bad science because it feigns an accuracy nobody can deliver - or does anybody REALLY KNOW how many people live in an area affected by cyclones? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This will be discussed in LAM4
1212	4	135	0	0	0	Table 4 - 7: Change in exposure can mean increase or decrease, thus a statement "XX: large change in predicted exposure" leaves the reader at a guess in which direction the change might be. Please rework this. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	There are several issues with this table, this is noted, but final version might include a graph.
1213	4	135	0	0	0	Table 4 - 8: Why do you use the abbreviation LECZ for "low elevation coastal AREAS"? Please use LECA or write "low elevation coastal zones". (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Use of the acronym was eliminated in the final draft of the chapter.
1214	4	136	0	0	0	Not clear what the different columns in Table 4-9 are providing. Column headings are needed. (Stocker, Thomas, IPCC WGI TSU)	This table was revised somewhat in the 2nd order draft. Then, it was subsequently deleted in the preparation of the final draft of the chapter.
1215	4	136	0	0	0	Table 4.9: Doubt whether this table and the underlying publication is authoritative enough to warrant an entire table. Also, what does it mean to illustrate? Would a synthesis of different sets of literature not be better, or own analysis of Munich Re or EM-DAT data not be better? (Bouwer, Laurens, Institute for Environmental Studies)	This table was revised somewhat in the 2nd order draft. Then, it was subsequently deleted in the preparation of the final draft of the chapter.
1216	4	136	0	0	0	Table 4 - 9: header is missing, "increase in every region" vs. "decreasing trend" just does not make any sense. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table was revised somewhat in the 2nd order draft. Then, it was subsequently deleted in the preparation of the final draft of the chapter.
1217	4	137	0	0	0	Table 4-10 is not particularly useful and needs to be redesigned if it is to remain in the Chapter. For example - Remote sensing of glaciers is relevant for 1) identifying glaciers with GLOF history, 2) monitoring glacial lake growth, 3) assessing GLOF hazard potential by recognising lake/dam/channel characteristics and geometry, and 4) management and mitigation. This table does not illustrate this in any way. Dam reinforcement and artificial construction which currently appears under 'Property management' is far more relevant to 'flood prevention'. (Stocker, Thomas, IPCC WGI TSU)	Table has been removed
1218	4	137	0	0	0	The references for statements in Table 4.10 are necessary (Wibig, Joanna, University of Lodz)	Table has been removed

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1219	4	137	0	0	0	Table 4 - 10: change format to landscape, delete horizontal lines. The way the table's lay-out is now suggests correlation of points mentioned in the same line and I do not see this correlation. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Table has been removed
1220	4	138	0	0	0	Tables 4.11 needs attention. Too much text is simply duplicated from elsewhere in the chapter (particularly under the 9th column) The table should serve to summarise this material, not reproduce it. This would help reduce the size of this table considerably, and make it visually much more effective. (Stocker, Thomas, IPCC WGI TSU)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1221	4	138	0	0	0	Table 4-11: these are case studies rather than a systematic exploration of links; there is little comment on water. (Darch, Geoff, Atkins & University of East Anglia)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1222	4	139	0	140	0	Table 4 - 11: please shorten text, subsistence farming does not need to be explained so lengthy. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1223	4	142	0	0	0	Table 4-11, First row: Mustn't it be "Flood" instead of "Food" in column 5 (hazards, exposures and their extend)? Same for second row. (Koppe, Christina, Deutscher Wetterdienst)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1224	4	142	0	142	0	Table 4 - 11, line health / Germany: Please check text. What did the WHO report assume? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1225	4	142	0	142	0	Table 4 - 11, first line "Forestry / Ecosystem": Please check wording and grammar. Droughts make peatlands, which contain vast amounts of carbon, more vulnerable to fires. AND: Drought is NOT the trigger, but a promotor and facilitator. The trigger is the ignition by humans or natural causes. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1226	4	143	0	147	0	Table 4 - 11: please shorten text (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This table was revised in the second-order draft. Subsequently, in the preparation the final draft chapter, it was deleted.
1227	4	152	0	152	0	Table 4-13. The Eastern Europe is mentioned as the only region in the world where "tourism non dependent on climate". This is an exaggeration, I would say an error that should be analyzed in depth. I would provide only the example of Romania. The Black Sea coast and the Carpathian Mts. are the main touristic destinations in the country. The touristic flux highly depends on weather. The occupation level for accomodation on the black Sea coast in summer fluctuates between 30-40% and 100%, and the only triggering factor is the weather. I suggest the authors to reformulate the incriminated paragraph, as it is not correct as it is. (Cheval, Sorin, National Meteorological Administration)	Of course, bad weather affects all areas. However, the authors haven't found any text indicating such high sensitivity in eastern Europe to high temperatures.
1228	4	152	0	152	0	Tourism in Latin America may not be only "slightly" dependent on climate. An example is the flood in Cuzco in January 2010, which isolated the access to the main touristic attraction in Peru: Machu Picchu. References are found elsewhere. (Kazama, So, Tohoku University)	An event, doesn't mean that area can be affected by climate
1229	4	155	0	0	0	References need to be included to support the 'changes in hazard' reported in Table 4-14. It should be sufficient simply to cite the relevant section of chapter 4 (and chapter 3 if relevant) where the reader can turn to for more information. (Stocker, Thomas, IPCC WGI TSU)	There is not the space to include all the desirable references. Further readings are included in the text. Please note that we eventually decided to delete this table in the preparation of the final draft of the chapter.
1230	4	157	0	0	0	Table 4.15 - It is not even clear from the title whether Table 4.15 is reporting observed or projected changes. In any case, the entries given under 'Changes in climate extremes' must be carefully checked to be sure they are consistent with the assessment provided by Chapter 3, and summarised for most extremes in Table 3.1. As a minor point - not sure why Frost/Drought in PNG is combined in the same entry. (Stocker, Thomas, IPCC WGI TSU)	Although not extensively revised in the second-order draft, please note that we decided to remove this table in the preparation of the final draft of the chapter.
1231	4	157	0	0	0	Table 4-15. Where is the assessment come from? Are there any citations? Same comment for Table 4-16. (Cavazos, Tereza, CICESE)	Although not extensively revised in the second-order draft, please note that we decided to remove this table in the preparation of the final draft of the chapter.
1232	4	162	0	0	0	A caption is needed to explain the 'Burning embers' figure. (Stocker, Thomas, IPCC WGI TSU)	Figure deleted.
1233	4	162	0	0	0	Fig 4-3: its resolution is too low, the explanation on the figure can hardly be read. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Figure deleted.
1234	4	163	0	0	0	Fig 4-4: its resolution is too low, the explanation on the figure can hardly be read. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Figure deleted.
1235	4	164	0	0	0	Fig 4-5: its resolution is too low, the explanation on the figure can hardly be read. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Figure deleted.
1236	4	165	0	0	0	Fig 4-7: upper right the title of hor axis is missing and background is too dark, can not be seen. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Figure 4.7 was removed
1237	4	165	0	0	0	Fig.4-7: at lower right, there is another Fig.6... This should be omitted. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	Figure 4.7 was removed
1238	4	165	0	0	0	Figure 4 - 7: The last sentence of the table subscript does not make any sense. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Figure 4.7 was removed
1239	4	166	0	0	0	Fig 4-8:at the top of the graph between the two legends the lines. (Incecik, Salahattin/Selahattin, Istanbul Technical University)	the point being made in this comment cannot be understood.
1240	4	168	0	0	0	Figure 4 - 14: top part is not visible completely. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Figure deleted.
1241	4	168	0	0	0	Figure 4 - 14: top part is not visible completely. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Figure deleted.

#	Ch	From Page	From Line	To Page	To Line	Comment	Response
1242	4	169	0	0	0	Figure 4-13: Use updated diagram. (Faust, Eberhard, Munich Reinsurance Company)	Figure not presented in the 2nd order draft and deleted in the final draft of the chapter.
1243	4	170	0	0	0	What time period is projected in Figure 4-14 ? This figure is meaningless without further explanation in the caption. (Stocker, Thomas, IPCC WGI TSU)	Figure deleted.
1244	4	170	0	0	0	Figure 4-14 caption: when is this projection for and in what scenario? (Hall, Jim, Newcastle University)	Figure deleted.
1245	4	171	0	0	0	What do the 1,2,3 refer to in Figure 4-17?? (Stocker, Thomas, IPCC WGI TSU)	Figure deleted.
1246	4	171	0	0	0	Figure 4-17: bars hide each other. Better: bars situated adjacent to each other in the two-dimensional space. (Faust, Eberhard, Munich Reinsurance Company)	Figure deleted.
1247	4	171	0	0	0	Figure 4 - 17: What does "1", "2" and "3" refer to? (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	Figure deleted.
1248	4	172	0	0	0	reference of figure 4-18? (Thalmann, Philippe, EPFL Swiss Federal Institute of Technology Lausanne)	accepted
1249	4	172	0	0	0	Figure 4-18: Updated diagram (until 2010) will be available from the source by early 2011, update to 2009 is already currently available. (Faust, Eberhard, Munich Reinsurance Company)	accepted
1250	4	304	1	305	33	This part could be integrated in Chapter 3 (Luterbacher, Juerg, Justus Liebig University)	Page does not exist
1251	4	304	4	0	0	Please add the following reference for the statement (after ...cope with): Xoplaki et al. (2004); Xoplaki, E., Gonzalez-Rouco, J. F., Luterbacher, J., and H. Wanner, 2004: Wet season Mediterranean precipitation variability: influence of large-scale dynamics and trends. <i>Clim. Dyn.</i> , 23, 63-78. (Luterbacher, Juerg, Justus Liebig University)	Page does not exist
1252	4	305	28	305	33	Please include also the new evidence of Dominguez-Castro et al. (2010); F. Dominguez-Castro, R. Garcia-Herrera, P. Ribera, and M. Barriendos, 2010: A shift in the spatial pattern of Iberian droughts during the 17th century. <i>Climate of the Past</i> , 6, 553-563. http://www.clim-past.net/6/553/2010/cp-6-553-2010.pdf (Luterbacher, Juerg, Justus Liebig University)	Page does not exist