WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

UNEP

IPCC WGII
Fourth Assessment Report
Climate Change Impacts, Adaptation and Vulnerability

Expert Review of First Order Draft

Specific Comments

Chapter 7

December 5, 2005

Discussion of expert review comments and record keeping

IT IS RECOMMENDED THAT:

- AUTHORS BEGIN WORK ON THE COMMENTS IMMEDIATELY. SUBSTANTIVE COMMENTS NEED TO BE SEPARATED FROM NON-SUBSTANTIVE, AND THE TWO SHOULD BE TREATED DIFFERENTLY
- CONTACT IS MADE BETWEEN AUTHORS AND THEIR REVIEW EDITORS IN DECEMBER

Substantive comments

- The chapter writing team should discuss all substantive expert review comments, by email and/or at Merida.
- Substantive comments require full and proper consideration. The *Principles Governing IPCC Work* state that:
  - genuine controversies should be reflected adequately in the text of the Report and
  - it is the role of the Review Editors to advise the lead authors on how to handle contentious/controversial issues
- You must record the outcome of these discussions in this document, under the column 'Notes of the Writing Team'.

Non-substantive comments

- For non-substantive comments, a very brief entry should be made in the column 'Notes of the Writing Team'. The following terms are acceptable:
  - Addressed
  - Not applicable
  - Text removed
  - A tick to denote a comment has been addressed (somewhere on the document this should be stated)

General

- The record can be kept electronically, or with pen-and-paper.
- The document becomes part of the traceable account of the Working Group II Fourth Assessment. When completed to the satisfaction of the Review Editors, a copy should be returned to the TSU by the **28th February 2006**.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-0	A	0				**Co-chair and TSU comments** As is known, one of the prerequisites to make IPCC reports, and in particular its conclusions, readily understandable to users / decision makers, is to present the texts in a clear, straightforward language, understandable and easy for translation, at least in the UN languages. This FOD version does not fulfill this requirement. Its long sentences and too technical wording should be reviewed. The ES is skewed in favor of economic issues and, in spite of the multi-factors involved, the mutual interactions between urban and rural areas, it misses appropriate reference to the human component. Reading the ES it appears that the references on poverty and indigence /pauperism, quite outstanding issues in the context of urban/rural settlements / societal relations in practically all the world ´s regions, are minor. I observe the repetition of complete sets of paragraphs, in different segments of the FOD. These will be mentioned in the specific comments. Further, since many references are taken from studies made from the point of view of developed countries, and so quoted, the advice to be provided to developing countries is lost or incomplete. There is no full discussion of the effects of industrial wastes and commercial leftovers on the environment and hence, in spite of making some references to Chapter 8 - Human Health, some information on their impacts on human, animal and plants, with the inevitable increased vulnerability of urban drainage and sewage systems, leading to flood-prone conditions and to air, water and soil pollution, are not mentioned nor cross-referred to other WG II chapters.(Ref. Urban Stormwater Management Planning (Adams B.J. and F. Papa, John.Wiley &Sons,Inc, 2000). Despite the increasing vulnerability of urban people to the environmental scourges enhanced	The ES has been substantially rewritten. Regarding style, many other reviewers were complimentary; will consider according to comments on particular sentences. Regarding social as well as economic issues, this AR4 report is the first to specifically consider social issues. Regarding attention to literature on the developing world, the author team is doing its best to find additional sources where available. We do not advise. We summarize what is known. Considered in revision of 7.4.2.3.

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						by shanty towns / slums / favela developments, etc, no reference is made to the study undertaken by the WHO Commission on Health and Environment – Report of the Panel on Urbanization (1992), regarding their adverse effects on urbanites (health, security, etc). Better cross referencing with chapter 8 is necessary. Finally, although the concept of globalization is applicable, authors should know that the huge income differences, which are reported in the ratio 40 : 1 are much more than that in large cities in developing countries, reaching the ratio 140 to 1. Developing countries show something more than 40 % of their population under the poverty line, and more than 20 % below the pauperism ´s situation.. **(Osvaldo Canziani)**	Considered in revision of 7.3
						Section 7 title should be "Conclusions: implications for sustainable development"	Done
						Can this section follow successful example of ch 4 in summarising its assessment, thus develop: a) table summarising impacts by increments of T change (table 4.5); b) a summary of projected impacts worldwide (figure 4.9); and c) a burning embers diagram for each subsector to show key vulnerabilities (fig. 4.10)	Not possible for topics in this chapter.
						It is not clear what messages in the ES and concluding sections are NEW or are re-affirmations of those in TAR. Please`make this clear.	Will try to clarify. Most of the subject matter in this chapter was not addressed by TAR.
						Some boxes are thin	Most have been deleted.
						Not all factual statements are referenced, but they should be.	Noted.
						Length: text is 50 pp Word (32 pp printed) and refs 10pp Word (5 pp printed). Total is thus 37 pp and needs reducing by 7 pp. In general the text is more discursive and less dense than in other chapters W(which, for example, have extensive surveys of the new literature)	Noted.

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						and therefore condensing the text should not be as problematic as in other chapters.	
						The post 2001 list of references is relatively thin, and I wonder whether it represents a portrayal of the extent of new information since TAR.	The FOD included 9 pages of references, most of them since 2001.
						Needs figures to break up the otherwise unrelenting text.	Doing our best, but length is an issue..
						Little on livelihoods and risk of life. Eg where is the literature on millions at risk	Being addressed.
						There is no discrimination between effects under different SRES scenarios and under varying mitigation scenarios (but there are some impact assessments of these)	Will consider, but generally other factors than those included in SRES scenarios dominate assessments of vulnerabilities, impacts, and adaptation potentials.
						Are the conclusions reported in TAR Table 7.1 and Figure 7.2 re-affirmed or modified?	Will consider, but the subject matter in this chapter is quite different.
						Below is a copy of earlier comments ON THE ZERO-ORDER DRAFT by Martrin parry in January 2005 [with his notes in square brackets regarding response in FOD]: 1) There is much text that a) appears to replicate what was reported in SAR and TAR; and b) is not sourced on post 2000 references, i.e. is not NEW knowledge. 2) The chapter should focus on the key new findings since TAR which either a) confirm and extend TAR findings and deserve re-emphasising, or b) revis TAR findings. 3) Every statement in the assessment should be supported by reference to sources. There is much text that is not. 4) Some of the key items in TAR might be confirmed or revised: eg revise Table 7.1 and Figure 7.2.	The top priority is to report what is known now, for subjects that in most cases are not the focus of much research support. Meanwhile, a majority of the space is devoted to subjects not covered by TAR. Noted. TAR tables limited to settlements.

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						More specific comments: 5) The section on current sensitivity could report new knowledge derived from researc on (eg) effects of recent extremes on industry etc eg warm summer 2003 in Europe and similar recent events 6) Section on assumptions might summarise (table?) pop, income, urbanisation, employment type assumptions in (eg) SRES futures 7) Costs section is thin 8) suggest separate sub-sections within Section 5 on: tourism, transportation, manufactruring, retailing etc., urban planing/design (and others listed in outline). 9) NB Plenary specifically requested coverage of livelihood (including rural) and employment (see Doc 4 p. 31 green book from LA1 Vienna). 10) Insurance section does not seem to represent new knowledge (source by recent references) as compared with TAR. All statements need sources. Much in the current text is already in the SAR and TAR. There are key areas in SAR and TAR, however, which need confirmation or revision such as Table 8.1 and Figure 8.4. More general comments: 11) Please follow the wording of the section headings in the outline (You have the correct sections: But we would prefer consistent wording between chapters) 12) You are not clear about the assumed mean climate change futures in your impact estimates, nor timescales of effects (2030s, 2050s, 2080s, etc) 13) Is there enough published science to assess, additionally, effects under a) stabilisation scenarios and b) different SRES futures? 14) Most generally: you need to think about/prioritise your conclusions regarding what new information about impacts in your several fields (make sure you cover them all, even if to say the new info is limited); and substantiate these.	Considered in 7.4.2.1. Source literatures for Chapter 7 generally do not use SRES scenarios. Insufficient space. Some material added, but limited by literature. Substantially revised. Done. Not possible for this chapter. No. Doing our best.

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						(Martin Parry)	
7-1	A	0				The general comment is that it seems as if the authors have not decided whether the chapter is meant to deal with methodological issues and challenges, or with results. So, it deals poorly with both. It touches upon methodological approaches and alternatives, but do not discuss it in the light of weaknesses and strengths. Concepts such as adaptation, vulnerability, and resilience, which I understand are given quite distinct interpretations in the literature, are mentioned, but not defined in any systematic way. But the chapter does not compensate these shortcomings with a survey of results from the literature dealing with impacts on industry, settlements and industry either. Instead, we are being served some examples of results from here and there: A small village in Portugal, the Gulf of Finland etc. Moreover, reading the chapter, I get the impression that Jorgenson et al.'s study from US is the only economic study that has been done to estimate on economic impacts on industry and society. It is referred to several places in the chapter, but a search for other economic studies of similar scope is in vain. The Jorgensen et al. study is great, but only one out of many! (Asbjørn Aaheim, CICERO)	It is not the task of this chapter to discus methodological challenges. These issues are dealt with in Chapters 2, 17, and 18. Other literatures have been addressed in SOD revisions.
7-2	A	0				The chapter is twice the length is should be; I suggest to shorten by changing the structure and thereby avoid repetition (esp. regarding impacts and vulnerability). In particular there seems repetition between sections 7.2 and 7.4 . Also, some of the arguments are repeated in the sub-sections of 7.4, for example in the 'systems of interest' and then again in 7.4.3 Key vulnerabilities. Is it possible to integrate those sections better? Overall I believe that the chapter could be shortened substantially by doing this and it would also improve overall readability. The section on current vulnerabilities refers largely to climate and it might be useful to also include other aspects that affect current sensitivities. For example, in relation to tourism there are vulnerabilities in terms of global competitiveness, running down of local resources, exceeding carrying capacities, developing tourism without participation of local communities, declining biodiversity on which tourism depends etc. Current climate variability comes on top of all that; and then as discussed in section 7.4 climate change is added to the equation. Following this stream of thought may also reduce the sense of repetition already commented on in 1. Overall the chapter is sometimes not easy to read, maybe it is possible to simplify the sentences, for example by shortening them. Throughout the chapter the authors have taken an approach of reporting examples	The structure is externally dictated. Climate impacts are the issue for IPCC. Multiple causation is emphasized in the chapter.

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						very early on in each subsection. I would probably prefer to read first about the big picture and some general ideas/principles/concepts (possibly more theoretical) which can then be underpinned by specific examples. For example in relation to adaptation in the tourism system (or vulnerability) one could start with a paragraph outlining that a supply or demand perspective could be taken; in fact it is important to look at both how demand might change and on how the industry, i.e. supply, might be affected or adapt. In a way, this has been done, but it seems to me that in the present version such general thoughts are lost in examples. (Susanne Becken, Landcare Research)	Will consider case by case.
7-3	A	0				1. There is little coverage of future costs of climate change, where there is a growing body of literature, e.g. integrated assessment work of Tol, Nicholls and OECD. It might be that these covered elsewhere in the WG2 volume, but I didn't spot an obvious area for this work in other title headings. 2. The long planning horizons involved in infrastructure should be explicitly mentioned, because this has a real relevance for adaptation. Infrastructure decisions today leave a real legacy for the future, when the effects of climate change intensify. This means we need to take account of future impacts in our infrastructure planning today. 3. The growth of "mega-cities" should be explored a bit more deeply in the context of climate change, particularly how increasing exposure of infrastructure to climate change could significantly increase costs/impacts. 4. The Chapter should recognise that insurance arrangements affect the balance of who pays, but not how much climate change will cost society. (Sebastian Catovsky, HM Treasury)	Where relevant to Chapter 7 subject matter, considered in 7.5, but the literature is very limited in these particular connections. Considered in 7.4.2.3. See new box using Katrina as an exempel Considered in 7.4.2.2. and 7.6.2
7-4	A	0				General: good chapter; only two minor objections: 1) uneven treatment given to tourism and insurance in section 7.6.2 even though I agree with what was said on insurance; 2) insufficient attention paid to opportunities, such as agriculture in Eastern North America. Insurance is a major adaptation tool and risk-hedging instrument, which does not seem to be addressed in any other chapter of WG II. It was the object of a separate chapter, c.8 in TAR, WG II. While the treatment of insurance in section 7.4.2.2 and box 7.5 is adequate, it should be handled more extensively in the body of section 7.6.2 as well; the latter section is almost exclusively devoted to tourism. Insurance was and is an early adaptation tool; the insurance industry is the most affected by events either presumed to be due to or consistent with climate change in industrialized countries. Special financial instruments (weather futures, financial	Will consider. Agriculture is addressed in another chapter. Considered in 7.4.2.2 and 7.6.2; length limitations are a problem

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						options, some real options, etc.) were developed to deal with climate events. These are alluded to but not developed on p. 24, l. 7-10. As impacts are local in character, devising co-insurance instruments similar to crop insurance for municipal governments are extremely important and must be investigated. These should be addressed in in section 7.6.2. Unless IPCC AR4 plans a special report/workshop on climate insurance, here is the place to deal with insurance. Re: opportunities, I understand that agriculture is the object of a different chapter. Benefits are mentionned on p.3, l.10 and on p. 14, l.36 - 39. but not much covered (e.g. p.28, l.32-33). However, there may be institutional opportunities (framing issues) to develop adaptation measures such as the requirement for municipalities to develop emergency plans. Institutional opportunities are alluded to on p. 5, par. 4. and p. 25, l. 5-8. The economic literature tends to emphasize the benefit side of adaptation (e.g. Mendelsohn). While table 7.4 refers to benefits in terms of space-heating savings,Table 7.1 deals mainly with negative impacts. (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Considered.
7-5	A	0				Basically I agree with the chapter and its prudent formulations, putting climate change in a wider vulnerability framework, and contexts in which many uncertaincies have to be addressed beyond climate change as well. I also like the careful attention for scale and geographical scope/specificity. (Ton Dietz, University of Amsterdam)	Thank you.
7-6	A	0				Although I do not have a clear overwiew on chapter 7 (and even less on the all the WGII section of AR4 !), I think it was quite challenging to deal with all industry, services and human settlement issues in one chapter. As a result there is quite an imbalance between general statements on this general fields, and precise comments on two selected sectors (tourism and finance). More could probably be said on urban issues (especially in the developing world : risk management (floods...)), and it could perhaps be more clearly stated in the introduction that tourism and finance are used only as examples and not as the most critical issues of the chapter 7 field. (Ghislain Dubois, Tourism Environment Consultants (TEC))	Agreed. Will consider, subject to length constraints.
7-7	A	0				My general comment is that the coverage in terms of urban settlements is not adequate. The coverage of urban heat island effect and its feedback with global climate change is very limited. This is especially the case in tropical and/or developing cities. Examples of urban vulnerabilities, adaptation possibilities and key urban uncertainties need to be covered, especially with respect to developing cities. The UHI-climate change vulnerability interactions/feedback is particularly problematic in the developing world. It is necessary to discuss the feedback and its	Length limitations make it necessary to limit the UHI discussion to one paragraph.

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						implications to urban population's vulnerability and adaptation practices (Rohinton Emmanuel, University of Moratuwa)	
7-8	A	0				The chapter is well documented and quite comprehensive. The sections on mega-cities are well described. However, in many regions or areas specific problems exist and could not always find solutions for adaptations or practices options. (Savitri Garivait, The Joint Graduate School of Energy and Environment (JGSEE))	Yes.
7-9	A	0				I understand the request was not for editorial comments, but there are significant differences in format and style (very empirical/more general) through these chapters, repetition, errors with ways references are cited, etc. These need to be dealt with. 1. I understand recent research is to be highlighted, but this means that in many cases: (1) reference is made to papers that are submitted or in press and thus have not necessarily been fully reviewed and evaluated by the research community; (2) benchmark papers that define processes/issues are not cited rather papers that cite those papers are. I think this is a mistake. (C Sue B Grimmond, Indiana University & King's College London)	Will consider.
7-10	A	0				1. In both chapters, the sections on human settlements (urban areas), which I focused on, do not make explicit the distinction between risk to the infrastructure of cities and risk to the human inhabitants. This has important implications for the discussion. This results, for example, in an emphasis on coastal cities as those most at risk. They are in terms of infrastructure. However, events of 2003 in Europe (heat wave), and elsewhere in other summers, indicate that the threat in terms of human life and health is greater in continental cities. 1. The latitude of urban areas should be explicitly considered. High latitudes may have decreased heating needs and not necessarily increased cooling needs. (C Sue B Grimmond, Indiana University & King's College London)	Will consider. Included in the energy discussion in 7.4.2.1
7-11	A	0				This chapter summarises research analysing the impact of climate change on industry, settlement and society (ISS). This is a very broad topic but I feel the authors have adequately addressed the three points stated as their main objectives i.e., to describe impacts of climate change on ISS, to identify (where possible) the costs of climate change, and finally to highlight potential adaptation strategies. This has been achieved by describing detailed examples of observed impacts. In general, this chapter would benefit from English language editing It would be useful to have a dedicated section stating what's new since the TAR (Claire Hanson, University of East Anglia)	Considered in chapter editing.

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7-12	A	0				This chapter documents the possible impacts of climate change on "industries, settlement and society" extensively and comprehensively, which is readable and written plainly, avoiding technical words. There seems to be very few reliable references on this subject, but the authors refer to relevant articles when they describe points required evidences and authorization. The following comments are rather technical some might be minor than substantial. (Hitoshi Hayami, Keio University)	Thank you.
7-13	A	0				Very (too) broad and general chapter. Too many individual (qualitative) examples, no enough tangible and quantified impacts on whole sectors. Insurance part also very descriptive. Would be helpful to have a list/table of affected lines of business, … I would suggest to add some more graphs or tables for better illustration/visualization. See eg Weather September 2005, Volume 60, no 9, Royal Meteorological Society, p. 259: Table 1 "Common climate impacts by activity" (Pamela Heck, Swiss Reinsurance Company)	Limited by available literature. Will consider, subject to length constraints.
7-14	A	0				Repetive descriptions are often in this chapter. This could be more compact, without losing the amount of information. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Will consider, but some repetition is imposed by the structure of the chapter.
7-15	A	0				In large parts of the chapter the useful focus on vulnerability to impacts of chnage as the compounded effect of exposure and sensitivity is not clearly made, despite the announcement in the summary (p.3, lines17-21) The overall tendency of the chapter is to over-emphasize negative impacts, and in several instances a more balanced representation is missing. Concrete examples follow below in comments #6, #7, #14. (Tom Kram, MNP-RIVM)	Will consider detailed comments.
7-16	A	0				This chapter does not cover a wide range of subsectors, but deals to a large extent with selected case studies. Although general findings are referred to and sometimes they are even developed, the emphasis on specific subsectors may appear too "casuistic". This approach is very much understandable regarding the limited length, the broad scope of the chapter, the state of literature etc. Still, the chapter might improve if even more effort were put into the development and explanation of general findings (meaning, of course, that some case study details would have to be sacrificed.) Several topics dealt within ch. 7 are touched in ch. 17 as well (e.g. impacts on infrastructure, ch. 17 pp. 9ff.). Supposingly, parts of the resulting duplication may be avoided already at this stage of the working process. It may be beneficial if thereby the entire literature surveyed in the two chapters is considered, if relevant,	Other comments point in different directions. Will consider. Will consider. CA Karen O'Brien is an LA for Chapter 17.

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						by authors of both chapters. (I have not read any other chapter's draft, therefore I am able only to draw the authors' attention to duplication within the ch. 7 and 17.) (Margareta E. Kulessa, Mainz University of Applied Sciences)	
7-17	A	0				This chapter covers the state of the art and condenses literature's major finding in a very comprehensive and comprehensible manner. This achievment itself is "added value". Additionally they report on initiatives for enhancing adaptation. Furthermore they move on and draw the attention to need for action, offering some careful advice for policy makers how to make use of the theoretical and empirical findings. This chapter follows the agreed plenary outline and the sections fulfil the expectations generated by their headings. Of course, it is always debatable whether some aspects could be further stressed (e.g. multiple stressors, technology), and others could be regarded less (e.g. assessment of adaptation practices). But I personally find the foci to be very well chosen and set in a consistable manner, esp. considering the given outline, the limited length and the piles of relevant literature. Summing up, I am happy to write down only a few specific comments, none of them having the potential to lead to time consuming alterations of the text. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Thank you.
7-18	A	0				This topic resists definitive conclusions for many of the reasons touched on in the chapter. First, information and data on the impacts of climate change at the regional or country level are still quite weak. Therefore statements, beyond generalities about possible impacts, are difficult to defend. Second, while scientists are in agreement that the world is warming, there is no consensus as to how to separate normal weather variability from changes caused by climate change. Further, while the climate is changing so are other indices such as economic and population growth, demographic shifts, changes in trade patterns, the penetration of new technologies, and the changing ratio of agriculture to other sectors of the economy. Some of these trends will reduce the impacts of climate change; while some may aggravate these impacts. Some may do both. These shifts will also affect a country's ability to implement adaptation options. As the authors point out, "climate is only one set of multiple stresses operating at diverse scales in space and through time." These interactions are so daunting that most analysts simply throw up their hands and focus on other aspects of the climate debate. The authors of this chapter are to be congratulated for articulating the complexities and avoiding overly-simplistic conclusions. However, the downside is that these realities induce the authors to be quite cautious. They couch their conclusions in the language of probabilities, which can lead to the conclusion that the impacts of climate and man's ability to adapt are	What we can do in this chapter is severely limited by the available literatures.

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						so uncertain that the world's governments should do little until they have completed significantly more research. I suspect that this is not the message that the authors intend to leave, but they are legitimately handicapped by the reality that the future is always uncertain and climate change is measured in decade length trends not individual storms, floods or draughts. While I think the chapter does a good job of discussing key impacts and the feasibility of adapting to them, there are several additional topics that might be mentioned. Let me suggest four. (Henry Lee, John F Kennedy School of Government)	
7-19	A	0				There is a lot written on the geopolitics of population movement and the implications to both domestic unrest and trans-boundary tensions. I would urge the author's to explore this literature in greater depth and discuss how it might apply to the climate problem. (See Homer-Dixon, and others.) One of the basic findings in the chapter is that the impact of climate change is not likely to have a significant effect on the growth in GDP, but localized problems could be serious, especially for cities in the developing world that are susceptible to flooding. How do the author's define climate change? Are they referring to a doubling in ghg concentrations? Would this same conclusion apply, if one was referring to a tripling? Since models do not allow us to identify with any specificity which localities or regions are likely to be impacted more than others, how do I, as a reader, weigh the significance of the chapter's finding? If it is true that climate will have a minimal impact on economic growth and a big impact on a few select areas, should this lead the reader to be less or more concerned about the problem. My guess is that it might lead them to the former conclusion, but this may not be what the author's intended. Hence I would expand on this discussion. (Henry Lee, John F Kennedy School of Government)	The chapter includes a box on environmental migration. Insufficient literature to support. Necessary to focus on vulnerabilities rather than impacts because of limitations in research that has been conducted to date.
7-20	A	0				My biggest problem with the draft was that it read as if there were several authors (which is probably the case). Certain sections are more readable than others. In some sections concepts were clearly described and in others the concepts were almost indecipherable. There were several places where concepts or arguments were repeated, leading me to conclude that the author of one section was not aware of what had been written in another. Hiring a good editor would be a major benefit. Also use the introduction to not only introduce the topic, but also walk the reader through the chapter, explaining what will be discussed and why the authors organized the material in the way that they	True. Considered in editing. Ditto. Space limitations are a constraint on this.

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						have chosen. I hope that these comments are helpful. As I said at the outset, I believe that the chapter is balanced and fair. I also recognize that this topic is a very difficult one to address, given all the interactions between multiple factors all operating in a future characterized by significant uncertainty. You do not want the reader to dismiss the potential impacts of climate change because we remain uncertain about impacts, costs and man's capacity to adapt, yet you do not want to make statements before science and analysis is ready to embrace those statements. (Henry Lee, John F Kennedy School of Government)	Very helpful comments. Will consider carefully.
7-21	A	0				1. There have been several excellent studies on the impacts of climate change on Arctic regions -- see Robert Corell's work and also the work at the University of Alaska. If a significant amount of the world's fossil fuels, particularly natural gas are located in the Arctic regions -- climate impacts may make it more difficult and more expensive to extract these resources. Witness the reluctance of the Russians to invest in their resources located in the Barents Sea and the Yamal peninsula. A page or two on the result of recent studies on the arctic region would strengthen the chapter. 2. Some experts have talked about the impacts of storms and droughts on the ability to navigate rivers and canals. Often these waterways, especially in developing countries, are critical to the movement of resources, such as food and materials. This is not my area of expertise, but it might be worth some mention. 3. The same argument can be made for including a paragraph on the increased risk of forest fires. (See Roger Kennedy's recent work.) 4. Migration. The chapter touches on this issue, but it is worth greater discussion. The geopolitical tensions (witness today's immigration/migration disputes in almost every region of the world) are likely to grow worse, especially if the costs of climate changes – fall more on some localized areas and less on others. A portion of the people in areas hardest hit will try to move to other localities, countries or regions. (Henry Lee, John F Kennedy School of Government)	ACIA included in SOD. Some of these issues belong to WG III. Considered in revision of 7.4.2.3. Space limitations…. See box on environmental migration.
7-22	A	0				There is a lot of interesting information in this chapter, but it tends to be overshadowed by text that seems to be struggling to say anything, given the general lack of information about many sub-topics. Somehow a better way needs to be found of covering important issues about which little is known. Falling back on generalizations that nobody could disagree with because they are virtually self-evident is not an answer. Also, this chapter would seem to be the obvious link to	The chapter is limited to the literatures that pertain to its subject matter, which – considering the breadth of the subject matter – make the presentation necessarily eclectic and, where little is known, less than satisfying.

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						economy-wide and trade-related issues, which are not covered elsewhere in the report. An obvious question is why not? Is there nothing to say? Or is it not considered an important issue? The migration and movement of industry and population are treated almost exclusively as impacts of climate change, and as stresses. There is no serious discussion of the opportunities for and barriers to migration as a desirable adaptation to climate change, even though one of the most obvious benefits of modern technology ought to be that it allows capital and labour to move relatively easily, and thereby reduce the costs of climate change. Moreover, there is no mention of the (even greater?) stresses that are likely to arise if such migration is prevented by imposing barriers to migration - through restrictions on urban residence or international migration. It is surprising that there is almost no mention of the share of population, human settlements of different sizes, or industrial activity located in zones especially vulnerable to the potential negative impacts of climate change, such as low-lying coastal zone; tropical storm areas; drylands (barring a reference on page 30 noted below). I recognise that this report is not meant to involve new research. There are, however, existing databases that attempt to locate human settlements spatially (e.g. CIESIN's Gridded Rural Urban Population, and which has already been linked to coastal and riverine zones and drylands, and could presumably be linked to zones specified as of particular relevance to climate change. If the authors feel this information is not sufficiently relevant or reliable to present, or if they feel a bit more research would be required to present it, this should be mentioned. (Gordon McGranahan, International Institute for Environment and Development)	Considered in 7.6. Interacting with IIED and CIESIN about this. Hope to add more in the Third Order Draft, based on literature just now emerging.
7-23	A	0				the text is too long and some informations are developed several times (Michel Paillard, IFREMER)	Addressing redundanties.
7-24	A	0				The biggest issue here is that the report has been overtaken by events. namely Hurricane Katrina makes Fig 7.1 worth replacing. I would be inclined to add a new box 7:3 on this event and its implications (Allen Perry, University of Wales Swansea)	Box and figure on Katrina added.
7-25	A	0				It is noted that this chapter does not address significant impacts of climate change on settlement and society (e.g. water scarcity, migration of rural population due to loss of natural resources e.g. crops or grassland) and the associated political problems. It is suggested that chapter 7 also informs about various impacts in a more concrete manner by building on the information included in those chapters addressing specific regions.	Many of these issues are alreeds included. Will reconsider, subject to literature and length limitations. Will consider, subject to length limitations.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Klaus Radunsky, Umweltbundesamt GmbH)	
7-26	A	0				Very complex sentences makes the reading uncomfortable, the sentences may be broken down in simple sentences. The chapter while focusing on industry talks very little about SMEs, SMEs are going to be prefred strategy at least in the nedium term to achieve sustainable development. While talking of human settlement the chapter completely ignores rural human settlement. It foucses mainly on urbanisation and somewhat on coastal zone. While talking of society no mention of life style is found which is major omission. (Joyashree Roy, Jadavpur University)	Considered in revision of 7.4.2.1 and elsewhere. Considered in revisor of chapter.
7-27	A	0				Number of locations where authors indicate references will be forthcoming (make sure these are all filled in) (David Sailor, Portland State University)	Doing our best.
7-28	A	0				As in most of the other chapters, there needs to be some revisions to use terms like vulnerability, risk, exposure consistently with the definitions set out in Chapter 2. (Daniel Scott, University of Waterloo)	Doing our best.
7-29	A	0				In many cases technical methods and approaches were developped considering existing natural conditions. This is well seen not only in agriculture, forestry, but in industry. Oil and gas industry, as well as infrustructure consructure in northern regions is utilising existing permafrost which could be severely effected by climate warming. Technological changes in industry should be one of the main priorities within adaptation strategy under climate change. (Andrey Sirin, Institute of Forest Science Russian Academy of Sciences)	Considered in 7.4.2.1 and 7.6.1
7-30	A	0				This chapter is in a bad shape. It is long on words and short on information. It is full of gobbledigook. It is repetitive. Some passages are literally repeated three times. Quantitative estimates are often missing or wrong. The discussion is often shallow, with a single, randomly selected paper "representing" a rich literature. Energy supply and demand are not well treated. (Richard S.J. Tol, Uni. Hamburg)	Not helpful to the authors without more specifics.
7-31	A	0				This Chapter covers a very wide range of topics, from the impact of sea level rise on cities to the impact of climate change on tourism. The Chapter does an impressive job of reviewing and synthesizing diverse literatures. The Chapter is very thorough. The bibliography is a very valuable resource. This Chapter can certainly used as a reference for researchers interested in the impacts of climate change on industry, settlement, and society. The other side of the coin is that the Chapter is not very compelling. It is certainly	Excellent research questions, but most of this research remains to be done.

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						not as compelling as some of the other draft chapters. Compelling should be interpreted in two ways. First, the Chapter is rather dry; the writing needs some 'punch.' I realize that it is hard to produce a 'hard to put down piece' that is a multi-authored literature review. However, since this piece has the potential to be read in particular by urban leaders around the world, it is important that this Chapter hold the reader's attention. The second interpretation of compelling relates to the underlying story of the impacts of climate change on human settlements. Soon, over 50% of the world's population will reside in urban areas. Urban economies are increasingly becoming enmeshed in the global economy. Populations in the developed world are aging rapidly. Drought, famine and disease are rampant in developing countries. Truly, climate change could have extraordinary impacts given this context. Yet, climate change is treated, as the report indicates, as simply another stress to 'the system.' Yes, that is true, but to what degree? Is it the first stress among equals? How many people world-wide may lose their homes to rising seas? For how many people who now life at the lower limit of subsistence may climate change be the factor that finally turns them into environmental refugees or into ever rising mortality statistics? How many homes and businesses worldwide may be destroyed each year by storms that are stronger and more frequent because of climate change? How vulnerable is the world's economic system to disruptions attributable to the myriad impacts of climate change? This Chapter addresses these types of questions in generalities (see the Executive Summary) but not in more compelling specifics. Let's address 'compelling' from the perspective of an urban leader who may read this Chapter. The urban leader will want to find out the threats that climate change poses to his or her human settlement. The leader will find in the Chapter information about a large number of potential impacts of climate change on human settlements and industries. However, in almost all cases, the Chapter does not provide much specific help to the urban leader. The Chapter does not provide a list of cities most threatened by sea level rise, for example. It does not provide a check list of conditions or circumstances that may describe a city and link those descriptors to climate change impacts. Anything that could be done to make the Chapter more useful to urban leaders is encouraged. It could be that a deeper mining and synthesis of the literature would allow the authors to make more specific and compelling statements about the impacts of climate change on human settlements, industries and society. Even it that is not the case, that the underlying research does not allow more definitive statements, it is	We wish we could offer more, but we are limited by the currently available literature.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						very important that Section 7.8 – Key Uncertainties and Research Priorities, be made much more explicit. The future research recommendations are stated in terms of reducing uncertainties and improving understandings of relationships. I would much prefer that the research priorities be stated in more forceful terms, such as: estimates of the number of people who may become environmental refugees because of the impacts of climate change must be developed; and vulnerabilities of specific global economic relationships in specific industries and specific human settlements must be assessed. Additionally, the list of research priorities should include new research in human settlement designs (including the built environment and infrastructure) that are resilient to the impacts of climate change. Intertwined with this list should be efforts to promote sustainable development, which most by most definitions encompass environmental and economic goals related to resource and land conservation, emissions reductions, and protection of biodiversity. The previous section, 7.7 – Implications for Sustainable Development, is also rather general in this regard. Not much is said in the Chapter about sustainability until this section and the section does not define sustainability very well. The section seems to describe sustainable development within the global economic paradigm whereas many people may believe that sustainable development may actually help shield communities from the potentially disruptive forces of the global economic system. In fact, the Chapter describes how climate change could have possibly severe impacts on regional and global economic relationships. Wouldn't a logical conclusion related to adaptation then be that human settlements become much more sustainable (i.e., rely less on imports, minimize resource requirements, move toward self-sufficiency)? (Bruce Tonn, University Of Tennessee)	We disagree with this example as the sort of thing that Section 7.8 should advocate, because we think it invites oversimplifications of complex multi-causal relationships. Interesting thinking that the authors will consider, but space limitations are a severe constraint on adding further material.
7-32	A	0				4. In conjunction with my second observation (on methodology), while I recognize fully the difficulty of including quantification within a theme that does not lend itself well to such an approach, I wished that a more systematic set of measures had been identified and employed. Instead, I found the text moving from one subject to another in a relatively discursive and inconclusive manner. 5. The title aims at industry, settlement, and society, but does not afford much explicit attention to institutions--that is, government agencies, international organizations, NGOs, community groups, and resource management authorities. I think those overarching entities are as important as the sectors that are being addressed.	Limited by available literatures and externally-imposed chapter structure. Adding brief treatments of government services in 7.4 and 7.6, but limited by space and literature constraints.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						6. Economic analysis has been one of the few quantifiable techniques employed to determine impacts of possible climate change. Pages 36 to 40 review some examples of the use of economics. But hard-to-value goods such as environment and scenery have limited the usefulness of economic analysis. A critique of this set of tools, along with a proposed set of instruments and metrics (economic or other), would be extremely useful for this chapter. 7. A separate look at transboundary problems would have been appropriate. 8. Similarly, there is little mention of the potential for increased conflict under various climate change scenarios. 9. The list of reference properly reflects the work of the authors and the sources they rely on. Has the list of references from the three prior IPSS reports been checked and compared to see if influential writing has been fully consulted? (Robert Varady, University of Arizona)	Will consider in 7.5. Will consider. Lack published reference materiaal. Supposed to focus on post-TAR literatures.
7-33	A	0				1. This first comment is political. The chapter and the executive summary have a strongly tentative 'hedge-and-haw' feel to them. This is unfortunate since the repeated apologies for the difficulty of tackling this subject and the resulting imprecision and uncertainty lead the reader to think that this is all rather inconclusive. The net effect of this impression is that those who already cite uncertainty in the science of global change prediction as a reason to postpone action will find much to like in this approach. In short, the tentativeness of the writing will strengthen their resistance by confirming that all this is speculative, imprecise, and not very scientific. A large part of the problem is due to the difficulty of attempting to gauge future trends, which the authors correctly estimate as a major obstacle to evaluating impacts on social systems. They are wise to be guided by Turner, et al., and Clark, et al. (p. 14/lines 6-10), who suggest focusing on vulnerabilities to impacts of change instead of on projections of the likely impacts. That is a useful caution but it probably doesn't go far enough in protecting against the sort of wishy-washiness that is palpable throughout the chapter. A stronger approach would be to forget about the future altogether and concentrate on past and present evidence. The tourism case the authors cite on page 11 is a perfect example of how you can argue and extrapolate from actual examples. 2. I would have appreciated a section at the very front of the chapter that outlined and identified the methodology being used to analyze impacts and to arrive at conclusions. By what means, for example, did the authors decide that conclusion #1 in the executive summary (pp. 3-5) could be stated with "very high confidence," while conclusion #5 merited only "medium confidence"? Did the authors take a	Limited by literatures, which necessitate caution about conclusieons. The chapter does this: see 7.4.1. See Chapter 2. For Chapter 7 subject matter, methodologie vary from source to source. Judgments about levels of confidence are based on analytic-deliberative processes within the author team, as is usual in IPCC.

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						straw poll? Was there an instrument? Without any discussion of this question, the reader may wonder whether the conclusions are based on anecdotal evidence. 3. The authors have missed an opportunity to use graphics effectively. The first graphic, Figure 1 on page 6, is a very poor choice for a number of reasons. As the first image, it should have punch and be persuasive. This image, a map of part of New York, is difficult to interpret (especially in blacks and grays), does little to illustrate or clarify a specific point, and in short, is a missed opportunity. Remarkably, it's the only map. Nor are there any numerical tabulations, graphs, or charts whose presentation supplements and strengthens the text. The only tabulations are somewhat idiosyncratic schematic representations. (Robert Varady, University of Arizona)	Figure 7.1 changed. Summaary table being added to 7.4.
7-34	A	0				As the guidance on this chapter is to have the final version no longer than 30 pages, I recognize that the chapter will be cut down considerably from its 51 pages. This should not be too difficult as I found considerable redundancy and extraneous information throughout the chapter. Some of my specific comments below delineate some redundancy. In a more general sense, I think the authors should attempt to be more quantitative and less qualitative. Throughout the chapter I found long passages in which the take-home message was essentially "we don't know much about this subject but we'll write a bunch about it anyway." An example could be page 16:8-23. That paragraph really says nothing not already clear to any policy maker and essentially repeats words found elsewhere in the chapter. Examples of the kind of paragraphs very useful and central to this chapter could be pg 17:22-37, pg. 21:11-24, pg. 24:40-47. The unifying theme is their specificity and well-cited nature. <paragraph break> I have noted in some of my later comments (they are in page order) that certain points I would consider crucial to the chapter are not really highlighted or mentioned until late in the chapter. This would include a discussion on resiliency of urban systems and building resiliency into infrastructure before it is too late, for example. <paragraph break> Because of the lack of quantification I mention above, I think the chapter fails to address sufficiently what is set out as a key goal of the chapter: pg. 7, lines 28-29: " 2) assess the current knowledge about the costs of such impacts." I think this latter point, although it may be difficult to arrive at, is the key question to the policy maker. The chapter is only relevant, in my opinion, insofar as this subject is thoroughly examined. As yet, I do not think that has been achieved. (Kevin Vranes, University of Montana)	Will consider detailed comments. Quantification is literature-limited

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7-35	A	0				Overall the Chapter reads well, comes across as very well researched, and seems to present a very balanced view of the issues. My area of expertise is the financial sector and the insurance sector in particular. In the TAR this was a separate section, while this time it is combined with a much broader spectrum of comunity interests. Presumably this was done because of the limited interest and information in the past on the impact of climate change on the financial sector. However since the TAR there has a been a significant change in this respect. My concern is that much of this new knowledge and activity is not reflected in this document, with material related to the financial sector being a very small proportion of the total chapter. Part of this reason may be that it is only very recently that much has been published. One major recent publication in this area is 'The Finance of Climate Change' (Ed. K. Tang), p.404, published by Risk Books, London, in July 2005 (hereafter referred to as Tang (2005)). Whereas insurance concerns have previously dominated reports on climate change and the financial sector, and do so again in Chapter 7, in this book only 2 of the 30 chapters directly address insurance, and only one of these devotes much attention to the problem of catastrophe insurance, which previously has tended to be the primary concern but is now being recognised as a relatively resilient area of insurance. Unless the financial issues are being addressed in more detail in other chapters - eg Chapter 18 - then I believe it would be remiss not to include this relative sea change in attitude that has occurred in the financial sector, particularly in Europe, over the past 5 years, largely driven by the Kyoto Protocol and the European Union Emissions Trading Scheme, but not limited to this. A reflection of this is the increasing involvement of major financial corporations in UNEPFI (which does get a mention in the report) as well as the Carbon Disclosure Project, whereby 300 of the FT500 largest companies in the world publicly disclose their emissions (Dickinson, P., 'Corporate Carbon Disclosure - The Work of CDP', pp.189-196, Tang (2005)), a number of national investor organisations such as the Investor Network on Climate Risk (INCR) in the US and Institutional Investors Group on Climate Change (IIGCC) in the UK (Sullivan, R., Robins, N., Russell, D. and Barnes, H., 'Investor Collaboration on Climate Change: The Work of the IIGCC', pp.197-210, Tang (2005)), and others (Tang, K. and Dlugolecki, A., 'A Changing Climate for the Finance and Insurance Sector', pp.3-14, Tang (2005)). (George Walker, Aon Re Asia Pacific)	Considered in 7.4.2.2 and 7.6.2, subject to space limitations.
7-36	A	1	0			Additional references: Sigma publications Natural catastrophes and man-made disasters in 2002: high flood loss burden, Sigma 2/2003 (www.swissre.com -> Research & Publications -> sigma ins. research -> sigma archive).	Recent loss experiences moved to Chapter 1.

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						Sigma publications Natural catastrophes and man-made disasters in 2003: many fatalities, comparatively moderate insured losses, Sigma 1/2005 (www.swissre.com -> Research & Publications -> sigma ins. research -> sigma archive). Sigma publications Natural catastrophes and man-made disasters in 2004: more than 300'000 fatalities, record insured losses, Sigma 1/2005 (www.swissre.com -> Research & Publications -> sigma ins. research -> sigma archive). Floods are insurable! Focus report, Swiss Re, 2002 (www.swissre.com -> Research & Publications -> Focus Reports -> all focus reports). Hurricane season 2004: Unusual, but not unexpected. Focus report, Swiss Re, 2004 (www.swissre.com -> Research & Publications -> Focus Reports -> all focus reports). (Pamela Heck, Swiss Reinsurance Company)	
7-37	A	1	1			I see that there are many references to the government sector (which is good), but it may be useful to add a coherent section addressing this as well. Topics could include the role of national and international disaster relief, disaster preparedness/recovery, government as insurer of last resort, and the exposure/vulnerability of government itself to climate change (infrastructure, costs of relief, etc). Show and discuss trends in international relief and how it systematically falls short of the need. Some info is here: http://eetd.lbl.gov/EMills/PUBS/Insurance_Emerging_Markets.html (Evan Mills, Lawrence Berkeley National Laboratory)	Good suggestion. Short sections on government services added to 7.4.2.5 and 7.6.
7-38	A	3	0			Executive summary: while the indication of confidence is useful, I am challenging the authors about specific assessments. For example, why is 2 on p. 3 less certain than 3? Similarly, I wonder why point number 4 on p. 5 is somewhat less certain than the other ones? I would also argue that point 6 is relatively certain, because we already know that specific adaptation measures (e.g. air condition) counteract mitigation efforts. On what criteria are those confidence levels assessed. Do the assessments really reflect the uncertainty of the issue or more the vagueness in which the argument is phrased. For example, point 1 is phrased very clearly, and of course we can be very confident with this statement that abrupt changes are more difficult to adapt to than moderate ones; on the other hand the statement of R&D is less clear (because it is more complex of course) and as a result we can not be as confident about its accuracy... In the end, I probably challenge the usefulness of those assessments, because they pretend that there is one single scale against which the statements can be compared. (Susanne Becken, Landcare Research)	Executtive summary substantiële revised. Judgments on confidence levels expected of all chapters, based on collective author expert judgments.

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7-39	A	3	0	4		Comment on the list of key vulnerabilities from pg. 3-5: Consider adding a new key vulnerability to this numbered list: A vulnerability due to the interactions between climate change, ecological change and urbanized regions as present management and regulatory systems for environmental and public health quality could become stressed in ways that challenge the structural methods and rationales for these systems. (I don't think this point is fully addressed in the rest of the list.) (Joyce Klein Rosenthal, Columbia University)	Will consider.
7-40	A	3	0	5		Comment on Executive Summary: Overall, the authors have provided a very good and thorough assessment in this Summary, considering the range of broad issues considered. However, this Executive Summary could be improved with a stronger emphasis on the social equity consequences of the potentially uneven distribution of the adverse impacts of climate change on various societies and social actors, in interaction with underlying socioeconomic status and conditions. Following this overall comment, most of my points below speak to suggestions for changes in the specific wording of sentences, or the additions of references for some topics. (Joyce Klein Rosenthal, Columbia University)	Will consider. Executive summary substantially revised.
7-41	A	3	1	5	22	For the classification of very high, high, and medium confidence to be applicable, one needs to be explicit and clear about criteria for the different classes. As it stands now, it seems more like a completely subjective evaluation. (Asbjørn Aaheim, CICERO)	Criteria defined in WG II AR4 front-matter.
7-42	A	3	1			Executive summary: Though I guess the executive summary will be altered anyway, some comments anyway: the summary is quite hard to follow as, among other things, it stays very abstract and, sometimes a bit tireing. It consists to the very part of unchanged text from sections 7.1 to 7.8 In these sections the arguments are developed and therefore the conclusions are easier to understand. In the executive summary in which these explanantions are, of course, missing, some messages become less clear. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Yes. Redone.
7-43	A	3	3	5	27	The Executive Summary seems very vague (ie too high level), no new messages, no specifics to catch the reader (Andrew Dlugolecki, university of east anglia)	Redone.
7-44	A	3	5	3	5	Specific comment on wording: The use of the word "cost" in this sentence rather than "impacts" ("The central issues for industry, settlement, and society are whether the costs of climate change…") immediately emphasis on economic consequences. Perhaps substituting "impacts" for "costs" would expand the sentence's meaning? If the word "costs" is retained, then the sentence could be slightly modified otherwise by replacing "are whether" to "include whether" -- E.g., "The central	Redone.

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						issues for industry, settlement, and society include whether..." (Joyce Klein Rosenthal, Columbia University)	
7-45	A	3	10	4	24	Maybe the readers should be even more explicitly familiarized with the thought that due to the state of the art the chapter deals with more questions than answers, more speculations than empirical findings (sometimes even a lack of sound theoretical findings). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Considered in chapter revisor.
7-46	A	3	14	3	18	It is not immediately clear that "uncertainties about such socioeconomic variables as possible technological and institutional change over a period of many decades tend to undermine the feasibility of comparing future prospects involving considerable climate change with prospects involving relatively little climate change" should imply that research focus on vulnerabilities – as an alternative. (Asbjørn Aaheim, CICERO)	Executive summary redone.
7-47	A	3	15			also include increasing population and changing livestyles among the upcoming changes (Paul Kirshen, Tufts University)	Executive summary redone.
7-48	A	3	16	3	17	It is proposed to indicate the terms considerable climate change and relatively little climate change in terms of global average temperature change. (Klaus Radunsky, Umweltbundesamt GmbH)	Other manifestations of climate chatnge are important as well.
7-49	A	3	17	3	21	This point is true, but not providing projections of impacts plays into the hands of sceptics, who will readily cite the cost of present day mitigation as a reason to do nothing.Two recent example of an impact projection are the Dlugolecki 2004 report for ABI on UK, and the ABI 2005 study on extreme event costs, while Dlugolecki and Lafeld 2005 provides further thinking. (Andrew Dlugolecki, university of east anglia)	Executive summary redone. The authors consider projections of climate change impact costs for industry, settlement, and society to be speculative at this point.
7-50	A	3	17	3	21	Here the vulnerability concept is introduced, but not very well supported in the rest of the chapter or the numbered lists in the rest of the Executive summary (Tom Kram, MNP-RIVM)	Executive summary redone.
7-51	A	3	18			Vulnerabilities to climate change impact provides a good social research focus to the paper (Kim Ritman, Bureau of Rural Sciences)	Thank you.
7-52	A	3	26	3	30	The recent extreme events (tropical cyclones in different regions of the world – i.e Katrina and Stan, and remarkable droughts – like the one severely affecting the Amazon Basin - suggest revision of these lines to write in potential terms (for instance most key vulnerabilities might be relatively localized, etc) (Osvaldo Canziani, IPCC WG2 Co-chair)	Executive summary redone. This point is being considered carefully by the authors.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-53	A	3	26	3	26	Comment on wording: change line 26 to read, "institutional) to cope, rooted in issues of social and economic development. The characteristics that create key vulnerabilities are often…" (Joyce Klein Rosenthal, Columbia University)	Will consider.
7-54	A	3	28	3	28	Line editing: remove word "such" (Joyce Klein Rosenthal, Columbia University)	Redone.
7-55	A	3	29	3	29	Line editing: "limited and although the characteristic may be widespread. Based on…." (Joyce Klein Rosenthal, Columbia University)	Redone.
7-56	A	3	29			Please define stresses (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	See earlier materiaal in WG II AR4.
7-57	A	3	29			It seems there is a grammatical inconsistency in how the vulnerabilities are listed here. "…key vulnerabilities…include…" is followed by items such as "Interactions between….". It doesn't seem that interactions are vulnerabilities. I prefer the wording in the first part of section 7.4.3 (David Sailor, Portland State University)	Redone.
7-58	A	3	32			The word 'interactions' is rather vague here. What is the nature and extent of these interactions? Is it a one-way or two-way interaction? (Hans H.J. Labohm, Netherlands Institute of International Relations 'Clingendael')	Redone.
7-59	A	3	32	4	7	The key vulnerabilities stated with high confidence intervals in this summary are very abstract and yet represent almost common-sensical claims. They are simply repeated in the vulnerabilities section of the main body of the chapter, without elaboration. (Gordon McGranahan, International Institute for Environment and Development)	Redone.
7-60	A	3	32	4	7	It might be appropriate to introduce the (perhaps counterintuitive) notion that development can, in some cases, increase vulnerability, e.g. in the case of increasingly extensive energy or communications infrastructure. Case in point: much less vulnerability 50 years ago to offshore oil infrastructure than there is today; 60% of electrical grid disturbances in US are weather-related, etc. (Evan Mills, Lawrence Berkeley National Laboratory)	Will consider.
7-61	A	3	32	3	35	You may have very high confidence in this statement, but I have much less confidence that it makes grammatical sense. (Richard S.J. Tol, Uni. Hamburg)	Redone.
7-62	A	3	36	3	41	Also the timing of any adaptation action is very important. For example, research done in metro Boston, USA on adaptation strategies for major infrastructure showed that the timing of a response action impacts total future damage and adaptation costs (Kirshen et al, in press). Also, please note that often in my	Will consider in 7.6.

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						comments i refer to the research done by myself and colleagues on the impacts of and adaptation strategies for climate change on infrastructure services in the 101 cities and towns in metropolitan Boston in the northeastern USA. Since the research was completed in 2004, some articles are still under review. Therefore in the text I refer to the grey literature of a chapter in a book being published soon and the final report, which was accepted by the US EPA. I am not trying to use this document as a mechanism to publicize our research but since there are so few small scale case studies, the results may be valuable. I leave that judgement up to you. The book chapter is reference (4) in comment 5 below. The report reference is Kirshen, P., Ruth, M., Anderson, W., and Lakshmanan, T.R., Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area, Final Report to US EPA ORD, EPA Grant Number: R.827450-01, 2004. (Paul Kirshen, Tufts University)	
7-63	A	3	37	3	41	Although water is a resource, its importance, enhanced by the fact that WG II has to prepare an IPCC Technical Note on Water, suggests to add, after resource, water and before wastes again water; so to read: " resource and water supply and water and waste management" (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.
7-64	A	3	37		41	Difficult for me to catch the message. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Redone.
7-65	A	3	37	3	41	I'm lost. What does this mean? (Richard S.J. Tol, Uni. Hamburg)	Redone.
7-66	A	3	40	3	40	Line editing: "supply, resource consumption, and waste management, but also to…" (Joyce Klein Rosenthal, Columbia University)	Redone.
7-67	A	3	41			fuel costs are only one example of possible cost increases - water is another (Paul Kirshen, Tufts University)	Redone.
7-68	A	3	43	3	47	The claim that specialization and interdependencies between regions ("globalization"?) automatically contribute to less resilience is questionable. From the outset, I would assume the opposite, but with a possible exception for small local communities based on only a few core activities (Asbjørn Aaheim, CICERO)	Will consider.
7-69	A	3	43	3	43	Line editing: add word 'economic' to describe global linkages"….strong and complex global economic linkages, which cause…" (Joyce Klein Rosenthal, Columbia University)	Redone.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-70	A	3	43	3	47	Poor reading which seems to imply that globalization tend to reduce reilience. Doubtful if that can be generalized with VERY HIGH CONFIDENCE: no supporting evidence is provided and possibly at odds with potential to gain economic benefits from globalisation. (Tom Kram, MNP-RIVM)	Redone.
7-71	A	3	43			Apparently everything is linked to everything. Some more focus might be desirable. (Hans H.J. Labohm, Netherlands Institute of International Relations 'Clingendael')	Will consider.
7-72	A	3	43	3	47	This is a difficult paragraph to interpret. It gives the impression that "expanding" (increasing in magnitude) series of interactions resulting from climate change, leading to indirect impacts, have been well documented elsewhere in the report. Yet it is hard to find more than tentative references to such interactions. On consideration it seems likely that the "expanding" is a reference to spatial spread rather than increasing magnitude. The addition "especially as the globalised economy becomes more locally specialized, less resilient and more interdependent" is ambiguous - is the globalised economy becoming more locally specialized etc? Can it be expected to become more so in the future? Or is this just a hypothetical, in which case it should say 'if' rather than 'as'. (Gordon McGranahan, International Institute for Environment and Development)	Redone.
7-73	A	3	43	3	47	One needs superior intelligence to even begin to understand the meaning of this statement. (Richard S.J. Tol, Uni. Hamburg)	Redone.
7-74	A	3	44			Cancel "to" before produce (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.
7-75	A	3	45			The idea, at the end of the paragraph should better read: " might become " (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.
7-76	A	3	46			Why would a globalized economy become less resilient? Resilience is a function of underconnectivity or overconnectivity of a system (see work by ecologists such as Ulanowicz, Joergensen, etc.) (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Will consider.
7-77	A	3	49			It is suggested to add, before fixed Some, to read: Some fixed physical etc (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.
7-78	A	4	5			Interactions are also affected by limited natural resources, for instance, water. Therefore after limited, in line 5 add natural, so to read "natural and economic resources" (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-79	A	4	9	4	24	You use economic cost or cost in several different meanings. This usage confuses me and it is hard to understand which cost is calculated for the figures. For example, (1) cost for insurance, for unrecoverble assets or for the number of deaths at a casualty, which will be estimated at the present value if it will be exists like insurance money, (2) cost for replacement, which can be applicable only for recoverble, (3) cost for economy, such as decreased GDP value when carbon emission would keep constant, (4) cost for direct damage, calculating market value of lost assets at the current price. Economically, (1) and (2) are cost for one side, but income for the other, therefore the problem is its distribution more or less, even if you can not recover the life of dead, but you contract the life insurance of your family with insurer. The figures you mention at lines 20-3 are (1) cost for insurance or (4) cost for direct damage. Do human costs include insurance for dead people? If there is the definition of economic cost or cost of climate change in this chapter, please describe the citation. (Hitoshi Hayami, Keio University)	This is indeed a probleem, when the various source literatures are inconsistent in this regard. Will consider in editing.
7-80	A	4	9	4	9	The use of the word "valuation" in this sentence seems again to restrict the focus to monetized concerns. There are may alternative ways to word this line, e.g., "...the assessment of vulnerabilities" or "...the social impacts and valuation of vulnerabilities," or simply, "...the evaluation of vulnerabilities.." (Joyce Klein Rosenthal, Columbia University)	Redone.
7-81	A	4	9		13	Exceptions are presented elsewhere in the text to the position that in more economically developed areas physical assets are more vulnerable and in less economically developed areas human assets and social institutions are more vulnerable (Kim Ritman, Bureau of Rural Sciences)	Redone – and this statement has been revised throughout the chapter.
7-82	A	4	9	4	15	What is the "valuation of vulnerabilities"? What are the "cost of impacts"? What is the difference between climate change impacts and climate change related impacts? (Richard S.J. Tol, Uni. Hamburg)	Redone.
7-83	A	4	10	4	13	Is this always true? Or, is it so because the infrastructure in the less developed areas is undervalued? (Chicken and egg case?) (Rohinton Emmanuel, University of Moratuwa)	Redone.
7-84	A	4	13			What does numeraire mean in this context? (Hans H.J. Labohm, Netherlands Institute of International Relations 'Clingendael')	Will check to see if this term is defined elsewhere in the WG II AR4.
7-85	A	4	15	4	24	this should include timeframes. The impression is given that "several percent" is acceptable. In fact this is vital, since the argument against mitigation is often that it would be too expensive (at a level that is maybe two percent of GDP, or even less) (Andrew Dlugolecki, university of east anglia)	Redone.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-86	A	4	15	4	24	25% short-run loss run value not substantiated in text, what is reference year or associated (SRES) scenario. What is basis for this? Are these direct, asset losses, or losses to GDP, if latter what time scale? Also, what are "and other human costs": loss of life? I think this is should not be in exec summary and with high confidence tag, if not substantiated, which is anyway difficult and associated with uncertainty (Reinhard Mechler, IIASA)	Redone: see new 7.5.
7-87	A	4	16			Existing models, as well as literature. Most impact models and studies seem to focus on the physical/biological dimensions, rather than socioeconomic dimensions. (Evan Mills, Lawrence Berkeley National Laboratory)	Redone.
7-88	A	4	18	4	21	My question on this sentence: Is there a high confidence on this claim? (That the economic costs of climate change impacts at a large scale are unlikely to represent more than several percent of the value of the total economy). Over what timeframe? Is it possible to say this over all considered timeframes, e.g., 2080 as well as 2030 and 2050? (Joyce Klein Rosenthal, Columbia University)	Redone.
7-89	A	4	19	4	24	Please indicate reference! GDP estimates exist only on a coarse resolution, figures have to be checked. (Pamela Heck, Swiss Reinsurance Company)	Redone: see 7.5.
7-90	A	4	20	4	24	Hurrican Katrina shows that global effects can arise from extreme events, tis text is not strong enough (Andrew Dlugolecki, university of east anglia)	Katrina box added to 7.4.
7-91	A	4	22	4	22	Line edit: Add words as follows: "…impacts for some economic sectors and settlements in some smaller locations.." (I.e., in higher latitudes.) (Joyce Klein Rosenthal, Columbia University)	Redone.
7-92	A	4	23	4	23	please specify "in the short run" = next decade? (Pamela Heck, Swiss Reinsurance Company)	Redone.
7-93	A	4	23			For clarity, should say "percent of GDP". I've seen higher numbers than 25% (Evan Mills, Lawrence Berkeley National Laboratory)	Redone.
7-94	A	4	26	4	30	This paragraph shows, at least, two weaknesses. First, assuming that, as in the past, challenges to adapt have been a part of previous experience only, will bring some decision makers to accept such generalization and not try to deepen their knowledge on possible modern adaptation strategies, with a net IPCC failure to give to adaptation the place it needs before the many implications of climate change, bringing a completely differnt climate system.. Second: the human history has never faced the effects of a completely different,	Executive summary substantially redone.

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						new climate system, in which average weather and climate variables and their extreme values may be widely different from the current ones, giving rise to a host of changes in landscape, resources distribution, with a permanent change of cultivars, resulting in crops which would bring even modification in dietary habits. Moreover, the observed exacerbation of extreme events calls, and even cries, for the development of early warning systems to face environmental risks, weather and climate included, which, in human history were developed but not effectively used, as shown by recent environmental disasters, or, as happens in many developed countries, not even thought of. The suggestion is to better draft this bullet. (Osvaldo Canziani, IPCC WG2 Co-chair)	
7-95	A	4	27	4	27	Line edit: "…have been part of every phase of human history. Although human societies have generally been.." (Joyce Klein Rosenthal, Columbia University)	Redone.
7-96	A	4	28	4	28	Line edit: "adaptable, the costs of these adaptations have been unevenly distributed.(Ausubel and Langford 1997). Adaptation strategies vary widely…" (Joyce Klein Rosenthal, Columbia University)	Redone.
7-97	A	4	32			Many adaptations to climate change will require changes in highly regulated sectors of society (such as the insurance industry, land planning and development, etc.). These areas are politically sensitive, and unless both the population and political leadership accepts and permits such adaptations, even industries that want to be proactive will be limited from doing so. (Charles Watson, Kinetic Analysis Corporation)	Redone. Will consider in 7.6.
7-98	A	4	36			I would add the identification of the opportunities opened by climate change (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Redone.
7-99	A	4	38	4	38	the degree to which it can (is likely or willing to) act (Pamela Heck, Swiss Reinsurance Company)	Redone.
7-100	A	4	40	4	40	the word "drivers" is less appropriate than "factors" I think, since sometimes it is is lack of movement that is the problem eg little technological development. (Andrew Dlugolecki, university of east anglia)	Redone.
7-101	A	4	43	4	45	The concept “prospects” presents a wide range of meaning. However, in this respect, some reference to funding as well as the legal aspects involved, which may reach some critical levels when dealing, for instance, with international issues, are necessary. (Osvaldo Canziani, IPCC WG2 Co-chair)	Redone.
7-102	A	4	43	4	45	this is a good example of banality, combined with excessive caution.Are there any cases where massive/abrupt change is more manageable than	We consider this to be a point worth making in this chapter.

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						moderate/gradual?Does anyone not know this point anyway, so what can we add? (Andrew Dlugolecki, university of east anglia)	
7-103	A	4	43	4	45	There are few studies that look into this matter. West, Dowlatabadi and Small is an exception. They reach the opposite conclusion. (Richard S.J. Tol, Uni. Hamburg)	Will consider.
7-104	A	4				I do have problems with the way 'industrialized' and 'developing' countries/areas are used as catch terms throughout the text (although sometimes 'less' versus 'more' developed are being usedd, e.g. p. 4). Many of the countries and regions, which are still generally labelled as 'developing' have rapidly industrialized in the last two decades and continue doing so, while many of the so-called índustrialized countries are in fact post-industrial. These are really terms of the past. I would like to suggest that you either use 'developed' versus 'developing', or (preferably) the more neutral 'low- and middle income', versus 'high income', following World Bank criteria. (Ton Dietz, University of Amsterdam)	Terminology changed.
7-105	A	5	4			Does "such linkages" refer to the prior bullet? (Evan Mills, Lawrence Berkeley National Laboratory)	Redone.
7-106	A	5	4	5	5	What are "potentials for human agency"? (Richard S.J. Tol, Uni. Hamburg)	Redone.
7-107	A	5	5	5	39	The NY map needs a comment. It does not speak for iteself (Asbjørn Aaheim, CICERO)	Replaced.
7-108	A	5	5			Why use the word ‘systems"? (Hans H.J. Labohm, Netherlands Institute of International Relations 'Clingendael')	Will consider.
7-109	A	5	9	5	14	This bullet would be suitable for developed countries, where its contents may show high confidence. This would not be the case in developing economies which, in addition, show a certain degree of corruption. Governmental support, as is shown after recent disasters, which included housing areas, in cities, towns and villages disappearing or becoming temporarily or permanently uninhabitable, particularly in the hurricane blown regions, plays an important role. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will consider.
7-110	A	5	24	5	27	In addition, adaptation actions taken in one sector can also effect the operation of another, related sector. For example, if one response to adapting urban drainage systems to increased flooding is increasing runoff infiltration, this action will also improve water quality and water supply. Therefore in order to capture these complementarities, a high level of cooperation by different agencies in decision making and implementation will be needed.(Kirshen et al, in press) (Paul Kirshen, Tufts University)	Kirshen et al. work considered by author team and integrated into the chapter at appropriate points.

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7-111	A	5	37	5	37	pl Edit the sentence as ….and governance structures, lifestyle- are (Joyashree Roy, Jadavpur University)	Accepted.
7-112	A	5	39	5	41	Unclear language, but seems to imply the same sign: all drivers leading to more emissions also lead to higher vulnerability. That seems difficult to support universally for all drivers under all circumstances, e.g. the notion that the poor are often more vulnerable to climate change. (Tom Kram, MNP-RIVM)	Will consider in redrafting.
7-113	A	5	41			After developing world, add : "having not the necessary legal and governance development, neither the physical infrastructure nor the wealth to cope with the adverse conditions of weather and climate or to take the potential benefits of climate change." This addition would make the paragraph a bit longer but more explanatory of reality (Osvaldo Canziani, IPCC WG2 Co-chair)	Incorporated in a briefer form.
7-114	A	5	43			can increase, or decrease energy use etc. (Ton Dietz, University of Amsterdam)	Noted.
7-115	A	5	44			"building design and technologies" should be more clearly described (passive cooling, etc. ?) Air conditioning is also a kind of building design and technologies for adaptation to warming. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Considered in redrafting.
7-116	A	5	44	5	45	I presume you mean "..energy-efficient building design….", i.e., sometimes A&M are complements and other times they work against one another. If not here, it seems important to get this notion across somewhere in the chapter (with examples) (Evan Mills, Lawrence Berkeley National Laboratory)	Incorporated.
7-117	A	5	45	5	45	Add reference at end of sentence: Cities and natural process : a basis for sustainability / Michael Hough. , 2nd edition. London ; New York : Routledge, 2004. (Joyce Klein Rosenthal, Columbia University)	Added.
7-118	A	5	45			References (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	See above.
7-119	A	5	47	6	38	This paragraph and accompanying figure in an example of a tendency to leave the reader confused, as the text states the obvious, but seems to be implying far more. The obvious point, and the only one actually made in the text, is that environmental events like storms are more of a problem if they are extreme and unexpected. The implicit claim is that such extreme environmental events are a plausible result of climate change. Unless this claim is made explicit here, it is inappopriate to have a large diagram showing what parts of New York are likely to be affected by	Incorporated in editorial redrafting.

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						different categories of hurricanes. It may be inappropriate anyway. The reader - and particularly the reader who does not know New York - is not being given sufficient information to derive any interesting conclusions from this diagram, except, again, the obvious one that bigger storms cause more damage. (At least I assume that is what it shows, although in my hard copy in black and white is is impossible to tell.) (Gordon McGranahan, International Institute for Environment and Development)	
7-120	A	6	2			Figure 2 shows a modeled example, an important step to show the vulnerability of a city in the developed world. The recent severe events in the same country and neighboring areas (heavy destruction situations by Katrina, Rita and Stan , as well as those registered in Asia) provide convincing examples of the need to adapt, starting with the first step: early warning and alert of risks systems. (Osvaldo Canziani, IPCC WG2 Co-chair)	Point taken; see, for exemple, the new box on Katrina.
7-121	A	6	2	6	38	the figure does not add value to the text . May be deleted (Joyashree Roy, Jadavpur University)	Figure changed.
7-122	A	6	4	6	15	Scale matters – also because what may be a large impact if isolating the impact to a local community may become less dramatic if one accepts flexibility, for example that people may move from one area to another. The less incovenient such a move is, the less vulnerable those who have to move are (Asbjørn Aaheim, CICERO)	Lack space to expand on the points made.
7-123	A	6	5	6	38	I admit that I am not sure that I could interpret fig 7.1 . Maybe some explanatory remarks could be included (following the note on p. 6 line 2) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Changed.
7-124	A	6	5			Figure 7.1 could use a better legend. There seems to be no color associated with 3 and 4. Also "zones by ZONE" is a bit cryptic. For non US folks it might be nice to also have a basic geographical reference on the map (e.g., "Manhattan"). Having "Hudson St." and "4th St" show up on the map is also distracting. (David Sailor, Portland State University)	Changed.
7-125	A	6	5			Figure 7.1 (page 6) needs some explanation in the text. What does zones by Zone mean? (Bruce Tonn, University Of Tennessee)	Changed.
7-126	A	6	36			The value of Figure 7.1 is not quite clear to me; is it relevant - or could its readabilitybe improved? (Susanne Becken, Landcare Research)	Changed.
7-127	A	6	36			Fig 7.1 p6 is not particularly informative – it's not clear what it's supposed to show and it's not described in the text either. (Claire Hanson, University of East Anglia)	Changed.

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7-128	A	6	44	6	49	Wording may suggest to casual readers that these three mental models may be mutually exclusive, but, in practice, all can apply simultaneously. (Evan Mills, Lawrence Berkeley National Laboratory)	Deleted.
7-129	A	6	48			There is temptation to add, after physical the words “political priorities”. This is true in corrupt countries; however, though full of truth, this addition could be considered as policy prescriptive. (Osvaldo Canziani, IPCC WG2 Co-chair)	Paragraph deleted.
7-130	A	6	49	7	2	Number of extreme events/period is correlated with wealth: more population in harm's way, more research, better data.... "Studies show, for instance, that the growth in reported losses from weather- related natural disasters is due not only to socioeconomic factors (e.g. population growth and growth in per capita real wealth) but also to weather variables such as precipitation and the number of extreme events per period (Choi and Fischer 2003)" (Reinhard Mechler, IIASA)	Will consider; point made in Chapter 1.d
7-131	A	6	49			We have a forthcoming letter in Science that discusses this. It is also taken up in our previous article: Science Vol 309, Issue 5737, pp.1040-1044. (Evan Mills, Lawrence Berkeley National Laboratory)	Thank you.
7-132	A	6	49	7	2	This statement should be more thoroughly referenced and 'caveated'. It has been shown very convincingly, notably by Roger Pielke (Univ. Colorado, Boulder, CO, USA) and his collaborators through the years, that by far the greatest effect is in the socioeconomic variables, far outweighing the climate factors. They further show in a recent paper in the Bulletin of the American Meteorological Society that any expected changes due to climate change effects on hurricanes/severe storms will be minor compared to expected demographic changes. Refer to his publications here: http://sciencepolicy.colorado.edu/publications/index.html?selectedLists%5B%5D=1&year=&authorList=&searchString=&newSearch=true&doSearch=Submit (Kevin Vranes, University of Montana)	Will consider.
7-133	A	6				Figure 7.1. This map is only useful if it is clear what the zones (categories 1-4) are in terms of inundation (risks). Also: in the legend: add the green colour for zone 4 (Ton Dietz, University of Amsterdam)	Changed.
7-134	A	7	2	7	2	Or how protection against extreme events and effective risk management can limit this increase. (Pamela Heck, Swiss Reinsurance Company)	Dealt with in a later section.
7-135	A	7	6	7	15	It is not totally clear what the three scales are; in the first sentence the author mention space and time; the second scale refers to what exactly, space or institutions? The third scale seems to refer to time again; could the authors please clarify this paragraph?	Clarified.

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						(Susanne Becken, Landcare Research)	
7-136	A	7	6			"both the exposure to" : exposure to what ? (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Added.
7-137	A	7	10	7	10	"United Kingdom" not "England" (Andrew Dlugolecki, university of east anglia)	Done.
7-138	A	7	10			"England and Norway can cope with most kinds of gradual climate change" does not support previous thesis "differ with scale". Both national scale and local scale may show variability in stress and capacities. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Point already made in the sentence.
7-139	A	7	12	7	14	There are also several more recent studies that show this.1) Jollands, N., Ruth, M., Bernier, C., Golubiewski, N., Andrewm R., and Forgie, V., Climate's Long-term Impacts on New Zealand Infrastructure, Phase 1 Report, Hamilton City Case Study, New Zealand Centre for Ecological Economics, Palmerston North, New Zealand, July 2005. 2) Holman, I.P., Rounsevell, M., Shackley, S., Harrison, P., Nichols, R., Berry, P., and Audsley, E., A Regional, Multi-Sectoral and Integrated Assessment of the Impacts of Climate and Socio-Economic Change in the UK, Part I, Methodology, , Part II, Results, Climatic Change, 71, 2005. 3) Office of City Auditor, Climate Change Will Impact the Seattle (USA) Department of Transportation, City of Seattle, USA, August 9, 2005. 4) Kirshen, P., Ruth, M., and Anderson, W., Climate's Long-term Impacts on Urban Infrastructures and Services: The Case of Metro Boston, Chapter 7 of Ruth, M., Donaghy, K., and Kirshen, P.H., (eds.) Climate Change and Variability: Local Impacts and Responses, Edward Elgar Publishers, Cheltenham, England, in press. (Paul Kirshen, Tufts University)	Some references added. Also considered in the statements sectio's to follow.
7-140	A	7	13	7	15	Another factor is (un)fortuitous timing of extreme weather events with other socioeconomic trends/events, e.g. the Great Dustbowl and Great Depression (some correlation here as well) (Evan Mills, Lawrence Berkeley National Laboratory)	Does not fit here.
7-141	A	7	15			The brackets shall include the regional chapters, showing many of the painful costs of extreme events. (Osvaldo Canziani, IPCC WG2 Co-chair)	Do not understand this comment.
7-142	A	7	24	7	24	instead of only "impacts" add "vulnerabilities, impacts and adaptation potentials" (Pamela Heck, Swiss Reinsurance Company)	Added.
7-143	A	7	27	7	27	Do the authors mean section 7.4 instead of Chapter 1? (Susanne Becken, Landcare Research)	Misunderstood notation.
7-144	A	7	27	7	27	1) identifies current vulnerabilities of diverse … (Pamela Heck, Swiss Reinsurance Company)	Done.

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7-145	A	7	35			"Human systems" should be defined. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Done.
7-146	A	7	37	7	37	pl edit the sentence as ….are diverse , dynamic and lifestyle driven. (Joyashree Roy, Jadavpur University)	Section redone.
7-147	A	7	38	7	38	Economic development and growth should be added to this list. (Charlotte Benson, Independent)	Section redone.
7-148	A	7	39			Understanding non-governmental institutions, as they exist over all the world, it would be better to change the words to read: "increasing participation of non-governmental institutions" (Osvaldo Canziani, IPCC WG2 Co-chair)	Section redone.
7-149	A	7	41	7	41	Instead of mix of stresses one could possibly talk about the different nature and magnitude of stresses. (Susanne Becken, Landcare Research)	Section redone.
7-150	A	7	43			It would be useful to add, at the end of the sentence the following largely valid statement: "In developing countries the lack of skilled technicians and workers may end in increasing unemployment and higher impoverishment rates". (Osvaldo Canziani, IPCC WG2 Co-chair)	Section redone.
7-151	A	7	43	7	43	Insert 'to' after 'respond' (Gordon McGranahan, International Institute for Environment and Development)	Section redone.
7-152	A	7	45	7	46	The comment 'especially in developing countries' can be taken out. (Susanne Becken, Landcare Research)	Section redone.
7-153	A	7	45	7	47	Presenting 'continued urbanization, especially in developing countries, due substantially to rural-urban migration' as the first in a list of stresses affecting human systems is confused and confusing. Firstly, whether or not the authors are confusing urbanization with urban growth, many readers will, and will think incorrectly that the aside on rural-migration is claiming that rural-urban migration is contributing substantially more to urban growth than is natural population growth, when it is really just making the obvious point that for the share of the population in urban areas to grow people generally have to move from rural to urban areas. More important, why is this urbanization presented as a stress? Would there be less stress if the urbanization did not occur? It is overly simplistic to present urbanization itself as a stress, and especially misleading to present it as the first in a list of stresses. Also, it is in danger of ignoring the perspective of the migrants themselves. Related to this, see next comment (Gordon McGranahan, International Institute for Environment and Development)	Good point, but the urbanization paragraph has been largely deleted: repetitive of other materiaal.
7-154	A	7	45			I would think that the concept that by 2006 or 2007 for the first time in the history of the planet more than half the population will be living in cities ought to come up	See previous comment.

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						at some point in this discussion as a motivating factor. (David Sailor, Portland State University)	
7-155	A	7	50	8	2	This may seem pedantic or silly, but I also object to presenting the conflicts that may result from equity concerns as a stressor, and not the inequity itself. Is inequity not a stress for those treated inequitably? Why is it only a stress when they demand that the inequities be stopped? One obvious reason is that those treated inequitably are not really part of the global discourse on climate change. But surely that is not a reason the authors would want to endorse. (Perhaps stress can be defined in such a way as to exclude inequities as a stress, and include the conflicts that result from trying to correct inequities, but why bother?) (Gordon McGranahan, International Institute for Environment and Development)	Section redone.
7-156	A	8	2			Temptation is to add, after "roots of political instability" "and bribery". So to explain better the many delays observed in regard to providing concerted, coordinated advice and warnings (Osvaldo Canziani, IPCC WG2 Co-chair)	Section no longer lists stressors.
7-157	A	8	2			this reference does not appear in the bibliography (Kevin Vranes, University of Montana)	Thank you.
7-158	A	8	4	8	4	… climate… Add 'and climate change'… (Susanne Becken, Landcare Research)	Done.
7-159	A	8	4		13	cost for operation may be a part of context for the operation (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Comment unclear.
7-160	A	8	7			suggest change "artificial built climates" to the "built environment" - this is more general and would include the need to improve road drainage, water systems, buildings etc to response to changed climate. (Paul Kirshen, Tufts University)	Done.
7-161	A	8	8	8	9	Example of unnecessary negative bias: climate change is overwhelmingly associated with higher temperatures: bad for cooling, good for heating demands. But here both impacts are phrased negatively. (Tom Kram, MNP-RIVM)	Changed.
7-162	A	8	8	8	8	.... "higher temperatures CAN increase costs of cooling and lower temperatures CAN increase costs of heating." (Margareta E. Kulessa, Mainz University of Applied Sciences)	No change needed. Statement is correct.
7-163	A	8	9		13	I have a problem with saying that climate in "some cases" reduces stress on human systems, while in "many cases" it exacerbates stress, for the statement seems to place a "blame" on climate. Climate alone does not produce or alleviate stress on human systems until humans choose to live and build in a certain climactic zone. Once humans have made the choice to locate in a certain area, it is up to them to	Changed.

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						adapt to the pre-existing climactic conditions. You can legitimately say that climate change might place stresses, but current climate regimes include parameters like drought and severe precip and so should already be built into human systems. (Kevin Vranes, University of Montana)	
7-164	A	8	11			… rural urban migration references may be mentioned (articles from Mitra ed. Science and culture, special issue august 2005) (Joyashree Roy, Jadavpur University)	Unable to find reference.
7-165	A	8	12			After urban infrastructures add : socio-economic imbalances affecting the security, sanitary conditions and health as well as urbanites' well-being (Osvaldo Canziani, IPCC WG2 Co-chair)	Change made.
7-166	A	8	12	8	12	"extreme climate events" - an extreme event is not a climate event! -> extreme weather events (Pamela Heck, Swiss Reinsurance Company)	Changed.
7-167	A	8	12	8	12	urban infrastructures (and delinquencies) (Michel Paillard, IFREMER)	Not normal English usage.
7-168	A	8	15		17	"An isolated extreme event might not have lasting economic consequences, in contrast to more frequent events" : I don't think so. Very frequent event (like earthquake in Japan) will create some culture including some preparedness, and people will not conceive them as "disaster", but a part of nature. However, the longer the interval is, the higher the rate of "forgetting preparedness" is, making the next event more tragedic. The threshold of the interval of events seems to be some 60 - 150 years. However, Kobe quake (1995) was the first experience for local people, because it was a quite new city established in the beginning of modernization (140 years ago). In Indonesian language, there is no special word for Tsunami. However, in Banda Ache, they call it "Ie Beuna" in local Aceh language, and people still talk about the tsunami 200 years ago, when they learned to strengthen their traditional timber houses using thick columns. Even though most of them were replaced with brick houses, some traditional timber houses survived tsunami. (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Rewritten.
7-169	A	8	16	8	17	An isolated extreme event might not have lasting economic consequences, in contrast to more frequent events -> seems obvious! formulate differently: the impact of one extreme event compared to the impact of several consecutive medium-sized events, especially if one event hits whilst the population/community is still in a weak condition. (Pamela Heck, Swiss Reinsurance Company)	Rewritten.

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7-170	A	8	16	8	16	Line edit -- add words "and duration" to read: "frequency and duration. An isolated…" (Joyce Klein Rosenthal, Columbia University)	Rewritten.
7-171	A	8	17	8	17	Line edit -- add words "or extended" in sentence to read: "to more frequent or extended events." (Joyce Klein Rosenthal, Columbia University)	Rewritten.
7-172	A	8	22	8	24	Please give proper references for these individual chapters of TAR WG2: "Scott et al. 2001" for the chapter on Human Settlements, Energy, and Industry and "Vellinga et al. 2001" for the chapter on financial services. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Chapter is in the reference list; chapters are not normally cited by CLA names.
7-173	A	8	32	8	33	What about drougth impacts on human settlements? Perhaps floods, storms and landslides are the most visible impacts, but heat-waves and groundwater depletion are not less direct. Perhaps a distinction can be made between rapid and slow onset events. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	This section summarizes TAR.
7-174	A	8	36	8	39	I would add a couple of sentences explaining why the authors believe that rapid urbanization increases global and regional vulnerabilities to climate change. (Henry Lee, John F Kennedy School of Government)	Ditto.
7-175	A	8	38	8	38	Add 'climate related 'impacts (Susanne Becken, Landcare Research)	Ditto.
7-176	A	8	41	8	47	The TAR also wrote that the role of the financial services sector in dealing with risks to society from climate change, as well as possible financing arrangements to cover the cost of adapting to climate change should be explored. This could be the starting point of the present chapter: to expore whether there are new insights on these two issues. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Added; also see later sectio's of the chapter.
7-177	A	9	1	12	4	The logical relashionship between the praragraph in this section is unclear. There are "for example" at lines 2-3, and "One example" at line 9 p.9, "a familiar example" at line 11, "Finally" at line 12 p. 10, "A further issue" at line 44 p.10, "an example" at line 1 p.11, "for example" at line 12, "a second set of studies" at line 14, "For example" at line 17, "In another study" at line 21, "Both studies" at line 24, "For instantce" at line 26 and 34, "Secondly" at line 34. Too many examples. "Secondly" after "Finally" is just not good for the first word of the paragraph. (Hitoshi Hayami, Keio University)	Good point. Revisions made.
7-178	A	9	2			Some adaptation measures, such as river control, can also be counterproductive, for example while dams ensure water flow for agriculture and electricity production, they are also at the core of floods (e.g. in Europe)	Point does not fit here.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Susanne Becken, Landcare Research)	
7-179	A	9	2	9	7	In the last phrase some examples of limited factors should be done. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	OK.
7-180	A	9	4			Recent experience.. Example of Mumbai (India) flood and drainage system may be mentioned (Joyashree Roy, Jadavpur University)	Katrina a more salient recent example; see new box.
7-181	A	9	7	9	7	"human control over climate-related aspects of nature is in some cases limited" or a cost-benefit question. To which degree does a society protect itself, and which residual risk is it prepared to accept? (Pamela Heck, Swiss Reinsurance Company)	See exempel.
7-182	A	9	9			The paragraph on infrastructure is interesting, but also an example of repetition as indicated in comment 1; more will be said about infrastructure later on (e.g. with the reference to Ruth); could the authors include a reference on infrastructure (e.g. I am aware of research undertaken in Boston by Prof. Ruth and in New Zealand by Dr. Jollands) (Susanne Becken, Landcare Research)	This section is about the current context; projected impacts come later.
7-183	A	9	9	9	12	More interactions exist in this area, e.g. Air humidity and air pollution. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Length limitations....
7-184	A	9	10			Since waste is a contamination factor and there are others, the sentence, after extreme events, could read : " exposure to hazards from emissions, effluents and wastes that put at risk human and natural systems. (Example: acid deposition also spoils buildings and monuments, as well as the surface ozone kills trees and plants) (Osvaldo Canziani, IPCC WG2 Co-chair)	The point here is about linkage systems, and it is not clear that these environmental probleem are attributable to climate change.
7-185	A	9	10	9	10	see eg Hurricane Katrina. Nature volume 437, p.301: "Samples of the flood waters swamping New Orleans taken from residential areas between 3 September and 5 September have revealed dangerous levels of lead and coliform bacteria.", "Of more immediate concern are the nearly 1000 drinking-water systems and more than 100 wastewater systems that have been battered by the storm, leaving many in the region without safe water" and "Nobody has ever dealt with anything on this scale before" (Pamela Heck, Swiss Reinsurance Company)	Referenced.
7-186	A	9	10	9	11	Please change: human and ecological health to human health (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	The authors disagree.
7-187	A	9	11	9	12	Add reference at the end of either of these sentences: Hogrefe, C., B. Lynn, K. Civerolo, J.-Y. Ku, J. Rosenthal, C. Rosenzweig, R. Goldberg, S. Gaffin, K. Knowlton, and P. L. Kinney, Simulating changes in regional air pollution over the eastern United States due to changes in global and regional climate and emissions,	Included reference.

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						Journal of Geophysical Research -Atmospheres109, D22301, (doi:10.1029/2004JD004690), 2004. Hogrefe, C., J.-Y. Ku, K. Civerolo, B. Lynn, D. Werth, R. Avissar, C. Rosenzweig, R. Goldberg, C. Small, W.D. Solecki, S. Gaffin, T. Holloway, J. Rosenthal, K. Knowlton, and P.L. Kinney, Modeling the impact of global climate and regional land use change on regional climate and air quality over the northeastern United States, In: Air Pollution Modeling and Its Application XVI; Borrego, C. and S. Incecik, eds., Kluwer Academic/Plenum, New York, 135-144, 2004. Knowlton, K., J. E. Rosenthal, C. Hogrefe, B. Lynn, S. Gaffin, R. Goldberg, C. Rosenzweig, K. Civerolo, J.-Y. Ku, and P. L. Kinney, Assessing ozone-related health impacts under a changing climate, Environmental Health Perspectives 112: 1557-1563, 2004. (Joyce Klein Rosenthal, Columbia University)	
7-188	A	9	11	9	12	A familiar example ..., unclear: In urban araeas, with high NO concentrations O3 is very low (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Comment unclear; the statement is well-supported.
7-189	A	9	15	9	15	"such as floods, landslides, fire, heat waves, and severe storm damage", I would add heat waves. (Pamela Heck, Swiss Reinsurance Company)	Linkage systems not generally affected by heat waves.
7-190	A	9	16	9	19	The recent hurricanes (Katerina, Rita) can be listed as well. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Now mentioned above and below.
7-191	A	9	17	9	19	Maybe one or two most recent examples (Katrina etc.) might be included. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Added.
7-192	A	9	18			why: 'over the past two decades'? (Ton Dietz, University of Amsterdam)	Deleted.
7-193	A	9	18	9	18	please add the more recent example of Hurricane Katrina: as infrastructure, technologies, production cycles have become more complex, and the whole system/economy strongly depends on individual components, it is highly vulnerable as was demonstrated by hurricane Katrina. Oil platforms and refineries were damaged / had to shut down which had worldwide repercussions on oil prices. (Pamela Heck, Swiss Reinsurance Company)	Added.
7-194	A	9	19	9	22	The serious problem of acid depositions and surface ozone, which may be exacerbated by increasing emissions, should be also mentioned here. (Osvaldo Canziani, IPCC WG2 Co-chair)	Not directly weather-related, in the sense of climate change.
7-195	A	9	26	9	42	Droughts have impacted rural communities throughout human history. People migrate where there are possibilities negated by nature. One of the strongest social reactions is that of the so called “sem terra” (i.e. those having no land to crop under	Box deleted.

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						remunerative conditions), who have invaded the frontiers of NE Brazil, an extremely arid region having the size of one fourth of Europe. Migrations are not peaceful displacements, large columns of starved people invade and occupy farms and estancias with a host of social implications. Therefore, to be more complete, the title of the Box 7.1 must be changed. A possibility is to name it "Drought and migration: the Sahel case". It would be good to mention that this type of massive displacement happens in other regions of the developing world. (Osvaldo Canziani, IPCC WG2 Co-chair)	
7-196	A	9	26			Box 7.1 Here is a good example where the Chapter could be made more compelling. How many people were impacted by the drought in the Sahel? How many became environmental refugees? Etc. Box 7.2 does provide some compelling information. Box 7.3 needs to be completed. (Bruce Tonn, University Of Tennessee)	Box deleted.
7-197	A	9	30	9	30	the 1970s and 1980s (Michel Paillard, IFREMER)	Box deleted.
7-198	A	9	48			delete ´disproportionate´ (Ton Dietz, University of Amsterdam)	Changed.
7-199	A	9	49			please modify ... and changes in weather and climate (a.e. tempereature or precipitation) (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	We prefer the more specific current text.
7-200	A	9				Box 7.1 Refer to Dietz et al. 2004: A.J.Dietz, R. Ruben & A. Verhagen (eds). The impact of climate change on drylands, with a focus on West Africa. Kluwer academic Publishers Dordrecht/Boston/London. (This 465-page volume has done what is suggested in Box 7.1). (Ton Dietz, University of Amsterdam)	Box deleted.
7-201	A	10	6	10	6	of drought, refugees or population growth (Michel Paillard, IFREMER)	Box deleted.
7-202	A	10	10	10	10	box 7.2 (Susanne Becken, Landcare Research)	Deleted.
7-203	A	10	10	10	10	see box 7.2 (Margareta E. Kulessa, Mainz University of Applied Sciences)	Deleted.
7-204	A	10	10			References (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Self-evident.
7-205	A	10	19	10	22	Please modify, in terms of gerneal air polution in urban areas and not only Ozone (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Changed.
7-206	A	10	20			this is ground level ozone specifically (Daniel Scott, University of Waterloo)	Changed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-207	A	10	23	10	23	This is crying out for a Box on Hurricane Katrina to demonstrate the vulnerability of even developed countries, and the vulnerability of the global economy on key commodities. Some may argue that Katrina was not climate change. I think it was, but even if it was not, it provides an excellent insight into the issues. (Andrew Dlugolecki, university of east anglia)	Added in 7.4.
7-208	A	10	26	10	40	I know there is need to conserve space, but I and probably many others suggest that you also add box describing the multidimensional planning and response failures around Hurricane Katrina in the USA (Paul Kirshen, Tufts University)	Ditto.
7-209	A	10	26	10	32	Please refer also the rest of the deaths in Europe (in generally more than 30000) (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Box revised.to focus on Chapter 7 issues. General impacts covered in Health chapter.
7-210	A	10	27	10	40	A more comprehensive profile could be given. We have a section on this in the following just-released report: http://www.climatechangefutures.org. Talk about wildfires, rockslides, etc. I have heard that WMO estimates 50,000 deaths across Europe. May want to note that one reason that power became scarce was inadequate power-plant cooling water (temperature/volume) -- a largely unanticipated form of vulnerability. (Evan Mills, Lawrence Berkeley National Laboratory)	Space limitations....
7-211	A	10	29	10	30	This is only true for some countries (e.g. Switzerland), not for Europe as a whole. Please provide references. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will consider.
7-212	A	10	29			hit' - is fatalistic / deterministic wording … 'occurred' (Daniel Scott, University of Waterloo)	Accepted.
7-213	A	10	30	10	30	Strengthen with some additional refs, e.g.,, Trigo et al 2005: 'How exception was the early August 2003 heatwave in France?' GRL; Stott et al 2004 'Human contribution to the European Heatwave of 2003' (Maureen Agnew, University of East Anglia)	Box revised and scope narrowed.
7-214	A	10	31	10	32	In fact Italy recently released figures suggesting that 24,000 Italians died in the heatwave, a re-estimate from the initial estimate of 4,000, so Italy was worst affected. (Andrew Dlugolecki, university of east anglia)	See above.
7-215	A	10	32	10	33	Should this not be 'excess deaths'? Also nice to quote proportion directly certified as related to heat stress. (Maureen Agnew, University of East Anglia)	See above.
7-216	A	10	32			Box 7.2 Should´t it say that 15,000 more people died than in ´normal´ summers? (Ton Dietz, University of Amsterdam)	See above.

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7-217	A	10	35	10	35	Box 7.2: model simulations suggest that towards the end of the century about every second summer could be as warm or warmer than 2003", Schär et al. (2004), Nature, Vol 427, p. 332-336. See also Science Volume 309, p.1040, the European heat wave 2003 viewed as a single event with multiple, correlated consequences: "Immediate or delayed impacts included extensive human morbidity and mortality, wildfire, massive crop losses, and the curtailment of electric power plants owing to the high temperature or lack of cooling water". Would also be interesting to include paper by Stott et al (volume 432, p.610-614). (Pamela Heck, Swiss Reinsurance Company)	Good points, but see above.
7-218	A	10	38			climate conditioning implies mechanical ventialtion or ac whereas passive measures would be effective. Suggest inadequte thermal design of buildings especially top floor rooms.. (Geoffrey Levermore, Manchester University)	Too detailed for the space available.
7-219	A	10	44	10	45	Slightly confusing what is meant by segment of an industrial structure… do the authors refer to economic sectors and their subsectors? (Susanne Becken, Landcare Research)	Changed.
7-220	A	10	45	10	45	Traditional industry is not necessarily more vulnerable. (Charlotte Benson, Independent)	Changed.
7-221	A	10	47			Also ref the storm in line 47 on p10 (Allen Perry, University of Wales Swansea)	Comment not clear.
7-222	A	11	1	11	2	Tourism has been a neglected field of research until recent years. (Maureen Agnew, University of East Anglia)	Only party true.
7-223	A	11	1	12	4	Some of the issues covered in this section (Current sensitivity/vulnerability) appear to be better suited to the section 'Key future impacts and vulnerabilities'. There seems considerable overlap with the section beginning p20, line 26 to p21 line 24. (Maureen Agnew, University of East Anglia)	Will consider.
7-224	A	11	1	12	4	Particular areas (sub-sectors, operations and agents, locations) of sensitivity to climate change should be highlighted. Attention should be given to changes in the competitive attractiveness of resorts (e.g., see Rehdanz and Maddison, 2005). (Maureen Agnew, University of East Anglia)	Already considered.
7-225	A	11	1	12	4	Other potential impact areas of relevence to tourism that could be considered: forest fires, landslides / mudflows, and severe storms (hurricanes and monsoons). Future climate related change in the frequency and severity of these natural disasters will affect the perceived relative attractiveness of resort locations. (Maureen Agnew, University of East Anglia)	Changes made.
7-226	A	11	1	12	4	Other issue: tourists' perception of risk and the psychology of tourist decision making (Braun et al., 1999).	Incorporated.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Maureen Agnew, University of East Anglia)	
7-227	A	11	1	12	4	Other issue: impact of climate change on tourist infrastructure (buildings, resorts, transportation networks) - of particular vulnerabilty of coastal destinations. (Maureen Agnew, University of East Anglia)	Incorporated, but this should be mainly addressed in the island nations chapter.
7-228	A	11	1	12	4	Other issue: Health and comfort of the tourist. Variation in heating and cooling requirements to maintain the comfort of the tourist. Perceived risks of heat stress (indoor and outdoor conditions), some discussion of bioclimatic indices with particular reference to tourist applications. Other health issues related to climate and affecting the relative appeal of destinations: waterborne disease, vector borne disease, and air pollution. (Maureen Agnew, University of East Anglia)	Included.
7-229	A	11	1	12	4	Other issue: coastlines and beaches - coastal inundation and beach erosion related to sea level rise, storm surges etc (see Jennings, 2004 for discussion of coastal tourism and shoreline management). (Maureen Agnew, University of East Anglia)	Added.
7-230	A	11	1	11	32	Include reference Hamilton et al 2005 (international model) (Maureen Agnew, University of East Anglia)	Space limitations require being selective in citing literature.
7-231	A	11	1	12	4	Case study of the particular sensitivies of small island states could be presented (eg see Uyarra et al, 2005): inundation of the coastline due to storm surges and sea level rise, vulnerability of fresh water supplies to salination, coral bleaching, (perceived and real) risk of severe storms and hurricanes. (Maureen Agnew, University of East Anglia)	Better handled by the island nations chapter.
7-232	A	11	1	12	4	A reorganisation of the presented material to provide better structure would be helpful. (Maureen Agnew, University of East Anglia)	Done.
7-233	A	11	1	11		Maybe it is useful to explain in a sentence or two why particular attention is paid to tourism; namely because it it the one service sector that is directly dependant on the natural environment… (Susanne Becken, Landcare Research)	Included.
7-234	A	11	1	11	32	The research of Blazejczyk (2003) point to the influence of temporal and multiannual changes in climate on the tourists flows in temperate climatic zone (Poland, central Europe). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Seems to belong in the Europe chapter.
7-235	A	11	1	12	13	This is too long. Use material from the MICE project (ask Jean Palutikof). (Andrew Dlugolecki, university of east anglia)	Will consider.
7-236	A	11	1	12	12	too detailed (Pamela Heck, Swiss Reinsurance Company)	Condensed somewhat, but literatures are more fully developed on this topic than many others

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							of interest to Chapter 7.
7-237	A	11	1	11	49	Good overview of tourism, but dominated by negative impacts on current destinations. No compelling reason why total tourism expenditures would drop, so more a relocation / redistribution issue with indeed potential to harm currently popular resorts. (Tom Kram, MNP-RIVM)	Will consider.
7-238	A	11	1	12	14	I wonder whether tourism is given relatively too much space in this chapter . First, the remarks go beyond "current sensitiviy/vulnerability" (this section's heading). Second, it is again emphasized in section 7.4.2.2 (p. 20, line 26 to p. 21, line 24). Several overlappings/redundancies occur. Maybe it would be an improvement, if the text on tourism on pp. 11f. is reduced. (Margareta E. Kulessa, Mainz University of Applied Sciences)	See comment on 7-236 above.
7-239	A	11	1	11	46	The discussion missed the recent studies with simulation models: Amelung and Viner; Hamilton et al., Berrittella et al. (Richard S.J. Tol, Uni. Hamburg)	See comment on 7-230 above.
7-240	A	11	2	11	2	Replace 'based on precptions' with 'the desire for'… (Susanne Becken, Landcare Research)	Modified.
7-241	A	11	2	11	2	I would argue that tourism has only recently been analysed in terms of climate change. (Susanne Becken, Landcare Research)	Modified.
7-242	A	11	2			I disagree that tourism and climate change have been studied in particular depth (especially relative to other sectors) and contend that the literature on this sector is 5-10 years behind leading sectors. (Daniel Scott, University of Waterloo)	Modified.
7-243	A	11	4			add: hours of sunshine (Ton Dietz, University of Amsterdam)	Modified.
7-244	A	11	5			Matzarakies et al 2004 is a suitable reference here. Matzarakies et al 2001 - reference is missing in bib. Besancenot reference is dated. Some more recent and more comprehensive sources for this broad point are: (1) de Freitas, C. (2003) Tourism climatology: evaluating environmental information for decision making and business planning in the recreation and tourism sector. International Journal of Biometeorology 4, 45-54. (2) Martin, M. 2005. Weather, climate and tourism: a geographic perspective. Annals of Tourism Research, 32 (3), 571-591. (Daniel Scott, University of Waterloo)	See comment on 7-230 above. There seems to be a misunderstanding on the Besancenot reference. We refer to a 260 pages book not to an article mentioned in the Scott bibliography. To our knowledge there is no comparable piece of literature written since then by a single author. We do not think that journal articles can be qualified as more comprehensive than this reference. Martin is quoted in SOD.

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7-245	A	11	6			old reference from 1989 may be dropped (Joyashree Roy, Jadavpur University)	See preceding comment.
7-246	A	11	7	11	11	The use of author initials is very unusual! (Rohinton Emmanuel, University of Moratuwa)	Accepted.
7-247	A	11	8			Staple and Wall 1996 is a dated reference considering several newer destination specific studies have been completed (which are much more comprehensive and have used improved methodologies). Some examples include: (1) D. Scott, B. Jones, C. Lemieux, G. McBoyle, B. Mills, S. Svenson, G. Wall. 2002. The Vulnerability of Winter Recreation to Climate Change in Ontario's Lakelands Tourism Region. Department of Geography Publication Series, Occasional Paper 18, University of Waterloo. Waterloo, Canada. (2) Scott, D., Jones, B. and Abi Khaled, H. 2005. Climate Change: A Long-Term Strategic Issue for the National Capital Commission (Tourism and Recreation Business Lines) – Executive Summary. Report prepared for the National Capital Commission. Waterloo, Ontario: University of Waterloo. p. 28. (3) Scott, D. and Jones, B. 2005. Climate Change and Banff: Implications for Tourism and Recreation – Executive Summary. Report prepared for the Town of Banff. Waterloo, Ontario: University of Waterloo. p. 31. (Daniel Scott, University of Waterloo)	See response to 7-230. Some of these references might better be addressed by the North America chapter.
7-248	A	11	9			recent citations for studies specific to parks include: (1) Jones, B. and Scott, D. (2005 in press) Climate Change, Seasonality and Visitation to Canada's National Parks. Journal of Parks and Recreation Administration, 23 (4) (2) Richardson, R. and Loomis, J. (2004) 'Adaptive recreation planning and climate change: a contingent visitation approach', Ecological Economics, 50, 83-99. (Daniel Scott, University of Waterloo)	See response to 7-230.
7-249	A	11	9			add Jones et al. 2006 as the only (known) example of study to examine implications for tourism events: Jones, B., Scott, D., Abi Khaled, H. (2006 in press) Implications of climate change for outdoor event planning: a case study of three special events in Canada's Capital Region. International Journal of Event Management. (Daniel Scott, University of Waterloo)	Same as above. Comment added.
7-250	A	11	10			replace Scott et al 2004 with: Scott, D., McBoyle, G., Mills, B., Minogue, A. (2006 in press). Climate change and the sustainability of ski-based tourism in eastern North America. Journal of Sustainable Tourism. Or add the following reference which has reviewed all of the international literature on climate change and skiing: D. Scott. 2005 (in press) Global Environmental Change and Mountain Tourism. In:	Same as above.

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						Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (Daniel Scott, University of Waterloo)	
7-251	A	11	11			I would like to see a more clear quantification of this statement, rather than leaving it at "most." (Kevin Vranes, University of Montana)	Deleted.
7-252	A	11	19	11	19	insert 'preferable' before maximum daytime temperature (Susanne Becken, Landcare Research)	Deleted.
7-253	A	11	26	11	32	The (quite critical) comment to Lise and Tol (2002) should be deleted, because it is of no general interest to be told only what a study do not take into consideration, unless one explains how non-included factors may affect the conclusions. If a study has a lot of weaknesses, one should rather try to explain what we can learn from it despite its weaknesses. (Asbjørn Aaheim, CICERO)	Revised and largely deleted.
7-254	A	11	27	11	32	nor do these macro-scale models consider the types of destination-regional level impacts identified in all of the literature cited in lines 1-11 (Daniel Scott, University of Waterloo)	Same as above.
7-255	A	11	28			Add also UV-Radiation as factors in the parameters or variables (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Changed.
7-256	A	11	34	11	41	Other issue: impact of climate change on freshwater resources for recreation and watersports. (Maureen Agnew, University of East Anglia)	Changed.
7-257	A	11	34	11	35	Another good reference would be Kent, Newnham & Essex (2002). Tourism and sustainable water supply in Mallorca: a geographical analysis. In: Applied Geography 22, 351-374. (Susanne Becken, Landcare Research)	See response to 7-230.
7-258	A	11	34	11	41	Tourism no only depend on water for human consumption, but also on water for outdoor activities (e.g. cannooing, water sports…), which high requirement on quantity (water levels in lakes) and quality. (Ghislain Dubois, Tourism Environment Consultants (TEC))	Changed.
7-259	A	11	34			alternate wording: 'The environmental resources on which tourism depends as also sensitve to climate change.' (Daniel Scott, University of Waterloo)	Changed.
7-260	A	11	35	11	35	comment : ocean thermal energy conversion (renewable energy) could be in the future an interesting approach for electricity and fresh water supplies in specific countries (Michel Paillard, IFREMER)	Does not belong in this secton.

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7-261	A	11	35			a recent references which provides an overview for freshwater issues is: B. Jones, D. Scott, S. Gossling. 2005 (in press). Lakes and Streams. In: Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (Daniel Scott, University of Waterloo)	See responee to 7-230.
7-262	A	11	43	11	46	Should tell what the conclusion of the study is. (Asbjørn Aaheim, CICERO)	Changed.
7-263	A	11	43	11	46	Redundant; has been said above. (Susanne Becken, Landcare Research)	Will consider.
7-264	A	11	43			Modify: snow and snow cover (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Changed.
7-265	A	11	43	11	46	clarify sentence … also cite the following as a overview of the literature on climate change and winter tourism and a specific discussion of adaptation in this sector: (1) D. Scott. 2005 (in press) Global Environmental Change and Mountain Tourism. In: Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (2) D. Scott. 2005 (in press). Ski Industry Adaptation to Climate Change: Hard, Soft and Policy Strategies. In: Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (Daniel Scott, University of Waterloo)	Changed. Re references, see response to 7-230.
7-266	A	11	46			the last part of this sentence doesn't make sense (Kevin Vranes, University of Montana)	Changed.
7-267	A	11	48	12	4	Other issue: wildlife recreation and safaris - shift in habit and seasonal migration. Fragile ecosystems of particular importance to tourism - e.g., biodiversity at high altitude (Gujj et al 2003 etc). (Maureen Agnew, University of East Anglia)	Seems to belong in the Africa chapter.
7-268	A	11	48			Since the rainforests are rather unpleasant environments, although the luxuriant vegetation may be an attraction, the most appealing "touristic-wise" are the fog forests, in the up-slopes of hills and mountains, as it is the case in Costa Rica. These have moderate climatic conditions making them more attractive. Suggest to change rainforests to fog forests, or if so considered, keep both. (Osvaldo Canziani, IPCC WG2 Co-chair)	Changed.
7-269	A	11	48	11	49	Over-simplified and incomplete discussion of bodiversity issue, besides climate change is in many ecosystems of secondary or lower importance as threat to biodiversity, see e.g. Millenium Ecosystem Assessment. (Tom Kram, MNP-RIVM)	Dealing here with only one small sub-issue; lack space to elaborate.
7-270	A	11				(i) the list/table of contents for this Chapter significantly differs to what is accepted (p. 11 of the Guidance notes); (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	The chapter follows guidance, with the advice of the TSU.

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7-271	A	12	0			Add. Box or Graph about sensitive areas concerning climate chnage and tourism (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Text alreeds too long.
7-272	A	12	1	12	4	Rather vague and wooly. Some references would strengthen this point, and the potential consequences of climate change for the aesthetic attractiveness of tourist landscape should be drawn. (Maureen Agnew, University of East Anglia)	Responding would lengthen the presentation.
7-273	A	12	1	12	2	Add references: a.e. de Freitas, 2003: Int. J Biometerology (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	See response to 7-230.
7-274	A	12	5			Hurricane Katrina this summer is an instructive example for vulnerabilities of urban settlement and society in the developed country. Improper administrative procedure may cause public in frustration and in vandalism. (Hitoshi Hayami, Keio University)	See new box in 7.4.
7-275	A	12	7	12	13	Box 7.3. Needs more information. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Box deleted.
7-276	A	12	7	12	13	We have a nice case study on coral reefs here: http://www.climatechangefutures.org (Evan Mills, Lawrence Berkeley National Laboratory)	Box deleted.
7-277	A	12	8			Figure 7.3 needs to be reproduced in English. (Claire Hanson, University of East Anglia)	Done..
7-278	A	12	8			Box 7.3: please complete (note that coral reefs are not only negatively impacted by climate change) (Pamela Heck, Swiss Reinsurance Company)	Box deleted.
7-279	A	12	10	12	12	Hopefully, other services, besides tourism, will be mentioned with regard to coral reefs, e.g. fisheries, and ecologic values. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Box deleted.
7-280	A	12	10	12	10	comment : it could be dramatic in Indian and Pacific Ocean (Michel Paillard, IFREMER)	Box deleted.
7-281	A	12	16	13	44	"Assumptions about future trends": I just can not understand the role of this section, because it is inevitable to describe the key assumptions in 7.4 and later. (Hitoshi Hayami, Keio University)	Section redone.
7-282	A	12	16			Section 7.3 ("assumptions on future trends"): This section ought to be improved in order to fit the heading. For example: broadened (covering more variables, e.g. economic growth and its sectoral structure), systematically structured with each topic/variable's discussion following a similar substructure, more precise and explicit. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Ditto.
7-283	A	12	28	12	39	Link those paragraphs and use the last sentence (rates of growth…) to link the	Ditto.

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						paragraphs (I.e. move it upwards) (Susanne Becken, Landcare Research)	
7-284	A	12	32	12	33	After having learnt about some biases included in some UN reports, it is suggested to dig also in other information, i.e. in SciAm: The Population Peak, by Cohen J.E., September 2005) (Osvaldo Canziani, IPCC WG2 Co-chair)	Ditto.
7-285	A	12	32	12	33	the authors are supposed to give projections for 2030, 2050 and 2080. They only do so for demographic projections in 2030 (Ton Dietz, University of Amsterdam)	Not possible.
7-286	A	12	33	12	33	delete the second part of the sentence, it is redundant (…net addition…) (Susanne Becken, Landcare Research)	Section redone.
7-287	A	12	41	12	44	Delete the first sentence; it does not add new information. (Susanne Becken, Landcare Research)	Ditto.
7-288	A	12	41	12	48	The expected massive growth of urban centres in developing countries will result in severe stresses in the hinterlands of these centres, particularly with regard to entitlements to water and firewood (biomass), and resulting in outcompeting poor rural people, but at the same time offering opportunities for livelihood diversification, and innovation support. E.g. see Broekhuis Annelet, Mirjam de Bruijn and Ali de Jong in a chapter in our book mentioned before: the chapter is called "Urban-Rural linkages and climatic variability", pp. 301-321. (Ton Dietz, University of Amsterdam)	Urban growth is addressed; the reference is not included because it refers to a particular issue rather than a general trend.
7-289	A	12	50	13	44	The following paper explicitly discussses the implications of globalisation for disaster risk:- Benson, C and EJ Clay, 2003, 'Disasters, vulnerability and the global economy', in Kreimer, A, M Arnold and A Carlin, 'Building Safer Cities: The Future of Disaster Risk', Disaster Risk Management Sereis No 3, World Bank, Washington, DC. The paper concludes that "the evidence presented in this paper suggests that increasing integration of economies around the world certainly has significant implications for the nature of sensitivity to natural hazards. In particular, globalization has expanded opportunities for risk diversification and, for nations as a whole, it is probably a positive trend. However, whether globalization ultimately exacerbates or reduces sensitivity, both of particular economies and individual households, is complicated and depends on specific country circumstances, including public action to reduce vulnerability." I suggest you refer to this paper for specific examples. (Charlotte Benson, Independent)	Adaptation is addressed in 7.6.
7-290	A	12	50	13	44	These lines of section 7.3 do not fully fulfil the expectations created by the headline ("Assumptions about future trends"). It is more of a brief summary of some past	Section redone and concern addressed.

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						trends and, makes hardly any statements on future trends. Or, for example, is it assumed, that globalization/liberalisation/marekt oriented structural reforms will continue? If so, this should be stated explicitly. (see my comment no. 45 below) (Margareta E. Kulessa, Mainz University of Applied Sciences)	
7-291	A	12				shouldn't it be 'paucity' of snow in stead of loss? (Ton Dietz, University of Amsterdam)	Section redone.
7-292	A	12				(iii) at some places of the this Chapter, new texts are considered to be added in the future (before SOD?) (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Not clear.
7-293	A	13	2	13	6	The hypothesis that globalization has reduced diversity and leads towards homogenization, is still disputed. Therefore I suggest a more careful wording. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Content of section changed.
7-294	A	13	5			pl.edit ….towards homogenisation of life style/culture reduces (Joyashree Roy, Jadavpur University)	Ditto.
7-295	A	13	7	13	7	Can the authors provide a reference for the last sentence (an important statement); a recent paper on evolutionary science discusses those issues. (Susanne Becken, Landcare Research)	Need reference from reviewer.
7-296	A	13	8	13	44	I think it would be fair to recognise the fact that, latterly, IFIs and bilaterals have played an important role in pushing the poverty reduction agenda and, related to that, the Millennium Development Goals. (Charlotte Benson, Independent)	Content of section changed.
7-297	A	13	9	13	27	This para contains an implicit assumption that the agricultural sector is most vulnerable to disasters. I suggest you state this explicitly. The statement should also be qualified as agriculture is not necessarily the most vulnerable, nor is that vulnerability uniform across either types of hazard or crop. (Charlotte Benson, Independent)	Ditto.
7-298	A	13	9	13	27	Evidence is by no means clear on whether economic contrasts have grown (line 12), which of course also depends on the definition of "economic contrats" and which regions, countries, groups of society etc. are compared with each other. Lines 18 to 23 suggest further that an increase in the developing world's share in manufactures is mostly negative, but on the one hand it can also be seen as a sign of convergence. On the other hand there exist several (former) developing countries which expanded quite a lot in services and several in medium and high tech industry sectors. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Ditto.
7-299	A	13	9	13	27	Besides my comments (no 9 and 10) above: The wording implies that poverty has	Content changed, but the research literature

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						risen during the 1990s (known for its fast globalization), most propably due to economic globalization. There is a pile of research on that topic and I do not have the impression that, in general, poverty has risen. For, example, the share of people living on less than 1 $ per day, or on 2 $ per day) in world population has decreased quite remarkably. Neither generalization can be made regarding inequality. Depending on definitions and the methodology many deny that worldwide inequality has risen, although other authors come equally wellfounded to contrary conclusions. Finally, the influence of globalization on poverty and inequality does not seem to be clearcut between developed and less developed countries but conditions within the countries seem to decide to a large degree on globalization's poverty implications (as recent studies by e.g. UNCTAD and World Bank illustrate, esp. concerning trade liberalization's and trade orientation's poverty effects). All in all, I would recommend to refrain from too strong statements on the globalization poverty linkage. (Margareta E. Kulessa, Mainz University of Applied Sciences)	does not support this point.
7-300	A	13	12			"growing economic contrasts" there are studies that conclude this, and studies that find the exact opposite (Richard S.J. Tol, Uni. Hamburg)	Content of section changed.
7-301	A	13	18	13	19	No mention of metrics: PPP or MER? (Tom Kram, MNP-RIVM)	No.
7-302	A	13	19			According to the World Bank World development indicators (on their website, their date: 15/July 2005) the differences between "the most affluent of the industrialized countries" and "the poorest countries", is not 40 times as stated, but 60 times using purchasing power parity -comparing USA and most of western Europe, with countries like Malawi, Tanzania, if you would compare Norway with Tanzania it is close to 100 times-. If you use the WB Atlas method the differences are even much higher: close to 400 times comparing the USA and e.g. Ethiopia. (Ton Dietz, University of Amsterdam)	Addressed.
7-303	A	13	23	13	24	It is really necessary to use the newest data, presented at the MDG+5 meeting last September. They go beyond 1998 (up to 2003) and are less dramatic. Exaggeration undermines the point you want to make. (Ton Dietz, University of Amsterdam)	Addressed.
7-304	A	13	23	13	24	What exactly is meant by "in these countries" ? Which countries? (Margareta E. Kulessa, Mainz University of Applied Sciences)	Content of section changed.
7-305	A	13	23	13	25	The term "people in poverty" is not clearly defined. If, for example, it refers to absolute income poverty and the 2 $ per day threshold, the numbers are similar but different (World Bank WDI 2005 on worldwide poevrty: 2.48 billion in 1987 and	Content of section changed; numbers checked against most recent data.

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						2.74 billion in 1999 and 2.73 billion in 2001). In general, I would recommend to clarify what is meant by poverty and to check the numbers. (Margareta E. Kulessa, Mainz University of Applied Sciences)	
7-306	A	13	23	13	24	I found the statement that the number of people in poverty increased from 1.2 billion people to 2.8 billion because they were employed in low wage manufacturing jobs surprising. Many of these people moved from subsistence agriculture to low wage manufacturing because they felt that this would result in a better life. The figures used in the chapter imply that when these people were on the farm they were not below the poverty line, but when they moved to the city and got a job in a low wage assembly plant they became poorer. This conclusion is counter-intuitive. (Henry Lee, John F Kennedy School of Government)	Content changed.
7-307	A	13	24		26	In the sentence beginning "Growing gaps..." you are presenting as cause and effect that the growing gaps will limit the ability of less developed areas to cope with climate change. It is implied that these areas will have less ability to cope because of the gap, regardless of whether or not they would have had the capacity to cope anyway. This seems to pin the blame for lack of an ability to cope squarely on the gaps between developed and underdeveloped areas, which seems highly improbable to me. If that link was the intent, I think the statement should be much better qualified and cited. If the intent was rather to say that these gaps also lead to differences in the comparative ability to cope, then that should be stated explicitly (Kevin Vranes, University of Montana)	Ditto.
7-308	A	13	29	13	31	This sentence is positive in excess. It could well represent conditions in developed regions, not so much in many developing countries where basic needs (i.e. feeding, health and education – all within the MDGs) are yet to be satisfied. Therefore, it is suggested to redraft it, saying, for instance : " The globalization of ideas and paradigms for governance would change the approach to political and administrative systems, bringing decision making to search for new policy alternatives which, inter alia, may include clearer concepts on the urgency to develop adaptive capacity strategies vis à vis the implications of global environmental change". (Osvaldo Canziani, IPCC WG2 Co-chair)	Ditto.
7-309	A	13	29	13	44	Why no trace of UN agenda's (CSD, Millennium Development Goals) here, which are attempting to link issues? (Tom Kram, MNP-RIVM)	Ditto.
7-310	A	13	38	13	44	The text is not entirely clear about it, but the conclusion that the World Bank and IMF contribute to higher vulnerability (lower ability to adapt) in developing	Ditto.

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						countries is very close at hand. Is this really dealt with in the referred studies? If so, be explicit about it; if not, leav out the implicit criticism of WB and IMF. (Asbjørn Aaheim, CICERO)	
7-311	A	13	40	13	40	I recommend to check, whether indeed an REDUCTION of expenditures on environmental protection was observed. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Ditto.
7-312	A	13	45	13		Would it be useful to talk about trends in migration and tourism; I.e. people movement; there are tourism forecasts for 2020 by the WTO. (Susanne Becken, Landcare Research)	Ditto.
7-313	A	13	47			Section 7.4 "Key future impacts and vulnerabilities" needs more quantification! see eg Weather September 2005, Volume 60, no 9, Royal Meteorological Society, p. 261: Table 2 "Quantified impacts of climate change from UKCIP studies". (Pamela Heck, Swiss Reinsurance Company)	Quantification very hard to find; this reference was accessed and is cited in the SOD
7-314	A	13	49	14	10	This implies that change in the impending decades is not worth considering. Hurricane Katrina and Europe 2003 show this is false- costly change is here now.Examples of trying to provide future impact costs arte Dlugolecki 2004, ABI 2005, Foresight Programme 2004, Dlugolecki and Lafeld 2005. (Andrew Dlugolecki, university of east anglia)	Will consider.but the authors generally view these destinaties as speculative.
7-315	A	13	49	14	10	I think this is a key critical point of this entire chapter and should have been highlighted much more prominently earlier in this chapter. (Kevin Vranes, University of Montana)	Thank you.
7-316	A	14	17			kolsky 1999 may be replaced by reference on mubai flood of 2005 (Joyashree Roy, Jadavpur University)	Lack open-literature citation.
7-317	A	14	19		20	… pl add reference….. And energy services(Roy et al 2005 in Mitra ed science and culture, special issue2005, august) (Joyashree Roy, Jadavpur University)	Considered in 7.4.,2.1.
7-318	A	14	20	14	21	Some readers might have difficulties to understand the difference of "cumulative effects" and "systematic effects". Maybe the terms could be explained further. Alternatively, this sentence might simply be deleted. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Edited.
7-319	A	14	24	14	24	I would add the word “location” (Henry Lee, John F Kennedy School of Government)	Done.
7-320	A	14	32	14	32	The sentence on the broad generalization of impacts should be considered in the light of the consequences of the severe exacerbation of extreme events which have hit with similar adverse effects both industrialized and less-developed areas (not only in the Caribbean). Now it looks too broad. (Osvaldo Canziani, IPCC WG2 Co-chair)	Meant to be broad: this is an overview.

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7-321	A	14	32	14	34	This "broad generalization" is somewhat difficult to agree to. It further bears some contradiction to ch. 7, p. 37 lines 7-14. I would recommend to already differentiate on this page (e.g. damage as a share of GDP). Further, the term "economic" might be a little misleading as "economic damage" often means more than the market value of buildings, machinery etc. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Qualified.
7-322	A	14	33	14	34	Is there a reference available for the (interesting) statement about economic and human damages? (Susanne Becken, Landcare Research)	Qualified.
7-323	A	14	33	14	34	It is important to introduce notions of absolute and relative economic loss. Economic losses are higher in absolute terms in industralised countries but in relative terms less developed ones often fare far worse. (Charlotte Benson, Independent)	Lack space to elaborate.
7-324	A	14	36	14	48	It is good to mention that there are positive implications of climate change. If there is no damage from climate change, people do not aware of it and may waste the fossil fuels than otherwise. There is a possibility that economic growth can be consistent with climate change, because cost of climate change might be financed by public spending, otherwise people just save. The only problem is distribution of wealth in the society. The sustainability is important in this context. (Hitoshi Hayami, Keio University)	Thank you.
7-325	A	14	37			not only mid-latitude benefits from winter warming, but also high-latitude benefits from summer warming (including expected changes in pioneer agricultural settlements moving into the former tundras). (Ton Dietz, University of Amsterdam)	Noted.
7-326	A	14	37			Make clear that these pros/cons are rarely "pure", e.g., carbon fertilization is expected to result in a steep rise in pollen and mold/fungus production, with non-trivial consequences for respiratory health. (Evan Mills, Lawrence Berkeley National Laboratory)	Noted.
7-327	A	14	42		45	examples of social infrastructure are inapporiate. Social infrastructure refers to informal insurance through loans from relatives, informal institutions to address disasters, Ngo activitities etc. There is huge literature on social capital, social infrstaructure etc. (Joyashree Roy, Jadavpur University)	Edited. Usage varies among research communities.
7-328	A	15	0			Section 7.4.2 should treat future impacts and vulnerabilities, but most descriptions are on current impacts or vulnerabilities. It is good and necessary to describe past experiences, nevertheless its distinction should be clear. (Hitoshi Hayami, Keio University)	Will try to be careful.

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7-329	A	15	5	15	17	This para could be worded much more succintly. Rather than 'scale of attention', I suggest the more conventional 'unit of analysis' is used. I also think it would be useful to explain why - ie, larger areas are typically more diversified. But smaller size does not necessarily imply higher vulnerability. (Charlotte Benson, Independent)	"Scale" has a different technical meaning.
7-330	A	15	5	15	17	This is a terrific paragraph and perhaps could be the lead as opposed to the conclusion of the entire section. (Henry Lee, John F Kennedy School of Government)	Thank you.
7-331	A	15	5	15	17	I strongly support the additional qualifications/cautions attached to some of this literature (including the study cited). The methods utilized for some of the sectors that I am most familiar with, produce questionable results and obscure the local-regional level complexities that require investigation. (Daniel Scott, University of Waterloo)	Thank you.
7-332	A	15	6	15	10	Qualify the timeframe that this sentence discusses: Might 2030 be different than 2080 impacts? (Joyce Klein Rosenthal, Columbia University)	Lack knowledge base to support this.
7-333	A	15	11	15	12	has to be checked "aggregate damages of climate change … are often rather small as a percentage of economic production …" (Pamela Heck, Swiss Reinsurance Company)	Supported by the literature.
7-334	A	15	16		17	This again is an important point and should be highlighted more prominently (Kevin Vranes, University of Montana)	Thank you.
7-335	A	15	20	35	35	Section 7.4.2: This together with Sections 7.4.1 and 7.4.3 is the largest sub-chapter in Ch. 7 (nearly 50% of the total pages). Section 7.4.2 has considerable coverage on utilities and relatively little on human settlements, especially urban settlements in developing countries. I suggest that the discussions on utilities be reduced (especially boxed texts) and the space so saved be devoted to impacts on human settlements in developing/tropical areas. (Rohinton Emmanuel, University of Moratuwa)	Will consider in editing. The utilities section addresses issues not considered by TAR.
7-336	A	15	22			Section 7.4.2 (systems of interest): I would suggest to start, if possible, with the section on utilities/infrastructure (as 7.4.2.1) because these sectors can be considered the base for the other sector's activities. Further, the subsections on industry (and sevices) already contain important statements on infrastructure. A restructuring of the subsections might help to avoid some of the redundancies (which, under the existing structure are difficult to avoid). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Structure is imposed externally.
7-337	A	15	22	15	24	A reference to chapter 5 of the report might be helpful in order to justify why the agricultural sector is not dealt with (more precise: only little dealt with) in chapter	Will consider.

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						7. (Margareta E. Kulessa, Mainz University of Applied Sciences)	
7-338	A	15	26			Section 7.4.2.1 there's very little quantification of future effects. In fact the only instance where future projections are mentioned is in Box 7.4 p17. (Claire Hanson, University of East Anglia)	Will include projections where available and scientifically valid.
7-339	A	15	26	29	20	The suggested classification (and sub-division) of industry, services and infrastructure may cause some confusion. On p. 15 lines 30-32 it is stated that transport and communication will be dealt with in the section on services and infrastructure, respectively. But on p. 16 (line 3) transport is mentioned within the "industry chapter". Same happens on p. 16 (line 31ff.) in table 7.1 (telecommunications and transport are listed) and on p. 41 (line 40)+K40. On p. 15 lines 28 it is stated that electricity and gas supply as well as mining are considered part of the industry sector. But on p. 24 (lin 41) energy is touched upon as "infrastrucure". [Maybe it causes less confusion if the classification is on a) infrastructure (in the sense of real capital but not directly services connected to it), b) public services, c) commercial services , d) industry and mining (incl. energy "production")] (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will consider. The specified categories make some confusion hard to avoid.
7-340	A	15	33	15	34	here a statistical difference is suggested between 'industrialized economies' and 'developing economies', which has been true for the second half of the 20th Century, but is probably fading away very rapidly now. Rapid expansion of low-wage mass industrialization results in higher percentages of 'industry' (as defines in the text) compared to so-called industrialized countries. See my general note. (Ton Dietz, University of Amsterdam)	Accepted.
7-341	A	15	33	15	33	What exactly is meant by "economic services"? Is it to distinguish these services from ecological services? Or, is it another term for "commercial services"? (Margareta E. Kulessa, Mainz University of Applied Sciences)	Economic services and commercial services are equivalent.
7-342	A	15	33	15	34	What exactly is meant by "account for xx percent of most industrialized economies"? Is it the share in GDP? If this is the case and if "economic services" is synonymous with "commercial services" I strongly recommend to check the numbers (the percentage given seems too low). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will consider.
7-343	A	15	36	15	40	Basically it means that "industries and service sectors are less vulnerable to climate change because their sensitivity is viewed to be less vulnerable . . ." ??? (Rohinton Emmanuel, University of Moratuwa)	Will consider.
7-344	A	15	36			Again Hurricane Katrina attacked the oil refinery located at coast. Many plants locate at coast for the convenience of transportation and facilities. The price of oil	See new Box 7.5

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						and gasoline depends on the demand condition, and concentration of production plants location increases vulnerability of the product supply. (Hitoshi Hayami, Keio University)	
7-345	A	15	44	15	44	Which sectors are covered under the expression "the sectors listed above"? (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will add clarification.
7-346	A	15	47			It should read Box 7.4 (Osvaldo Canziani, IPCC WG2 Co-chair)	Numbering will be reviewed in editing.
7-347	A	15	47			(ii) there are mistakes in numbering of sub-sections and other parts (p. 15, line 47 – Box 7.1 instead of 7.4 is cited; (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Ditto.
7-348	A	16	6			Cross-referencing with Chapter 5 – Food, Fiber and Forests - will enable to include other industrial activities, like dairy and meat production. (Osvaldo Canziani, IPCC WG2 Co-chair)	Accepted.
7-349	A	16	8	16	8	Could the authors specify what they mean by primary inputs? (Susanne Becken, Landcare Research)	Primary resource input to production, as contrasted with manufactured parts.
7-350	A	16	13			add a ref to UK Rail safety and standards board 2003 "Safety imp;lications of weather,climate and climate change"-- could be added on line31 on p28 (Allen Perry, University of Wales Swansea)	
7-351	A	16	16	16	18	This sentence should recognize the feedbacks from forest products to the environment. In the book "The Vanishing Borders- Protecting the Planet in the Age of Globalization", by French H., (Worldwatch, 2000) it is made abundantly clear that developing country ´s problems arise from critical factors linked to the core of this sentence: first, brutal deforestation with known local and global effects and, second, the pollution of the paper industry which, for many reasons, particularly those fuelled by NGOs, may lead to changes in the siting of such industries or in the improvement of the paper production´s processes. In both cases, there are impacts on the socio-economic areas. (Osvaldo Canziani, IPCC WG2 Co-chair)	Accepted.
7-352	A	16	31	17	1	I am not capable of interpreting the content of Table 7.1: E.g. what is meant by internal environment being a direct impact on building and construction? … and what is structural integrity? (Asbjørn Aaheim, CICERO)	Accepted.
7-353	A	16	31			Table 7.1: there is slight confusion about what is part of industry and what is part of services; for example energy and water or transport feature in both. I imagine that generation of electricity is part of industry and supply is part of services; I am less clear about transport or telecommunication. Is it worth clarifying this? (Susanne Becken, Landcare Research)	Clarified.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-354	A	16	31	17	1	Table 7.1 is missing the reference on pollution and acidic depositions as well as a column on Tourism, quite affected by climate change (Osvaldo Canziani, IPCC WG2 Co-chair)	Will ontsierd..
7-355	A	16	31	16		Table 7.1: too cryptographic to allow a review! and incomplete (lots of literature available) (Pamela Heck, Swiss Reinsurance Company)	Clarified, with additional text.
7-356	A	16	31	17	1	Table 7.1 summarizes impacts on "industry" , but includes telecommunications and transport, which were excluded from the definiton of the "industry sector" on p. 15 (line 31) (see my comment no. 19 above) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Clarified.
7-357	A	16	31			Table 7.1 is not easy to read or interpret. For example, what does “internal environment (higher temperatures) mean with respect to construction and civil engineering? Same comment goes with respect to changing consumer preferences linked to climate risk perceptions. (Bruce Tonn, University Of Tennessee)	Clarified.
7-358	A	16		17		Table 7.1. Natural Resource Intensive industries, in stead of resource intensive (Ton Dietz, University of Amsterdam)	Will consider.
7-359	A	17	2			Box 7.4: The earlier text boxes discuss in very brief words a case example - I think this is an excellent idea. The box on energy demand and supply seems to fit better in the text (not a box), because it is more than a narrow and specific case-study. In fact, it highlights the issues that industry faces and one could argue that energy production is used for further discussions because of its critical link with the mitigation side of climate change. I would suggest not to use a text box for this important part of the chapter. (Susanne Becken, Landcare Research)	Moved from a box to text as suggested.
7-360	A	17	2	18	48	In general, the criteria to deal with a sector in a box are not very obvious. Regarding box 7.5 on p. 22ff., insurance industry is discussed both in and outside a box. Box 7.6 on water management (pp.27f.) is a copy of what is already written within the text (propably a mistake). Tourism (from p. 20 line 26 to p. 21 line 9) on the other hand is similarly discussed as those sectors that were (partially) banned to a box. (Margareta E. Kulessa, Mainz University of Applied Sciences)	See precieus comment.
7-361	A	17	3			Box 7.4: very long, but also very inconclusive text. Many anecdotes but no overall balance of the energy issues. (Tom Kram, MNP-RIVM)	Box deleted and presentation condensed.
7-362	A	17	3			In this discussion the concept of summer vs. winter costs/benefits is brought up, but there is no discussion of the obivous price differential between electricity and	Good point, but we are summarizing the available literature.

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						heating fuels…. It is something like a factor of 3 I believe, and would certainly factor into the cost-benefit of individual residents. (David Sailor, Portland State University)	
7-363	A	17	3			Box 7.4 is interesting but there is so much text, why is it contained in a Box? Same comment for Box 7.5. (Bruce Tonn, University Of Tennessee)	Box deleted.
7-364	A	17	3			Box 7.4: With respect to supply side in the energy sector, several of the productive oil fields are offshore in areas vulnerable to severe storms. As was seen in 2005, hurricanes disrupted the Gulf of Mexico oil fields for most of the latter half of the year. A change in hurricane frequency/intensity could result in more (or, more positively, less) frequent disruptions in production. Other fields such as the North Sea and prospective areas in the South China Sea are also vulnerable to changes in severe storm activity. Production methods in the Arctic will have to change if the permafrost is lost, as another example. (Charles Watson, Kinetic Analysis Corporation)	Addressed in a new Box 7.4 related to Hurricaene Katrina.
7-365	A	17	5	18	48	Too long. A box is a parenthesis, not an essay. (Andrew Dlugolecki, university of east anglia)	See above comments.
7-366	A	17	11	17	20	Given the distribution of people across the globe, and the distribution of wealth, my hypothesis would be that -for the next few decades- the less-heating benefit of climate change will be much higher than the 'more cooling cost'. A lot will depend on the economic growth of South Asia, though. Later in the 21st century it may be expected that cooling costs will exceed less-heating benefits (with of course a major mitigation challenge). (Ton Dietz, University of Amsterdam)	See citation of Tol study below.
7-367	A	17	11	17	20	cold water for cooling could be provided from ocean deep water (Michel Paillard, IFREMER)	Point too specialized for a short, general discussion.
7-368	A	17	12			partly related, not closely related, to ambient air temp (Solar and internal gains are the difference). (Geoffrey Levermore, Manchester University)	We do not think such a technical qualification is needed.
7-369	A	17	19			Box 7.4: The effect of urban heat island is more severe in summer than in winter and the two will not cancel each other out (see, Oke, 1987 and his subsequent works). Besides, the case of tropical cities where the change is always negative (i.e. more electricity energy use) is not discussed. (Rohinton Emmanuel, University of Moratuwa)	Will consider.
7-370	A	17	22		37	This kind of quantification of the balance between energy and climate is what this chapter needs more of. As this chapter is overlong, I suggest in the cutting of extraneous text that the focus be to retain passages such as these while cutting long	Will consider..

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						passages of uncited suppositions. As an example, another good section with important specifics is page 21 lines 11-24. (Kevin Vranes, University of Montana)	
7-371	A	17	23	17	37	Another study is that of Amato et al (2005) who found that peak summer monthly, per capita residential electrical energy use in Massachusetts USA could increase from approximately 250 kwh in 2000 to 600 kwh by 2030 with 20 percent of the increase due to climate change.Increases were also found in summer commercial electricity use and decreases were found in winter heating fuel use. from Amato, A., Ruth, M., Kirshen, P., and Horwtiz, J., Regional Energy Demand Responses to Climate Change: Methodology and Application to the Commonwealth of Massachusetts, Climatic Change, 71(175-201), 2005. (Paul Kirshen, Tufts University)	Will consider.
7-372	A	17	28	17	30	Conclussion from Tol well may be correct, but the "Thus" is conditional on relative prices and physical energy shares in values. (Tom Kram, MNP-RIVM)	Accepted.
7-373	A	17	31	17	37	Possibly, the discussion of the U-shaped curve could be deleted to save space. (Susanne Becken, Landcare Research)	Deleted.
7-374	A	18	18	18	38	This discussion could be strengthened and made more comprehensive. Extensive discussion of energy supply impacts in our pending MITI article (Tom has draft manuscript); more here: http://eetd.lbl.gov/EMills/PUBS/PDF/ceres-insure_report.pdf (Evan Mills, Lawrence Berkeley National Laboratory)	Will consider.
7-375	A	18	18			On the supply side there have been additional QUANTITATIVE studies that looked into potential impacts of climate change on hydropower - see the journals of Renewable Energy and Energy Conversion & Management. (David Sailor, Portland State University)	Limited space to elaborate.
7-376	A	18	32	18	34	"need to consider climate variability and long term climate change … selection decision process" - is that the result of their study? seems obvious… (Pamela Heck, Swiss Reinsurance Company)	Not as opvouw to many readers as it sounds.
7-377	A	18	32	18	34	needs of R&D (forecast, alert) (Michel Paillard, IFREMER)	Will consider lin 7.8.
7-378	A	18	37	18	38	"impacts of severe weather events on windpower stations, electricity transmission and distribution networks" with consequences on business interruption and business interruption insurance policies. (Pamela Heck, Swiss Reinsurance Company)	Will consider.
7-379	A	18	38	18	38	"off-shore oil production" as was currently demonstrated by hurricane Katrina, which closed down 91% of daily crude oil production from the Gulf of Mexico and	See new Box 7.4.

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						83% of natural gas production, accordingto US government figures. The Gulf of Mexico accounts for about a quarter of US oil and gas production. (Financial Times September 2 2005). Oil production in the Gulf, accounting for 25 per cent of US output, was shut down 98% by the storm. (The Independent September 8 2005). Also considerable damage to pipelines (distribution system) and onshore refineries. (Financial Times September 2 2005) (Pamela Heck, Swiss Reinsurance Company)	
7-380	A	18	45			Electricity generation itself of course depends on other resources, of which coal might be a major one, with expanding growth in e.g. China (Ton Dietz, University of Amsterdam)	Accepted.
7-381	A	19	0	20	0	Explain more clearly how trade might affect the impacts from climate change. The description followed by Figure 7.2 is too cryptic. (Henry Lee, John F Kennedy School of Government)	Addtional explanation added in caption.
7-382	A	19	1	19	41	Sensitive areas of retailing: perishable commodities (Lin and Chen 2003; Agnew and Thornes, 1995). However, long-term impacts are negligibe due to the huge capacity to diversify and adapt. Trends in consumer behaviour in the long-term are difficult to predict , but are likely to be substantial relative to the impacts of climate change. The most vulnerable are communities whose economy relies on the supply of a restructed range of climate sensitive goods - the degree to which diversification is possible is a key issue. (Maureen Agnew, University of East Anglia)	Agnew added as chapter CA.
7-383	A	19	1	19	41	Potential regional long-term impacts: indirect effect of a shift in tourism would alter the consumer base for retail activites at the local and regional scales. (Maureen Agnew, University of East Anglia)	See above.
7-384	A	19	1	19	41	Potential long-term impacts: there may be a shift in the international distribution of markets related to increasing costs arising from carbon taxes leave present patterns of consumption unsustainable (see e.g., Carlsson-Kanyama 1998). (Maureen Agnew, University of East Anglia)	See above.
7-385	A	19	1	19	41	Impacts on retailing and distribution. Direct effects: water and energy demands (heating and cooling), and the health and comfort of the workforce. Indirect effects: raw materials, infrastructure and transportatation networks, inflated costs related to climate change mitigation legislation and contol, consumer behaviour and the demand for goods (see eg Agnew and Palutikof, 1999). (Maureen Agnew, University of East Anglia)	See above.
7-386	A	19	1	24	36	This section 7.4.2.2 on services has a number of paragraphs on financial services and insurance. However, at present this section covers the topic inadequatly for three reasons: 1) it overlooked many major papers that have appeared since the	Taking these in turn. 1) will include any additionl relevant references

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						TAR; 2) this section mostly discusses the issues related to financial services in developed countries; and 3) it repeats much of the information that was already present TAR WG2 Chapter 8. At least three important issues pertain to natural disasters, financial services and climate change: 1) loss trends (current and future); 2) options for adaptation, in particular linking to disaster risk management; and 3) synergies between adaptation and mitigation that can supported by the financial services sector. Suggestions for working along these lines are given below, as well as proposed references. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	2) have tried to include something on microinsurance – but there is very limited literature (and activity) related to property insurance. 3) Will try to condense – but the TAR never actually explained to the reader that 'the insurance industry' is actually a risk market. 4) loss trends are being covered in Chapter 1, 5) Some of the insurance section will be moved to adaptation 6) Adaptation-mitigation should be in Chapter 18.
7-387	A	19	1			The material in this section dealing with financial services is completely dominated by insurance issues, and specifically on catstrophe insurance issues, with little reference to the impact on financial services generally. Although catastrophe insurance is my primary area of work, as indicated in my general comments, I believe the present report presents an unbalanced view of the current situation, reflecting more the situation at the time of TAR than the present. One of the significant changes in the financial world since TAR has been the increasing regulatory requirements on corporate management for high levels of fiduciary responsibility, driven by major corporate failures such as Enron. This is forcing the Directors of major corporations to take a much greater interest in investor risk, including risks arising from climate change (Kiernan, M. 'Climate Change, Investment Risk and Fiduciary Responsibility', pp.211-224, Tang (2005)). The emergence of the organisations mentioned in my general comments is partly a response to to this change in the general business environment which is making climate change a much larger issue for corporate management than it used to be. (George Walker, Aon Re Asia Pacific)	Will include more of the financial services and their appetite for taking action around investor risk and liabilities associated with climate change.
7-388	A	19	2			The impacts on retailing and real estate are mentioned but future reference to these activites are notably absent in this section. (Maureen Agnew, University of East Anglia)	See above. Agnew added as a chapter CS to help with this.
7-389	A	19	2	19	5	What about the medical services and health resort treatment ? (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Government services are addressed in 7.4.2.5; also see the health chapter.
7-390	A	19	3			Strange to formulate it as such: government services in many countries are partly in those fields earlier defined as (economic) services. (Ton Dietz, University of Amsterdam)	See above.
7-391	A	19	9			in a larger sense' : not clear what this means.	See above.

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						(Maureen Agnew, University of East Anglia)	
7-392	A	19	10	19	10	"Insurance" is more correct, than "finance". There is some limited work on banking: Dlugolecki and Lafeld 2005, UNEPFI 2005, but almost all the work is on insurance specifically. (Andrew Dlugolecki, university of east anglia)	Accepted.
7-393	A	19	14	19	15	Nearly all so-called integrated models from the economics tradition emanate from trade-models, that is, global models with trade between regions. It cannot be true that there is a lack of literature on this specific issue Although few may focus particularly on trade, one can certainly read the impacts on trade from them. (Asbjørn Aaheim, CICERO)	Very little literature on the topic of climate change effect on trade, apart from mitigation polis issues.
7-394	A	19	14	20	23	The excursion on international trade, the Doha round and regional integration seems a bit misplaced, esp. as it is not dealing with trade in services. Figure 7.2 (p. 20, lines 3-23) is impossible to understand, the explanation on p. 19 (lines 16-20) seems unsufficient. For example, I have difficulties to understand the concept of comparative regional advantage in this setting (the "reshaping", p. 19, line 16 appears clear to me, but the "reduced" and "increased" advantage in fig. 7.2 is not.). Further, does environmental migration (fig. 7.2, p. 20) refer to people, industries, or both? All in all I recommend to alter the paragraph on p. 19 (lines 14-24) and to delete one pragraph on p. 19 (lines 33-34) as well as fig. 7.2. A deletion would have little further consequences as international trade is hardly mentioned further on (although it can, to a certain degree, be considered an adaptation strategy, that could have been mentioned in section 7.6 pp. 40-45). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Revisons made.
7-395	A	19	15	19	16	It is incongruous to state that one has a "relatively high degree of confidence." If the degree of confidence is high, why is it relative? What is it relative to? Finally if one is confident, then why condition all the subsequent statements that one claims that one is confident about? (Henry Lee, John F Kennedy School of Government)	Will seek to use terminologie consistent throughout the WG II AR 4.
7-396	A	19	16			In the interregional as well as in the global trade there is export / import of "out of season" products, to such an extent that, nowadays, it is possible to obtain fruits and vegetables unavailable in the local markets, because of seasonal produce limitations (Osvaldo Canziani, IPCC WG2 Co-chair)	Too detailed a point for such a brief chapter.
7-397	A	19	19			Instead of "create" it should say " might create" (Osvaldo Canziani, IPCC WG2 Co-chair)	We think the current statement is correct.
7-398	A	19	23	19	24	Litigation does not belong here, but in one of the later sections (7.) (Andrew Dlugolecki, university of east anglia)	Deleted.

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7-399	A	19	26	19	31	What about the interactions between climate change and air transport ? (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	More an issue for WG III.
7-400	A	19	26		31	exapmle of Norway maybe supplemented by examples of flodd related rialway disaster in 2005 oct in India, Delhi fog and airteavel disruptions and consequent loss etc.. To show vulnerability acroos regions. (Joyashree Roy, Jadavpur University)	Lack space for further examples.
7-401	A	19	27			Add "airports" after "ports" (Osvaldo Canziani, IPCC WG2 Co-chair)	Only an example here.
7-402	A	19	33	19	41	More examples with some references might improve the clarity of this paragraph. (Maureen Agnew, University of East Anglia)	Will consider.
7-403	A	19	36			The listing of regional markets is large so, to obviate any loss of reference, cross-referencing with regional chapters will cover all. (Osvaldo Canziani, IPCC WG2 Co-chair)	Condensed.
7-404	A	19	37	19	39	I suggest to replace the sentence starting with "An example of…" with "An example of a relevant question is how price variations of goods and services are linked to climate change in the long run (…". (Asbjørn Aaheim, CICERO)	Text changed.
7-405	A	19	39	19	41	It would be opportune to add that " the increasing demand for fuels and increasing price of fossil fuels will enhance biofuel production, increasing soybean and sunflower production, with the adverse effects of uncontrolled landscape change, mainly due to uncontrolled deforestation, with adverse feedbacks on climate at different scales. (Osvaldo Canziani, IPCC WG2 Co-chair)	Text changed.
7-406	A	19	39	19	41	The example of falling coffee prices does not seem to be a very clear one for climate change linkages (at least I had quite some difficulties recognizing potential links). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Text changed.
7-407	A	19				Box 7:4 requires ref to impact of Katrina on oil production and supply in Gulf of Mexico. (Allen Perry, University of Wales Swansea)	Box deleted. See new box 7.4.
7-408	A	20	1	20	23	Figure 7.2 is unclear - is a plus (+) sign needed at the heads of the arrows ? Also what are dotted vertical lines ? I am not sure the figure is needed. (Paul Kirshen, Tufts University)	Clarification added in caption.
7-409	A	20	1	20	23	In this diagram and the accompanying text comparative advantage is presented as something one trading location has more or less of in contrast to another with which it trades. Conventionally, comparative advantage is something all trading partners inevitably have (or there is no trade). To oversimplify, if Ruratania has a	We disagree.

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						comparative advantage in rice as opposed to cars in relation to Urbania, then urbania has a comparative advantage in cars over rice in relation to Ruratania. Given this conventional interpretation of comparative advantage, the diagram does not make sense. In particular, it does not make sense to present the less negatively impacted region as gaining a comparative advantage. (Gordon McGranahan, International Institute for Environment and Development)	
7-410	A	20	1			Figure 7.2 seems simplified and a bit mundane in its presentation (David Sailor, Portland State University)	Nothing like it exists.
7-411	A	20	1			Figure 7.2 is not very enlightening. Additionally, it seems to downplay the seriousness of environmental migration (i.e., movement of environmental refugees) as simply related to changes in regional economics. (Bruce Tonn, University Of Tennessee)	Caption expanded.
7-412	A	20	23			Figure 7.2: add more detailed description (Pamela Heck, Swiss Reinsurance Company)	Caption expanded.
7-413	A	20	26	21	24	Highlight: In contrast to many of the other sectors examined in the report, climate change presents opportunities as well as risks to tourism. (Maureen Agnew, University of East Anglia)	Included.
7-414	A	20	26	20	50	The two paragraphs repeat information that has been provided in a similar way in an earlier section on p. 11; it would be useful to shorten it either in this section or in the earlier one to reduce repetition. (Susanne Becken, Landcare Research)	Will consider.
7-415	A	20	26	20	43	Use material from the MICE project (ask Jean Palutikof) (Andrew Dlugolecki, university of east anglia)	See response to 7-235.
7-416	A	20	30			Agnew and Viner (2001) only speculate on such impacts and provide no empirical analysis of the magnitude of change. Maddison (2001) is a suitable reference however. Another related reference for Chapter 14 is: D. Scott, G. McBoyle, M. Schwarzentruber. 2004. Climate change and the distribution of climatic resources for tourism in North America. Climate Research, 27, 105-117. (Daniel Scott, University of Waterloo)	Will consider.
7-417	A	20	33			Add chapter 13 within the brackets (Osvaldo Canziani, IPCC WG2 Co-chair)	Changed.
7-418	A	20	34	20	34	"Although artificial snow making can be a solution in a short term"…Would add "questionned by the law availability of funding of ski resorts to invest in these costly equipments, the consumption of water to make snow, and more generally by the different landscapes induced by CC (a mountain without snow that artificial snow on ski slopes could not compensate in the tourism image). (Ghislain Dubois, Tourism Environment Consultants (TEC))	An adaptation issue, subject to page length constratints.

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7-419	A	20	36			In all North American locations we have assessed minimum temperatures required for snowmaking have not been exceeded so as to be problematic (see Scott et al 2003, 2006 in chapter 14). Nor was this identified as a particular problem in Australia (see Hennessy et al. 2004 or 2005). If this is a problem specific to some areas of Europe, this needs to be clarified. Other issues of water supply or the cost of snowmaking are more problematic, especially under warmer scenarios (see all of the aforementioned studies). (Daniel Scott, University of Waterloo)	See precieus comment.
7-420	A	20	45	21	9	and others activities such as fishing activities? (Michel Paillard, IFREMER)	Will consider.
7-421	A	20	47			Sasidharan et al (2001) is entirely speculative in terms of how tourists/recreationists may response to environmental changes driven by cliamte change. Some more appropriate recent studies that surveyed tourists to see how they would respond to environmental change are: (1) Scott, D., Jones, B., Konopek, J. (in review – July 2005) Implications of climate and environmental change for nature-based tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. Tourism Management. (2) Scott, D. and Jones, B. 2005. Climate Change and Banff: Implications for Tourism and Recreation – Executive Summary. Report prepared for the Town of Banff. Waterloo, Ontario: University of Waterloo. p. 31. (3) Richardson, R. and Loomis, J. (2004) 'Adaptive recreation planning and climate change: a contingent visitation approach', Ecological Economics, 50, 83-99. (Daniel Scott, University of Waterloo)	We think it is better to stay with the more general reference rather than substituting North America specific references.
7-422	A	20	49			some tourist as positive' - also positive to regional economies and local tour operators. (Maureen Agnew, University of East Anglia)	Unnecessary addition.
7-423	A	20				Figure 7.2 Environmental migration of what? People? Enterprises? Investments? (Ton Dietz, University of Amsterdam)	
7-424	A	21	0			I would also suggest not limiting the discussion to catastrophe insurance. "Small-scale" losses (incompletely captured in the insurance loss statistics) have large aggregate impacts. Section doesn't cite any of the work done at LBNL over the past decade. See http://eetd.lbl.gov/insurance/CIpubs.html (Evan Mills, Lawrence Berkeley National Laboratory)	Covered in Chapter 1.
7-425	A	21	11	21	24	indirect effects on tourism could be more clearly presented. (Maureen Agnew, University of East Anglia)	Addressed in 7.2.
7-426	A	21	11			The discussion on futures of tourism may fit better in the earlier section on future trends 7.3; the paragraph could also be shortened in itself. (Susanne Becken, Landcare Research)	Changed.

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7-427	A	21	11			use this sentence to start the previous paragraph (7-20-44) (Daniel Scott, University of Waterloo)	Changed.
7-428	A	21	15	21	17	Consider including reference to arctic communties - Berman et al 2004. (Maureen Agnew, University of East Anglia)	
7-429	A	21	26	24	36	I don't think the discussion of the insurance sector sits very well here. First, insurance is only one part of the broader financial services sector, the rest of which is pretty well ignored in this chapter - ie, treatment is unbalanced. Second, even then, then the discussion focuses on just one part of the insurance sector, namely catastrophe insurance. I think this text would be better presented as part of the discussion on capacity to adapt to and manage risk. (Charlotte Benson, Independent)	Intend to shift the balance and move more of the insurance section into Adaptation section of Chapter 7. The special status afforded to insurance is also in respect of the way in which it has the potential to be seen as a barometer of loss costs – but this is also better covered in Chapter 1.
7-430	A	21	26	21	32	Since the TAR, there has also been a developing literature about the effect of climate change on assets held as investments eg Dlugolecki et al 2001, Mansley and Dlugolecki 2001, CERES (2002 ?), Dlugolecki and mansley 2005, as distinct from the more obvious one of the effects of mitigation policy on assets. (Andrew Dlugolecki, university of east anglia)	Will include – with a focus on how the threat of litigation can change corporate behaviour. .
7-431	A	21	26	24	36	It is not obvious why some information on the insurance sector are within a box (box 7.5 on pp. 22f.), and others are not (see my comment no. 24 above). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Box deleted.
7-432	A	21	26	24	36	Very good discussion. Needs stronger linkages to relevant vulnerabilities identified in other parts of this chapter, and elsewhere in the AR4 (Evan Mills, Lawrence Berkeley National Laboratory)	Will do.
7-433	A	21	27	21	27	Please add the reference "Vellinga et al. 2001". (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will do.
7-434	A	21	27			It would be helpful to cite the exact IPCC/TAR chapter (Evan Mills, Lawrence Berkeley National Laboratory)	Will do.
7-435	A	21	29	21	32	Since the TAR, many new papers have been published on the topic of increasing disaster losses, and there is a lively debate going on. Some suggestions: Mills, E. (2005). Insurance in a climate of change. Science 309, 1040-1044. http://dx.doi.org/10.1126/science.1112121; Pielke Jr., R.A., Agrawala, S., Bouwer, L.M., Burton, I., Changnon, S., Glantz, M.H., Hooke, W.H., Klein, R.J.T., Mileti, D., Sarewitz, D., Tompkins, E.L., Stehr, N., Von Storch, H.(2005). Clarifying the attribution of recent disaster losses: a response to Epstein and McCarthy. Bulletin of the American Meteorological Society 86(10), 1481-1483. http://dx.doi.org/10.1175/BAMS-86-10-1481; Pielke Jr., R.A., Rubiera, J., Landsea, C., Fernandez, M., Klein, R.A. (2003). Hurricane vulnerability in Latin America and the Caribbean. Natural Hazards Review 4(3), 101-114.	Will reference this debate, but mainly relevant for Chapter 1.

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						http://dx.doi.org/10.1061/(ASCE)1527-6988(2003)4:3(101); Raghavan, S., Rajesh, S. (2003). Trends in tropical cyclone impact: a study in Andhra Pradesh, India. Bulletin of the American Meteorological Society 84(5), 635–644. http://dx.doi.org/10.1175/BAMS-84-5-635; (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	
7-436	A	21	30	21	31	Unclear what this sentence is trying to say: an increase above a rise? Please rephrase. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will clarify.
7-437	A	21	30	21	30	TAR WG2 Chapter 8 did not mention the year 1986 as date after which losses were inflated. Rather, it stated that there as a ten-fold increase since the 1950's. These numbers could be updated from recent publications from Munich Re. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will clarify.
7-438	A	21	30			The statement "…considered to reflect…" needs to cite a source or supporting documentation (Evan Mills, Lawrence Berkeley National Laboratory)	Will reference.
7-439	A	21	30			"Inflation" might be a confusing word choice. Perhaps "inflation-corrected increases in losses" would be clearer. (Evan Mills, Lawrence Berkeley National Laboratory)	Will clarify.
7-440	A	21	34	21	43	Tsunami (especially in Dec. 2004) is not in any relation to climate (it is effect of earthquake). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Included as the best known modern envirnmental disaster in the developing world.
7-441	A	21	35			Sudden as well as gradual (Evan Mills, Lawrence Berkeley National Laboratory)	Will clarify.
7-442	A	21	38			Due to generalized laymen confusion, considering the tsunami a climate change-exacerbated process, it is suggested to use one of the many costly climate change events registered in the last decade starting with hurricane Andrew(1992) and continuing with the hurricanes and typhoons of this tropical cyclone's season. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will use hurricanes Mitch and Stan.
7-443	A	21	38	21	39	A tsunami has not much to do with climate, would rather use hurricane Mitch or similar (Pamela Heck, Swiss Reinsurance Company)	Will use Mitch.
7-444	A	21	38		39	Extended (large) family culture provided emergency shelter in the survived inland area, for the homeless people in Sumatera, instead of / in addition to the governmental emergency temporary houses (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Will clarify.
7-445	A	21	41	21	41	Perhaps it should read "by floods"? Please also explain why and how this shaping	Will clarify.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						of risk financing systems by extreme events has taken place. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	
7-446	A	21	45	23	9	I do agree that there is a potential in studying private insurance markets, but the pitfalls are many and well known, and should be mentioned: Insurance is a luxury good (very high income elasticity). This is one reason why risk premiums or payments from the insurance sector may be an extremely biased measure of risk, which is difficult to adjust for. For natural hazards, in particular, wrong incentives or anomalies related to cases of low risk-high consequence (which results in very high premiums and few buyers of insurance) represent further "disturbing" factors. (Asbjørn Aaheim, CICERO)	Will clarify.
7-447	A	21	49			The issues of availability (and affordability, which could also be mentioned) are discussed here: http://eetd.lbl.gov/EMills/PUBS/PDF/ceres-insure_report.pdf [This is currently submitted to the Journal of Insurance Regulation] (Evan Mills, Lawrence Berkeley National Laboratory)	Will reference.
7-448	A	22	6			…investment decisions include: hydroelectric… (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Will reference.
7-449	A	22	7	22	7	The reference for UNEP 2002 is not listed. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Included.
7-450	A	22	8			"… alternative risk transfer products (eg insurance linked securities such as Catastrophic Bonds)" as amendment (Pamela Heck, Swiss Reinsurance Company)	Edited.
7-451	A	22	12			As for the Energy Text Box, I think that the topic of insurances is too important and too general to match the style of the boxes; I would incorporate the box into the general text; this will also allow the authors to shorten the text somewhat. For example, the discussion of Andrew Hurrican is repeated in several places - it may be useful to include a short textbox on Andrew (similar to the one on drought in the Sahel) and delete reference to it in the other sections. (Susanne Becken, Landcare Research)	Box deleted, new boxes added.
7-452	A	22	12	23	39	This box contains much general information that was already present in the TAR. The most important information is in the final paragraph, where issues for developing countries are being discussed. This could be eleborated on. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Box deleted.
7-453	A	22	12			Box 7.5 p22. There is much emphasis on the management of insurance risk but what about the role of the insurance industry in promoting energy efficient dwellings, raising property building standards, and their role in influencing Governments to relocate new builds away from vulnerable regions.	Will be mentioned in questions around adaptation and the role of the insurance industry – although the degree to which insurers play an active role in reducing the

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						(Claire Hanson, University of East Anglia)	risk varies a lot according to what they currently cover.
7-454	A	22	12	23	40	The insurance for natural disaster is common, but there is a problem of moral hazard in insurance. Once insured, people can recover direct economic cost for the damage of climate change, then people tend not to prepare for it. In addition to insurance, recently the weather derivative is highly popular hedging strategy for covering the risk from climatic irregularity, the weather derivative is based on Cooling Degree Day Index, or Heating Degree Day Index. Thus it is suitable for the global warming. And there is no moral hazard problem in the weather derivative. The derivative contract can attain optimality through sharing risks between the parties. See Jewson, Brix, and Ziehmann, The Weather Derivative Valuation, Cambridge University Press, 2005. (Hitoshi Hayami, Keio University)	The relationship between the presence or absence of insurance and adaptation will be dscussed. Weather derivatives bought to cover unforeseen temperatures or drought/excess rainfall will be priced to include any identified climate change trend and therefore cannot be considered to be a climate change hedge. However they will be mentioned as an example of a product designed to help provide protection against unusual weather (but at a price).
7-455	A	22	12	23		Box 7.5 is still very general. Would be helpful to have a section on risk and opportunities in the insurance sector (Pamela Heck, Swiss Reinsurance Company)	Box deleted.
7-456	A	22	12			Consider the new Swiss Re study with reference to the discussion of life/health insurance (http://www.climatechangefutures.org) (Evan Mills, Lawrence Berkeley National Laboratory)	Changes in life insurance are at the margins, and this is more a marketing document from Swiss Re around potential new products.
7-457	A	22	12			In my opinion Box 7.5 is too focussed on the impact of climate change on catstrophe insurance. While in the long term there is no doubt considerable potential for climate change to have a major impact on catastrophe insurance, the insurance industry is well aware of it, it is developing sophisticated tools to cope with it, the response times to significant impacts are short (catastrophe insurance is generally for one year), and recent events have demonstrated the industry is very resilient to shocks from unexpected large losses. All of this is well stated in the report at considrable length. However, the greatest potential for a major impact on the industry in the long term in my opinion is liability arising from climate change, precisely because it is a latent risk whereby actions now could lead to large liabilities in several decades time when society might view responsibility for severe consequences arising from climate change quite differently to what it currently does - cf the asbestos claims (Allen, M. 'The Spectre of Liability: Part 1- Attribution, Part 2 - Implications', pp.367-399, Tang (2005)). I think much of the general discussion on the insurance industry could be significantly shortened as much of it is common knowledge and seems to be unnecessary, and could be covered by a reference to a standard textbook on insurance.	This will be discussed in this section – however as stated action is principally in fear of litigation. Insurance section will be shortened

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						(George Walker, Aon Re Asia Pacific)	
7-458	A	22	14	22	27	Box 7.5. Earthquakes are not climatic events. In line 24 is a technical error "impact of climate c(Swiss...)". (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Earthquakes are included in this list as examples of natural catastrophes, not because they are of climate origin.
7-459	A	22	14	24	36	This ignores recent literature eg Dlugolecki et al 2001, Dlugolecki and Keykhah 2003, Dlugolecki and Lafeld 2005, Mills et al 2005 (for CERES), Dlugolecki 2004 (for ABI), ABI 2005, Friends of the Earth 2005, MCII 2005 (to be prsented at COP11), Bayer (at IIASA) , TERI (study of Indian insurance industry and climate change, in draft, see Ritu Kumar, TERI UK) (Andrew Dlugolecki, university of east anglia)	Will ensure appropriate and judicious reference to Dlugolecki's work.
7-460	A	22	14	22	20	Since you've made the effort to characterize the industry in this level of detail, you might also mention the Residual Market Mechanisms and other forms of insurance pools. Similarly, insurance regulation could be mentioned and its current/potential role in this issue noted. (Evan Mills, Lawrence Berkeley National Laboratory)	If space allows.
7-461	A	22	20			Excellent point about "market" versus "industry" (Evan Mills, Lawrence Berkeley National Laboratory)	Thank you.
7-462	A	22	22	22	27	Reinsurers are the ultimate risk takers. As climate change has the potential to affect many lines of business, the reinsurance industry could bear a considerable risk accumulation. In addition to that "insurers hold major investments that may be vulnerable to climate change", science volume 309, p.1043. (Pamela Heck, Swiss Reinsurance Company)	Reinsurers follow the fortune of insurers in terms of coverage and ultimately have limits placed on most of their contracts. It is not reinsurers, but reinsurance that is of concern, because new capital arrives into the market when prices rise after major catastrophic loss (as after Hurricane Katrina), often to form new reinsurers.
7-463	A	22	22	22	23	Give reasons / formulate differently: Reinsurers often have entire units dealing with natural catastrophe risk assessement and management, and thus the ressources for detailed risk analyses; insurers most often do not have these capabilities and will more easily oversee certain aspects. In addition, the reinsurers are the ultimate claims payers, meaning that everything which has been overseen, or was not known during the pricing process (regulatory changes, non-modeled perils, levee breach, ...) will have to be paid by the reinsurance industry. Sometimes an uncertainty loading is applied ("more pessimistic"), this is however rarely the case. I suggest to remove the whole sentence as it is too subjective ("reinsurers will be more pessimistic about catastrophe risk-costs than the insurer who are ceding the risk"). (Pamela Heck, Swiss Reinsurance Company)	This seems to be a reinsurer's perspective – but is important to understand for outsiders that the insurance industry is a market in which different perspectives on buyers/sellers prices reflect the understanding of the uncertainties of the risk. Also reinsurers will argue strenuously to avoid payments that they believe lie outside the terms of the coverage they provided – as witness Swiss Re following the 2001 World Trade Center losses.
7-464	A	22	24			impact of climate change (….	Edit.

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						(Philippe Crabbé, Institute of the Environment, University of Ottawa)	re
7-465	A	22	24			"impact of climate change" (Pamela Heck, Swiss Reinsurance Company)	Edit.
7-466	A	22	27			The term "long-tail" might be better. (Evan Mills, Lawrence Berkeley National Laboratory)	Edit.
7-467	A	22	30			"One of the central principles of insurance is diversification" (Pamela Heck, Swiss Reinsurance Company)	Edit.
7-468	A	22	36			"against property damage (physical property such as houses, …)" (Pamela Heck, Swiss Reinsurance Company)	Edit.
7-469	A	22	37			"… and business interruption (interrupted commercial activity)" (Pamela Heck, Swiss Reinsurance Company)	
7-470	A	22	39	22	44	The insurance industry will be affected by climate change through all those sectors which will be affected by climate change (see 7.4.2 "Systems of interest", ie infrastructure, agriculture, tourism, energy, transportation, communication, ...). (Pamela Heck, Swiss Reinsurance Company)	Edit.
7-471	A	22	39	22	40	"… caused by one party or to another, or legal liability through not complying with emission laws). While several lines of insurance business are most likely to be affected by climate change, the most significant impacts will be probably to property lines." (Pamela Heck, Swiss Reinsurance Company)	The question as to the insurability of current or future liabilities associated with emissions will be mentioned. .
7-472	A	22	40	22	43	Directors and officers liability policies could also be affected where one party could prove that another was negligent in failing to prevent or mitigate climate change related consequences, and life policies could be affected where changes in mortality resulted from some alteration in disease vectors (swiss Re, 2004) (Pamela Heck, Swiss Reinsurance Company)	Swiss Re is currently placing wordings in contracts excluding D & O coverage for liabilities associated with a failure to reduce emissions. The whole question as to actual or threatened litigation of companies (and the role of D & O insurance) will be discussed. .
7-473	A	22	48			To say that in the U.S. flood insurance is provided by a government-run insurance system is a vast oversimplification of the real situation. In light of the fact that much has been written about flood insurance in the U.S. (start with publications of Mary Downton of the National Center for Atmospheric Research, Boulder, Colorado, USA), I think the authors have an opportunity to examine the situation in depth to lend valuable insight into the question being examined. In light of the knowledge available the opportunity to use this knowledge to illuminate a valuable point, I think the authors should not use such an oversimplification here. (Kevin Vranes, University of Montana)	Will clarify that flood insurance is limited coverage and only in identified floodplains.
7-474	A	23	9	23	9	Please remove paranthese: tropical and extra-tropical cyclone (Pamela Heck, Swiss Reinsurance Company)	Edit.

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7-475	A	23	9	23	9	add reference Natural catastrophes and reinsurance. Risk Perception series, Swiss Re, 2003 (www.swissre.com -> Research & Publications -> Property & Casualty -> Publications overview). (Pamela Heck, Swiss Reinsurance Company)	There are numerous Swiss Re publications, many of which are overlapping in coverage and which all to varying degrees have a marketing function. Where there is objective new information for which a Swiss Re publication is the primary source it will be referenced
7-476	A	23	12			P23. May be use the description of Hurricane Andrew 1992 as an example of impacts and responses by the insurance industry to extreme events, and use what is currently in Box 7.5 in the main body of the chapter. (Claire Hanson, University of East Anglia)	Will include a short 1992 Hurricane Andrew box.
7-477	A	23	13	23	13	Please specify to what perils the 60 bn USD apply: TC & EQ east and west coast?? If EQ included, it would be more meaningful to have only weather related perils... (Pamela Heck, Swiss Reinsurance Company)	Will clarify.
7-478	A	23	16	7	18	Despite talk of "prospective premium adjustment" by Munich re, the only written work is by Dlugolecki 2004, suggesting an annual rate of deterioration of risk of two to four percent, based on scenarios of flooding damage for UK produced by Foresight Programme 2004. This idea of an annual rate is more actionable than presenting 2030/2050/2080 scenarios. (Andrew Dlugolecki, university of east anglia)	Will cross reference trends fro Chapter 1.
7-479	A	23	18	23	18	Even small changes in hazard intensity (<10%) can cause substantial increses in damage, as the damage-intensity relationship is strongly non-linear. (Pamela Heck, Swiss Reinsurance Company)	Will clarify.
7-480	A	23	18	23	18	Crucial for the insurance industry will also be to have the models reflect the increasing variability. Linked to increasing uncertainty, this will be a major challenge. (Pamela Heck, Swiss Reinsurance Company)	Will clarify.
7-481	A	23	20	23	24	see earlier comment reagrding literature on asset management and impacts of climate change- not just insurers, but also pension funds, and other investors have the same issues. (Andrew Dlugolecki, university of east anglia)	While it is interesting to predict that climate change will impact asset management – it is also important to substantiate this with actual or realistic examples.
7-482	A	23	26		26	An example of this is the recent Tsunami and insurance costs in Asia. (Susanne Becken, Landcare Research)	Other reviewers have asked to take mention of the Tsunami out!
7-483	A	23	29	23	39	Statement on benefits of ex-ante risk financing too optimistic and without qualifications, suggest toning down: ex-ante risk financing mechanisms offer a lot of potential compared to ex-post relief in terms of speed of claims settling, security and potential for linking to risk reduction, however important who pays premium	Will clarify the arguments in more detail around the role of different contractual and volunatry funding mechanisms.

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						(donors?) and how high (post-disaster assistance being free of charge), and linking to ex-ante risk financing to risk reduction has not been very sucessful so far. Also see Linnerooth-Bayer, J., Mechler, R. and Georg Pflug (2005). Refocusing Disaster Aid. Science, Vol 309, Issue 5737, 1044-1046. (Reinhard Mechler, IIASA)	
7-484	A	23	39	23	39	an excellent reference on microinsurance is Abels and Bullens publ by MIAN, 2005 (Andrew Dlugolecki, university of east anglia)	Will try to find reference and include.
7-485	A	23	42	24	4	: Figures look entirely different after the recent 2005 (New Orleans) calamities, and should be mentioned (Ton Dietz, University of Amsterdam)	Will include.
7-486	A	23	42	42	4	obviously reference must be made to the 2005 hurricane season, including specifically Katrina, Rita and Wilma, setting new records for insured losses (Andrew Dlugolecki, university of east anglia)	Will include.
7-487	A	23	42			The Andrew figure is usually indexed to actual prices -> 22 bn USD (2004 prices). Makes it easier for comparison. Please also add 2005 figures: Katrina in the range of USD 40 - 60 bn, Wilma USD 6-12 bn, Rita USD 10 bn (insurance loss). Also on page 24, line 4 (Pamela Heck, Swiss Reinsurance Company)	Wil include.
7-488	A	23	42			update with impacts of hurricane Katrina if available (Daniel Scott, University of Waterloo)	Will do.
7-489	A	23	48	24	4	If feasible, some similar information on more recent hurricanes might be added. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will do.
7-490	A	23	50			This characterization is questionably "rosy". There are many reports of primary insurance price increases on the order of 20%, which is not trivial. Also, the fact that many insurers withdrew from the market or stopped renewing should be noted. (Evan Mills, Lawrence Berkeley National Laboratory)	Will reflect what is happening with regard to insurance price increases, insurabilitity and who provides risk protection when insurers have moved out of offering coverage.
7-491	A	24	4			Regarding rising levels of hurricane risks, reference to the paper “Comparing the hurricane disaster risk on U.S. coastal counties", Davidson R.A et al, Natural Hazards Review, August 2001, would be quite interesting because a table had given New Orleans and Mobile highest HDRI (Hurricane Disaster Risk Index). However, the too much outspoken preparedness of developed versus developing countries, did not consider these projections, already available more than four years ago. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will note in the new Katrina Box that New Orleans had been identified as among highest risk locations in the US.
7-492	A	24	4	24	4	"anticipated rising levels of hurricane risk" AND storm surge risk (rising sea level)! see Hurricane Katrina! (Pamela Heck, Swiss Reinsurance Company)	Will make the link clear.

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7-493	A	24	6	24	36	This interesting description of insurance coverage does not include references on the situation in developing and less developed countries. Since, in hazards of this nature, governments shall assume full responsibility, this should be mentioned, with appropriate reference to possible guidance material to face risks and disasters. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will clarify the situation in countries where insurance plays a lesser role.
7-494	A	24	6	24	21	this needs to extend into discussion of altrernative risk transfer eg weather derivatives and catastrophe bonds (Andrew Dlugolecki, university of east anglia)	Will raise the profile of these in the text as it is true in 2006 these are gaining in attention again.
7-495	A	24	6	24	10	This strongly depends on the size and location of the (re)insurance company. Smaller local companies might face greater challenges as worldwide operating reinsurance companies. (Pamela Heck, Swiss Reinsurance Company)	This is a large reinsurer business perspective. Medium sized reinsurance companies are just as viable as large ones, as long as they balance their capital adequacy and diversification requirements.
7-496	A	24	6	24	7	"the insurance is adaptative" instead of "is highly adaptive". I would suggest to be more precautious. (Pamela Heck, Swiss Reinsurance Company)	Edit.
7-497	A	24	6	24	10	In the United States, this is not the case, as insurers are highly restricted in their ability to change rates. The primary insurance market in the US is highly regulated. Rates are set in individual states through complex procedures that vary widely from state to state. Insurance Commissioners, who are responsible for overseeing this process, are often reluctant to accept numerical models, especially the proprietary models used by the insurance industry (see Watson, Johnson, and Simons, 2004: "Insurance Rate Filings and Hurricane Loss Estimation Models", J. Insurance Regulation, Vol 22, Nr 4). The process of reviewing and approving a rate in theory takes only a few months, but it is an expensive process and often takes several years from the time a rate filing is made to the time a rate is approved due to legal challenges. Since in many states the Insurance Commissioner is elected, it is also a highly political process - an insurance commissioner would probably never allow a rate that included climate change unless he or she were certain such a move would have widespread public support. When the subject of incorporating even natural climate variability in insurance runs has been raised, it has been met with skepticism (see the transcripts of the Florida Commission on Hurricane Loss Prediction Methodology (FCHLPM) over the last few years, for example). As noted in this paragraph, the reinsurance industry is less regulated and in theory more adaptable, but how much of the additional cost of reinsurance can be passed through to the consumer, given the limitations of the highly regulated primary insurance industry, remains to be seen.	Will clarify – but do not wish to focus disproportionately on the US which has its own peculiar structure of insurance coverages and insurance regulation. However mention of the US flood insurance system will be made within the new Katrina box.

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						(Charles Watson, Kinetic Analysis Corporation)	
7-498	A	24	10	24	21	This paragraph gives a wrong picture!! Should be re-written. 1) The reinsurance industry is NOT free to raise prices as it is not the only market player (as correctly stated on page 22, line 20). If e.g. a governmental pool is available the price leeway is very small, if the company wants to make business / remain competitive. 2) Proportional reinsurance programmes as are common in the Caribbean eg, are programmes in which the reinsurer covers the losses (AND accepts the premiums) on a proportional basis, this means also that original rates are passed one to one to the reinsurer, ie not the reinsurer, but the insurer can decide to raise or not to raise rates. 3) The reinsurer is strongly dependent on regulatory issues. If eg the government decides (as was the case after the 4 hurricanes in the US in 2004) that a per event deductible should be applied as an annual aggregate deductible (meaning that the insured has to pay it only once even though two hurricanes may have damaged his house), the reinsurance industry has to pay the claims. In other words, pricing issues are not solely in the reinsurer's hand (see also * below). 4) The reinsurance industry is the ultimate claims payer, which means that all the uncertainty, also associated with increasing variability (due to climate change) or non modeled perils (or break of levees as in New Orleans 2005) and thus not part of the premium will remain on the reinsurer's side. Please see also Science Volume 309, p. 1041-1042: "a shrinking gap between insurance premium and losses", Figures 3 and 2D. * see also Science volume 309, p.1043-1044: "In the wake of Hurricane Andrew, regulators limited or rejected insurers' requests for price increases or permission to cancel hundreds of thousands of policies. A decade later, in response to the four deductibles charged to some Florida homeowners following an intense year of hurricanes, regulators mandated reimbursement of 36'000 homeowners, forbade insurers from canceling or nonrenewing victims, and required the instatement of 'single-season' deductibles for the windstorm hazard." (Pamela Heck, Swiss Reinsurance Company)	I will clarify that in not every situation is there an open market for insurers – but the point is an important one (and maybe not so palatable to reinsurers) that there is no regulation of reinsurance prices and hence there is a pure market. Some component of uncertainty inevitably falls into the pricing models employed by reinsurers. However contracts are written and rewritten to continue to restrict the terms of coverage. Also up until the 1990s insurance was engaged in a cycle of expanding coverages but can now be considered to be more likely to be restricting coverages
7-499	A	24	11			Say "market" rather than "industry" (Evan Mills, Lawrence Berkeley National Laboratory)	Wiil do.
7-500	A	24	12	24	14	I'm not nearly as sanguine, and nor are some insurers. This section should more fully explore the standards of insurability and consider the implications of the continued trend towards exclusions and withdrawl from areas with rising losses. The discussion should go beyond flood, to windstorm, wildfire, mudslides, crop, etc. Some of these are now a mix of public/private insurance and I would argue that the trend is increasingly toward private insurance in many cases.	Will consider in editing.

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						(Evan Mills, Lawrence Berkeley National Laboratory)	
7-501	A	24	15			As reinsurers sit (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Edit.
7-502	A	24	15	24	15	"reinsurers" not "reinsures" (Andrew Dlugolecki, university of east anglia)	Edit.
7-503	A	24	15	24	17	"reinsurers (…) have been more profitable than insurers" ? if this is true, please indicate over which time period, in which market, line of business, … ? (Pamela Heck, Swiss Reinsurance Company)	Will clarify with supporting material – or if not found in sufficient depth and detail will exclude.
7-504	A	24	17	24	19	Proposal: instead of "although rate rises that followed the 9/11 attacks, meant that while the 2004 year both the worst for US catastrophe losses it was also the most profitable year ever for US Insurers" -> "Although 2004 was the worst so far in terms of US catastrophe losses, it was the most profitable year for US reinsurers since 1997 and a very profitable year for the US insurers" (comment: might change in 2005: Hurricane Katrina, no Cat Fund in Louisiana, as opposed to Florida; Wilma, huge losses in Mexico/Yucatan, where flood losses are covered as opposed to the US, ...) (Pamela Heck, Swiss Reinsurance Company)	Will clarify with respect to 2005. However it is important to note that no insurers have gone bankrupt as a result of the 2004 and 2005 hurricanes (in contrast to the situation after Hurricane Andrew).
7-505	A	24	23	24	36	this needs to discuss the great difficulties that have prevented government solutions in eg USA, Germany, Belgium, Italy despite repeated discussion/analysis. Also look at the affected parties ie lenders and owners of property and activities in the vulnerable areas.A special case is local government- which seems to be a real issue in the aftermath of Katrina. (Andrew Dlugolecki, university of east anglia)	This is important with regard to the dynamics of an expanded or restricted role for private insurers and will be mentioned.
7-506	A	24	23	24	36	See Science Volume 309, p.1040, key vulnerability for the insurance sector: "Unanticipated changes in the nature, scale, or location of hazards are among the most important threats to the insurance system. History has shown that society in general, and insurers in particular are often caught unprepared for ostensibly "inconceivable" disasters." (Pamela Heck, Swiss Reinsurance Company)	While this is a key vulnerability, the insurance industry has survived major tests of its ability to cope (in 9/11 and Hurricane katrina) remarkably well – and then put up prices after these events.
7-507	A	24	23	24	36	One important vulnerability for the insurance sector is the increasing variability, which is linked to increasing uncertainty. The actual pricing models are based on historical data and do not / or only very crudely take into account climate change. See also Science volume 309, p. 1042 "rising uncertainty would complicate the fundamental actuarial and pricing processes that underlie well-functioning insurance markets". Especially as the pricing models themselves are characterized by considerable uncertainties (factors different), see Bulletin of the American Meteorological Society, Hurricane Loss Estimation Models, by Watson and	Impacts of rising hurricane activity are being incorporated into the models in 2006. – as will be mentioned here.

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						Johnson, November 2004, p.1713 (Pamela Heck, Swiss Reinsurance Company)	
7-508	A	24	23	24	36	Of concern for the (re)insurance industry and the society/economy as a whole are 1) mega-events (see eg Katrina 2005) and their possible changes in a future climate, as they have the potential to affect the whole economy (world-wide) 2) consecutive medium-sized events (as was seen during the 2004 hurricane season), as they can affect weakend communities (and thus more vulnerable) (Pamela Heck, Swiss Reinsurance Company)	These will be mentioned, although the insurance industry has proved fairly resilient to these events.
7-509	A	24	23	24	36	Example in Nature volume 437, p.6: nuclear safety in the wake of floods (Pamela Heck, Swiss Reinsurance Company)	Will check out this reference and see if it can be fitted into the argument.
7-510	A	24	23	24	36	"The key vulnerability (…) non-availability or withdrawal of private insurance cover". This might be a vulnerability, but at the same time an adaptation incentive: the (re)insurance industry can give incentives for a better risk awareness and behaviour (see also section on adaptation). Please formulate in a more positive manner. (Pamela Heck, Swiss Reinsurance Company)	The reality is that insurance is already being withdrawn in certain situations. Therefore while there are opportunities for incentivising adaptation if risk rises too high, or if regulatory restrictions prevent insurers raising prices appropriately they may withdraw coverage.
7-511	A	24	23	24	36	Consider allocating some discussion to the issues of insurance in emerging markets (developing countries and economies in transition -- already 12% of the global market, and growing 3x faster than insurance in industrialized countries), where much of the industry's long-term future rests along with the greatest vulnerabilities to climate change and poorest levels of preparedness/resilience. (Evan Mills, Lawrence Berkeley National Laboratory)	Will mention within discussion of developing economy insurance markets although the figures quoted are chiefly for Life insurance.
7-512	A	24	23			Again, affordability could be mentioned/discussed, in additionto non-availability. There is also the issue of tightening of terms and conditions (which shifts retention back to consumers). (Evan Mills, Lawrence Berkeley National Laboratory)	Will clarify within adaptation section of this chapter
7-513	A	24	38			(ii) there are mistakes in numbering of sub-sections and other part (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Addressed.
7-514	A	24	40	24	43	The use of the words “hard” and “soft” which might stem out from the classical computation vocabulary, is not applicable here. For a developing economy every element could be classified as “hard”. More appropriate wording should be sought. (Osvaldo Canziani, IPCC WG2 Co-chair)	Wording changed.
7-515	A	25	10		10	Should the heading read Water supply and demand? (Susanne Becken, Landcare Research)	Concern here is with utilities rather than water resources (a separate chapter).
7-516	A	25	10	26	39	There is an excellent resource that will add considerable insight in this section: Robert Glennon, Water Follies: Groundwater Pumping and the Fate of America's	An excellent book, but no space to elaboraate with a single-country case.

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						Fresh Waters, Island Press, 2002. It is especially relevant to bolster the points made in the middle paragraphs of page 26. (Kevin Vranes, University of Montana)	
7-517	A	25	12	25	20	What about water quality ? (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	The main climate change water quality issue is saline intrusion, discussed below.
7-518	A	25	12	25	20	This paragraph should be cross-referred to chapter 3. This is to reduce excessive extension and obviate repetitions; for instance, sea level rise will not only affect coastal areas and the nearby located underground water wells; large estuaries will be affected by seawater intrusion even in the capture of riverine freshwater. This information is given in chapter 3 (Osvaldo Canziani, IPCC WG2 Co-chair)	Cross-reference added.
7-519	A	25	12	25	12	"Climate change either annual or seasonal" - are you speaking about climate variability??? (Pamela Heck, Swiss Reinsurance Company)	Wording changed.
7-520	A	25	12	25	17	for some countries and activities, the use of marine ressources could be interesting (Michel Paillard, IFREMER)	Desalination is affordable only in exceptionele cases; see water chapter.
7-521	A	25	19			"… heavy rainfall, river flows or storm surges, which may additionally impact the water quality of water supply systems" (Pamela Heck, Swiss Reinsurance Company)	Wording added.
7-522	A	25	20	27	21	Again these paragraphs' information is included in chapter 3 with better science backing. For instance, the underground water in the phreatic layers is not the same as the one in confined underground streams. The same applies to the critical pollution problems from natural heavy metals, like Ar and F, or that from industries pouring their effluents on the ground, with grave lixiviation to underground water layers and very heavy health impacts, or the reference to the WHO standards for water.(Chapter 8) (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-523	A	25	20	25	20	Climate change will also lead to need for increased instream flows to meet environmental needs - if only because of higher temperatures leading to lower dissolved oxygen satuation amounts. Also, generally instream environmental requirements are increasing even without climate change. (Paul Kirshen, Tufts University)	Considered a marginal impact.
7-524	A	25	22	25	50	I suggest shortening this section about changes in the mean - as correctly noted on page 26, more serious impacts due to changes in variability and extremes. (Paul Kirshen, Tufts University)	Shortened.
7-525	A	25	37	25	38	"the drawdown of the water table is usually occasioned by excessive abstraction for agriculture, rather than from climate change alone" - I doubt that climate change	Deleted.

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						has already affected water tables, at most climate variability. Proposal: "water table is up to now only occasioned by excessive abstraction for agriculture, than from climate change." (Pamela Heck, Swiss Reinsurance Company)	
7-526	A	26	18	26	22	this is unclear to me - particularly the last sentence. (Paul Kirshen, Tufts University)	Clarification would add too much to chapter length; see referenced study.
7-527	A	26	24	26	46	This part is repeted in box 7.6. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Addressed.
7-528	A	26	42			To avoid possible confusion, better to use "decrease" instead of "fall" as we are talking about precipitation. (Kevin Vranes, University of Montana)	Done.
7-529	A	26				14-46 redundant (Ton Dietz, University of Amsterdam)	Dealt with.
7-530	A	27	8	27	21	This part is repeted on page 28, lines 13-25. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Dealt with.
7-531	A	27	8	27	21	Again p. 27 lines 8-21 are repeated in section on sanitation p. 28. (Ton Dietz, University of Amsterdam)	Dealt with.
7-532	A	27	8	27	21	The same sentences are appeared in line 13-25 at page 28. (Hitoshi Hayami, Keio University)	Dealt with.
7-533	A	27	8	27	16	needs of monitoring systems (Michel Paillard, IFREMER)	Point not clear.
7-534	A	27	8			paragraph starting with line 8. Isn't it also a problem with combined storm water and sewage systems? When too much rain falls, the storm water overwhelms the waste water treatment facilities and washes untreated waste water into local water bodies. (Bruce Tonn, University Of Tennessee)	True in some cases, but globally an absence of danstheater treatment is moe often the norm.
7-535	A	27	21	27	21	Also, climate change with reduced low flows and higher nonpoint source pollution might increase wastewater treatment needs. (Paul Kirshen, Tufts University)	Relatively minor point for climate change effects.
7-536	A	27	23	28	7	Box 7.6 is identical to p. 26 lines 14-46. I suggest to delete the box. (see my comment no. 24 above) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Box deleted.
7-537	A	27	23			Box 7.6 All of this text has already found in the body of the report. (Bruce Tonn, University Of Tennessee)	Ditto.
7-538	A	27	24	28	7	The text in this box is identical to the text on Pg. 26, lines 16-46. If this is an editing error, it should be corrected. If not, what is the value of this redundancy? (Lenny Bernstein, IPIECA)	Ditto.

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7-539	A	27	24			Would this box be better placed under chapter 3? One of its principal task is exactly integrated water management. Note also that paragraphs from line 35 to line 50 are repetition of texts in page 26 (lines 24 to 31 and 34 to 39) and those in page 28,lines 3 to 7 repeat those in page 26 lines 41 to 46. (Osvaldo Canziani, IPCC WG2 Co-chair)	Box deleetd.
7-540	A	27	24			Box: more or less repeat of the text before (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Ditto.
7-541	A	27	24		50	There is a pagination/duplication error in which page 27 is a repeat of page 26. (Kevin Vranes, University of Montana)	Dealt with.
7-542	A	27	26	27	50	this seems repetitious. (Andrew Dlugolecki, university of east anglia)	Dealt with.
7-543	A	27		28		redundant, also in box 7.6 (Ton Dietz, University of Amsterdam)	Dealt with.
7-544	A	27		28		some text duplication here (Paul Kirshen, Tufts University)	Dealt with.
7-545	A	28	11	28	25	Section 7.4.2.2.2: Please add the following report on the costs of financing sanitation: Camdessus, M., Winpenny, J. (2003). Financing Water For All: Report of the World Panel on Financing Water Infrastructure, World Water Council, Marseille, France (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Not directly relevant to climate change.
7-546	A	28	11			Section 7.4.2.2.2 Repeated text. (Bruce Tonn, University Of Tennessee)	Dealt with.
7-547	A	28	13	28	25	This is identical to p. 27 lines 8-21. I suggest to delete the lines on p. 27. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Dealt with.
7-548	A	28	29	28	29	For example Hurricane Katrina 2005: "it is not clear how badly shipping lanes on the lower Mississippi river and the port of New Orleans " key transit points for US agricultural exports and imports of fuel and other materials "have been damaged." The Independent September 8 2005 (Pamela Heck, Swiss Reinsurance Company)	Box on Katrina added; will consider in other editorial revisions.
7-549	A	28	29	29	11	If feasible, the implications of a sea level rise might be added to this section on transport infrastructure (e.g. ports and harbour related infrastructure). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will consider.
7-550	A	28	29		31	This statement should be quantified in some way or else the point is not useful. (Kevin Vranes, University of Montana)	Quantification not available in literature.
7-551	A	28	32	28	32	Please add example on effects of impacts of permafrost thawing on transport infrastructure (Alaska, …) (Pamela Heck, Swiss Reinsurance Company)	Considered in editing.

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7-552	A	28	34	28	35	It should be noted that under certain geomorphological and edaphological conditions, e.g., the case in extremely flat prairies such as the extensive Pampas, inundation, affecting road and railway transportation happens also by the effect of sequences of moderate and intense precipitation episodes during the wet seasons. See Canziani, O.F., J.C.Gimenez, in an EPA contracted study on the exacerbation of precipitation events under climate change. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will consider, but flooding gets considerable attention in the chapter.
7-553	A	28	34			"More vulnerable" compared to what? (Kevin Vranes, University of Montana)	Changed.
7-554	A	28	39	29	1	Slides (snow, clay and earth are relevant anyhow, stone-falls are questionable) should be added under heavy rain. Impact: Damage on buildings, constructions and infrastructure, closure and human injuries. Add also under adaptation: Evacuation plans. (Asbjørn Aaheim, CICERO)	Modified.
7-555	A	28	39			Table 7.2. An addition to this Table, regarding flood events under other than extreme events meteorological situations, may be useful. Cross-reference with chapter 13 is suggested. (Osvaldo Canziani, IPCC WG2 Co-chair)	Point not understood.
7-556	A	28		29		section on transportation is very much UK based. Isn't there evidence from elsewhere, which can be refered to as well? (Ton Dietz, University of Amsterdam)	Editorial changes made.
7-557	A	29	11	29	11	another good local transportation reference is Pablo Suarez, William Anderson, Vijay Mahal and T.R. Lakshmanan, 2005, Impacts of flooding and climate change on urban transportation: A systemwide performance assessment of the Boston Metro Area, Transportation Research D, 10:231-244 (Paul Kirshen, Tufts University)	Reference added to Boston study.
7-558	A	29	13	29	20	The title of this sub-section should be changed. It could well read : Power transmission and communication network infrastructure (Osvaldo Canziani, IPCC WG2 Co-chair)	Changed.
7-559	A	29	13			Section 7.4.2.2.4 (communications infrastructure): These few sentences seem too little to justify a subsection on "communications infrastructure". If looked at closly the statements are applicable to other grid dependent sectors as well (e.g. electricity). And as is already stated in line 19 (p. 29), it is seldom telephone cables (but power cables) that cause lethal harm. But, of course, the point made is rather important and deserves attention : underground cables need more economic resources than overhead installation. Thus, poorer countries are at a disandvantage. (Additional comment: Maybe mobile communication technologies should be	Paragraph modified.

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						included in the discussion, as they might be less sensitive to extreme weather events and, some see a chance of leapfrogging in developing countries. Side remark: Similar thoughts are connected to the strategy of centralized energy supply systems versus decentralized solutions of energy production and supply.) (Margareta E. Kulessa, Mainz University of Applied Sciences)	
7-560	A	29	15	29	20	Frosts and snow falls should be mentioned as well. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Too specific an issue.
7-561	A	29	17		19	This sentence should be referenced. (Kevin Vranes, University of Montana)	Added.
7-562	A	29	20	29	20	add a note on emergency management if communication infrastructure not available (Pamela Heck, Swiss Reinsurance Company)	Added.
7-563	A	29	20	29	20	communications and power lines infrastructure are also very vulnerable to ice storms. A major storm in the end of the 20 century caused major damage throughout northern New England, USA (Paul Kirshen, Tufts University)	Not entirely clear whether net effect would be positive or negative.
7-564	A	29	22			74.2.3 Human settlement: In Japan every local governments (city and town) should prepare the "hazard map" for the earthquake, the volcano (if necessary) and the floods. For example, the flood projection map of Shinjuku-ku, Tokyo http://www.city.shinjuku.tokyo.jp/bousai/hazard%20map/kouzuiseisai.pdf. The map shows evacuation route as well as degree of vulnerability. As you see, the risk of submergence widely differs within a city. It is very difficult to mention general characteristics. But its knowledge and awareness of the residences can reduce vulnerability, increase efficiency of people's behaviors at the extreme event, and obtain better understanding to spend public expenditure for preparation of natural disaster. Everyone can access to see the current situation of nearby river in Tokyo at http://www.keihin.ktr.mlit.go.jp/live/index.htm as well as the record of precipitation. (Hitoshi Hayami, Keio University)	General point accepted; included in 7.6.
7-565	A	29	24			The statement about the most important question is anthropocentric. (Susanne Becken, Landcare Research)	Rephrased.
7-566	A	29	29			It is necessary to have the reference of the WG III quotation. It does not appear in the attached bibliography. (Osvaldo Canziani, IPCC WG2 Co-chair)	Accepted.
7-567	A	29	31	29	37	Vulnerbility of an urban area for precipitation was also studied in Krakow (Poland) by Twardosz (1996). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Accepted.

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7-568	A	29	33			add New Oleans (Allen Perry, University of Wales Swansea)	Accepted.
7-569	A	29	35			Add Buenos Aires (Canziani O.F. and Jc: Gimenez, 2002), and Santa Fe (La Nación, April 2003) (Osvaldo Canziani, IPCC WG2 Co-chair)	Accepted.
7-570	A	29	35	29	35	suggest you add 1) Jollands, N., Ruth, M., Bernier, C., Golubiewski, N., Andrewm R., and Forgie, V., Climate's Long-term Impacts on New Zealand Infrastructure, Phase 1 Report, Hamilton City Case Study, New Zealand Centre for Ecological Economics, Palmerston North, New Zealand, July 2005. 2) Holman, I.P., Rounsevell, M., Shackley, S., Harrison, P., Nichols, R., Berry, P., and Audsley, E., A Regional, Multi-Sectoral and Integrated Assessment of the Impacts of Climate and Socio-Economic Change in the UK, Part I, Methodology, , Part II, Results, Climatic Change, 71, 2005. 3) Office of City Auditor, Climate Change Will Impact the Seattle (USA) Department of Transportation, City of Seattle, USA, August 9, 2005. also , more up to date reference for Ruth and Kirshen is: Kirshen, P., Ruth, M., and Anderson, W., Climate's Long-term Impacts on Urban Infrastructures and Services: The Case of Metro Boston, Chapter 7 of Ruth, M., Donaghy, K., and Kirshen, P.H., (eds.) Climate Change and Variability: Local Impacts and Responses, Edward Elgar Publishers, Cheltenham, England, in press. (Paul Kirshen, Tufts University)	Accepted; selected references included.
7-571	A	29	39			Are there examples of cities in developing countries, for example Bangkok? (Susanne Becken, Landcare Research)	One exists for Cochin, India – grey literature.
7-572	A	30	1	30	32	This study also contains data on costs of coastal and river flooding in a metropolitan area. Kirshen, P., Ruth, M., and Anderson, W., Climate's Long-term Impacts on Urban Infrastructures and Services: The Case of Metro Boston, Chapter 7 of Ruth, M., Donaghy, K., and Kirshen, P.H., (eds.) Climate Change and Variability: Local Impacts and Responses, Edward Elgar Publishers, Cheltenham, England, in press. also, the same data are available in Kirshen, P., Ruth, M., Anderson, W., and Lakshmanan, T.R., Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area, Final Report to US EPA ORD, EPA Grant Number: R.827450-01, 2004. . (Paul Kirshen, Tufts University)	Will consider, but references may not be citeable.
7-573	A	30	5	30	5	Add references on findings from the New York Climate & Health Project's peer-reviewed articles:	Accepted; selected references included.

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						Kinney, P.L., J.E. Rosenthal, C. Rosenzweig, C. Hogrefe, W. Solecki, K. Knowlton, C. Small, B. Lynn, K. Civerolo, J.Y. Ku, R. Goldberg, C. Oliveri. Assessing the Potential Public Health Impacts of Changing Climate and Land Use: The New York Climate & Health Project. In: Climate Change and Variability: Consequences and Responses (Ruth M., Donaghy K., Kirshen P., eds.) Washington, D.C.: U.S. Environmental Protection Agency (in press 2005). Knowlton, K., J. E. Rosenthal, C. Hogrefe, B. Lynn, S. Gaffin, R. Goldberg, C. Rosenzweig, K. Civerolo, J.-Y. Ku, and P. L. Kinney, Assessing ozone-related health impacts under a changing climate, Environmental Health Perspectives 112: 1557-1563, 2004. Hogrefe, C., B. Lynn, K. Civerolo, J.-Y. Ku, J. Rosenthal, C. Rosenzweig, R. Goldberg, S. Gaffin, K. Knowlton, and P. L. Kinney, Simulating changes in regional air pollution over the eastern United States due to changes in global and regional climate and emissions, Journal of Geophysical Research - Atmospheres109, D22301, (doi:10.1029/2004JD004690), 2004. Hogrefe, C., J.-Y. Ku, K. Civerolo, B. Lynn, D. Werth, R. Avissar, C. Rosenzweig, R. Goldberg, C. Small, W.D. Solecki, S. Gaffin, T. Holloway, J. Rosenthal, K. Knowlton, and P.L. Kinney, Modeling the impact of global climate and regional land use change on regional climate and air quality over the northeastern United States, In: Air Pollution Modeling and Its Application XVI; Borrego, C. and S. Incecik, eds., Kluwer Academic/Plenum, New York, 135-144, 2004. (Joyce Klein Rosenthal, Columbia University)	
7-574	A	30	10	30	10	The number of 400 million people seems a bit low to me. I recommend to check the number. (Note that on p. 37, line 41f. it is said "assuming that half the developing world's urban population of 2 billion people live [in] coastal cities [are] likely to be affected, ...) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Edited; number confirmed.
7-575	A	30	10	30	12	This is the only reference to the population in coastal areas, and gives one figure with no reference to urban sizes, parts of the world, or how appropriate the particular criteria are (up to 20m above sea level, and up to 20km inland). The reference is not given in full in the list of references. In any case, as noted in the second comment above, there should be better information to use than this, which one would also expect to be found in the coastal chapter. (Gordon McGranahan, International Institute for Environment and Development)	Will consider.
7-576	A	30	10	30	24	consider revision of the paragraph - moves from SLR to storms and back to SLR (Daniel Scott, University of Waterloo)	Done.

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7-577	A	30	13			(The same can be said for the western part of The Netherlands) (Ton Dietz, University of Amsterdam)	Need reference.
7-578	A	30	17			By this time the authors have relied much too heavily on a single reference (Rosenzweig and Solecki, 2001a) throughout this section. This is especially troublesome as this reference seems to be an internal report of an academic institution, and so its status as refereed literature is doubtful. Furthermore, despite searching I cannot even locate this source to read it for myself and assess its legitimacy for inclusion here. (Kevin Vranes, University of Montana)	Will consider; study was peer-reviewed and is available in the web.
7-579	A	30	18	30	24	Are there quantitative figures available? (Pamela Heck, Swiss Reinsurance Company)	None that the authors could find.
7-580	A	30	24			Reference to beach losses in Punta del Este, Uruguay; an international summer resort should be added (Osvaldo Canziani, IPCC WG2 Co-chair)	Added.
7-581	A	30	26	30	32	Cities also induce higher precipitation in downwind areas (see, Marshall Shephard's work: Shepherd, J.M., H. Pierce & A.J. Negri, (2002). "Rainfall modification by major urban areas: observatons from spaceborne rain radar on the TRMM satellite," J. of Applied Meteorology, 41: 689-701). Additionally, they cause changes to precipitation distribution (even if annual totals remain unchanged; Jauregui, E. & E. Romales, (1996). "Urban effects on convective preceipitation in Mexico City," Atmospheric Environment, 30(20): 3383-3389) (Rohinton Emmanuel, University of Moratuwa)	Will consider, but space limitations are a problem.
7-582	A	30	26		32	This passage does not make sense climatologically. Although it may be explained sufficiently by drawing out the language, on the face of this paragraph as written, there is no logical reason why urban areas face flooding effects while rural areas face drought effects. (Kevin Vranes, University of Montana)	Edited.
7-583	A	30	32			In our study mentioned before (Dietz et al, 2004, p. 80) a grid-based map has been produced showing the changes in population density in the whole of Africa between 1960 and 1994: in most of the dryland/desert fringes there has been depopulation, in almost all coastal areas population increased more than fourfold, a lot of it in urban settlements. (Ton Dietz, University of Amsterdam)	Water is still a key in either case.
7-584	A	30	42	30	45	Since it is clear that regional chapters treat these and other cases, it is strongly suggested to cross-refer the mountain glaciers and continental ice-shelf importance in urban water supply to the regional chapters. Such an action will reduce the extension of this chapter 7	Will consider.

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						(Osvaldo Canziani, IPCC WG2 Co-chair)	
7-585	A	30	42			Reference to underground water resources is pertinent. Therefore after "precipitation" add "and impair underground waters resources replenishment" (Osvaldo Canziani, IPCC WG2 Co-chair)	Done.
7-586	A	30	42	30	45	sources of conflicts (Michel Paillard, IFREMER)	Will consider, depending on literature
7-587	A	31	0			The discussion of the UHI (Chapter 7, page 31) and predictions of its future extent and magnitude is too simplistic. The causes of the UHI are complex and the interactions between atmospheric processes at different scales complicated. The foundational and comprehensive work of Oke, that defines the phenomenon and the causes should be cited, as should the process-based modeling studies that are investigating how urban climate processes will be affected by climate change. In the discussion, explicit discussion should be made to air versus temperature effects, and those of the surface, canopy or boundary layer. Moreover, attention should be directed to the rural reference, and changes there, not just the urban area, when defining the urban heat island as an urban-rural difference. The Rosenzweig et al study, cited in both Chapters, does not make clear these distinctions, nor does it appropriately consider scale, nor the complexity of interactions of processes at multiple scales. Its results are given too much prominence in both chapters as to what is to happen. Other mainstream urban climate work should also be cited (C Sue B Grimmond, Indiana University & King's College London)	The authors consider the present paragraph to be the appropriate length for this issue, considering overall space limitations.
7-588	A	31	0			Include box: about urban climate or urban heat island, which is the most known phenomenon in urban araes (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Not a high priority, given space limitations.
7-589	A	31	0			In generally: Urban effects are not clear (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Not clear.
7-590	A	31	2			Box 7.7 on Mega-deltas. Going to up-date with the impacts of hurricane Katrina? (Bruce Tonn, University Of Tennessee)	New box added.
7-591	A	31	3			Box 7.7 Due account taken of the fact that some of the mega-deltas already have contaminated underground water (See The Atlas of Water, Earthscan, 2004, Mass poisoning in Bangladesh, page 57) (Osvaldo Canziani, IPCC WG2 Co-chair)	Not a high priority, given space limitations.
7-592	A	31	3	31	3	Box 7.7: see also marsh creation projects. In case of a storm, the marsh shall absorb some fo the wave energy and help protect the levee that in some cases is exposed to open water. See Nature volume 437, p. 174 "After the flood". (Pamela Heck, Swiss Reinsurance Company)	In mega-delta boxes in other chapters.
7-593	A	31	5	31	17	this now should be expanded to consider new Orleans 2005 (Hurricanes Katrina	Done.

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						and Rita) (Andrew Dlugolecki, university of east anglia)	
7-594	A	31	20	31	26	Another air pollutant is haze observed e.g. in Bangkok and other subtropical cities. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Box has been reconceived.
7-595	A	31	20	31	26	This paragraph should be improved with reference to heavy pollution rates, particularly in developing countries (case of Tubaçao, in the Sao Paulo area and the Riachuelo, the stream making the southeast boundary of the city of Buenos Aires and presenting the heaviest possible pollution from industry (Ref RENA News Agency´s study, October 2005) Information on this heavy pollution would be included in Chapter 8, where other references would be given. In line 26 it is recommended to say surface ozone pollution. Studies of this kind of pollution started as far back as in 1950, in the U.S.A. It is important to discriminate surface ozone from that in the troposphere and the stratosphere. (Osvaldo Canziani, IPCC WG2 Co-chair)	Relationships with climate change not clear.
7-596	A	31	20	31	46	Improve structuring (Pamela Heck, Swiss Reinsurance Company)	Authors think the structure is OK.
7-597	A	31	28	31	30	This sentence could be deleted; the following sentence could be added to the previous paragraph. (Susanne Becken, Landcare Research)	Agreed.
7-598	A	31	34	31	46	The reference to the city ´s heat island may include the topographic effect induced by building blocks and enhancing precipitation rates at the lee-side of the obstacle. This effect has been evaluated analyzing precipitation rates in neighboring cities and there are old bibliographic references. (Osvaldo Canziani, IPCC WG2 Co-chair)	Lack space to discus UHI in greater detail.
7-599	A	31	34	31	38	The urban heat island is largely due to the geometrical arrangments of buildings and streets - the canyon geometry effect - and the thermal properties of urban surfaces. Multiple relfection of sun's rays and anthropogenic heat are of lesser importance (see, "An Urban Approach to Climate Sensitive Design: Strategies for the Tropics," R. Emmanuel, London: E & FN Spon Press, 2005, 172 pp) (Rohinton Emmanuel, University of Moratuwa)	Ditto.
7-600	A	31	34	31	46	Please adds general information about UHI, see attached file with 2 tables. (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Ditto.
7-601	A	31	34			Referring to the urban heat island: "…because their physical structures generate heat and reflect the sun's rays". Is misleading. (1) the physical structures don't generate heat the activities therein do; (2) cities typically reflect LESS solar radiation than unbuilt surroundings due in part to generally lower albedo of surfaces and also to the trapping effect of multiple reflections.	Will consider.

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						(David Sailor, Portland State University)	
7-602	A	31	34		35	The physical structures of an urban area do not "generate heat," they absorb solar radiation. Only the industrial/economic activities of a city – not the structures themselves – generate heat. As well, the point of an urban heat island is that concrete and steel absorb heat, rather than reflecting it (as in "reflect the sun's rays"). If city structures reflected solar incoming radiation then there would be no heat island effect! (Kevin Vranes, University of Montana)	Ditto.
7-603	A	31	44			Pinho ref missing (Geoffrey Levermore, Manchester University)	Noted.
7-604	A	31	44			Is this "…reducing the local wind speeds" result a GLOBAL result or one that was found in the referenced study which appears to be specific to New Jersey? (David Sailor, Portland State University)	Derived from a down-scaled GCM for NYC region.
7-605	A	32	5			Since the Solecki & Rosenzweig ´s study corresponds to a developed country city, this is an important fact to be remarked. The results of their study cannot be extended to other settlements, very particularly when they are in developing countries where the geophysical, social, cultural and economic factors are largely different. (Osvaldo Canziani, IPCC WG2 Co-chair)	Lack equivalent studies for developing country cities, but the general message is consistent with views of developing country experts.
7-606	A	32	5	32	16	It is suggested to redraft this paragraph including the stresses stemming from the surrounding environs, particularly when they are occupied by shanty-towns, etc. See the already-mentioned study of the WHO on Urbanization. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will edit.
7-607	A	32	5	32	6	I do not agree with this statement. For examples, increased coastal and river flooding due to climate change, not even abrupt climate change, are major concerns for human settlements. (Paul Kirshen, Tufts University)	The authors disagree.
7-608	A	32	5	32	6	How convincing is this statement? Lines 30-35 on this same page (p. 32) suggest otherwise when it comes to sea level rise (even without storms). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Will edit.
7-609	A	32	6			Add interactions with Urban Heat Island effect (Rohinton Emmanuel, University of Moratuwa)	Agree.
7-610	A	32	8			some ref to the "low cost airline model" seems appropriate-- and how sustainable it is ? (Allen Perry, University of Wales Swansea)	Will consider.
7-611	A	32	18			Social issues: it is somewhat lenghty to read through the Social Issues, followed by the Key vulnerabilities (which in some way had been discussed earlier, see	Section has been restructured.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						comment 1); is there any possibility to combine those sections maybe under a heading: Key vulnerabilities from a societal point of view...? (Susanne Becken, Landcare Research)	
7-612	A	32	18	34	35	As an additional source for some references on social issues and climate change impacts on poverty the following recent publication might be of help: German Advisory Council on Global Chnage (WBGU): World in Transition - Fighting Poverty through Environmental Policy (Earthscan, forthcoming in dec. 2005, already available as download from www.wbgu.de) (German Edition 2005. Springer Verlag) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Not applicable here.
7-613	A	32	18			7.4.2.4 Social Issues. Point a. For me, this also brings up the issue of emergency management services, locally, nationally, and internationally. Is the adequacy of EMS discussed elsewhere in the Report? (Bruce Tonn, University Of Tennessee)	Addressed.
7-614	A	32	24			Change “cities” to “urban areas, including shanty-towns/slums” Cross-refer this paragraph with the regional chapters. (Osvaldo Canziani, IPCC WG2 Co-chair)	Addressed.
7-615	A	32	26	32	28	"recent examples"; please add dates of fires in Indonesia, rainfall in US, floods in Mississippi and Red River valleys. Also Hurricane Katrina and European example? heat wave in 2003. (Pamela Heck, Swiss Reinsurance Company)	Addressed.
7-616	A	32	30			The bullet b calls for the important reference of the WMO Operational Hydrology Report Nº 30 : Hydrological aspects of Combined Effects of Storm Surges and Heavy Rainfall on River Flow”, 1988. The impact and vulnerability studies Argentina is presenting in its Second National Communication to UNFCCC include a study on this combined effect. (Osvaldo Canziani, IPCC WG2 Co-chair)	Will consider.
7-617	A	32	32			add ref to Katrina (Allen Perry, University of Wales Swansea)	Addressed.
7-618	A	32	47	33	1	Narrowly defined, only d) deals with social issues. I am surprised to see that there is no more knowledge about this. What about unemployment, climate refugees, moving etc? (Asbjørn Aaheim, CICERO)	“Social issues” are not narrowly defined: see the entire section.
7-619	A	32	47			Bullet d. cross-refer to chapter 8 (Osvaldo Canziani, IPCC WG2 Co-chair)	Not applicable.
7-620	A	32	47	32	1	new Orleans 2005 provides a recent insight (Andrew Dlugolecki, university of east anglia)	Addressed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
7-621	A	32	48	32	48	the very young (instead: "the young") (Margareta E. Kulessa, Mainz University of Applied Sciences)	Addressed.
7-622	A	32	49	32	49	Why should the least skilled feel the impacts more acutely than better skilled? Is it because they presumably have less income and less property? If this is the underlying reason then it is poverty (already identified in line 48 of p. 32), not skills. If this assumption is based on other reflections (maybe literacy etc.), these need mentioning. (Margareta E. Kulessa, Mainz University of Applied Sciences)	Text deleted.
7-623	A	32	50	32	50	Add reference at end of sentence: Eric Klinenberg, Heat Wave: A Social Autopsy of Disaster in Chicago. The University of Chicago Press: Chicago, 2002. (Joyce Klein Rosenthal, Columbia University)	Addressed.
7-624	A	32		33		In the section on social issues an important one is not mentioned: the management of catastrophic drought risk. In our book a very useful contribution by Peter Hazell summarises the experiences: "Climate change and management of catastrophic risk", p. 385-395. (Ton Dietz, University of Amsterdam)	Addressed.
7-625	A	32				Paragraph on energy transportation systems (transmission lines, pipelines, …) and impacts of extreme events, permafrost and implications for disruption of business activities (Pamela Heck, Swiss Reinsurance Company)	See 7.4.2.3.
7-626	A	32				(iii) at some places of the this Chapter, new texts are considered to be added in the future (before SOD?) (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Not clear.
7-627	A	33	1	33	1	The gender dimension of climate change impacts may not be known to all readers. Therefore one or two examples might be helpful. (or, a reference to chapter 17 in which, at the time being, this matter is dealt with in box 17.4 on pp. 26ff.) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Addressed.
7-628	A	33	5	33	7	Add or better cross-refer the highly vulnerable conditions of cities and rural settlements in mountainous regions with glaciers, which are located in valleys under the danger of glacier-lake outburst floods (ref Chapter 13, for settlements close to tropical glaciers, in the Andes). (Osvaldo Canziani, IPCC WG2 Co-chair)	Addressed.
7-629	A	33	16			Given that poverty will be discussed a few paragraphs further down I would probably reduce the text of point f in this respect. (Susanne Becken, Landcare Research)	Addressed.
7-630	A	33	31	33	35	I would take this paragraph out.	Addressed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Susanne Becken, Landcare Research)	
7-631	A	33	35	33	35	What do you mean by the phrase if things go wrong people will blame "the government"? Do you really want to use this line? Why not discuss potential civil unrest or something that is a little more precise? (Henry Lee, John F Kennedy School of Government)	Sentence retained: Katrina is an exempel.
7-632	A	33	35			the recent events in New Orleans exemplify this point (Daniel Scott, University of Waterloo)	Yes.
7-633	A	33	37	33	40	Why does the vulnerability of human societies to climate change vary with gender? Does having more men than women in a society make that society less or more vulnerable? (Henry Lee, John F Kennedy School of Government)	Addressed; cross-referenced to Box 17.4.
7-634	A	33	38	33	38	"treatment of gender differences" not "gender" , because all societies are about 50/50 male /female! (Andrew Dlugolecki, university of east anglia)	Text deleted.
7-635	A	33	42			Regarding the parenthetical "e.g. heat outbreaks, floods": this is an example of an overstressed point that has been made relentlessly in this chapter. It's redundant at this point, and other instances of this point can be deleted as well to save space. (Kevin Vranes, University of Montana)	Addressed.
7-636	A	33	44	33	46	first mention in Chapter 7 of fishing activities ! (Michel Paillard, IFREMER)	Noted.
7-637	A	33	45			It would be opportune to add : "In coastal settlements" so to read: In coastal settlements, large etc. (Osvaldo Canziani, IPCC WG2 Co-chair)	Not applicable.
7-638	A	33	48			The discussion of poverty is important, but it appears that the key arguments are repeated in those points; namely that poorer people have no means to adapt and that they also live in areas that are most likely to be affected (e.g. resulting in higher fatality rates etc.). Is it possible to summarise those points made in a) to d) in one single paragraph? (Susanne Becken, Landcare Research)	Addressed.
7-639	A	33	50	33	50	The Klinenberg reference is also appropriate for this sentence, as it discusses the differential impact on men and women from heat-related mortality during the July 1995 Chicago heat wave: Eric Klinenberg, Heat Wave: A Social Autopsy of Disaster in Chicago. The University of Chicago Press: Chicago, 2002. (Joyce Klein Rosenthal, Columbia University)	Addressed.
7-640	A	34	11			This bullet b needs to be adjusted to reality. It is not that illegal occupancy of empty houses, factories, etc, only happens in developing countries; in fact this "behavior"	Addressed.

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						finds its origin in some European countries, the practice was then copied by illegal groups in the developing countries. (Osvaldo Canziani, IPCC WG2 Co-chair)	
7-641	A	34	22			Bullet d should be redrafted to accommodate the sad experiences gained with this year's (2005) tropical cyclones season, i.e. of severe storms apparently fuelled by climate change. (Osvaldo Canziani, IPCC WG2 Co-chair)	Text deleted.
7-642	A	34	38			Section 7.4.3 Key Vulnerabilities: Urban vulnerabilities (heat and pollution related health vulnerabilities, increased flooding, changes to natural ecosystem in urban areas) need to be added (Rohinton Emmanuel, University of Moratuwa)	Considered; but other reviewers felt that we were placing too much emphasis on urban areas.
7-643	A	34	40	36	4	this does not need to be duplicated earlier as well. (Andrew Dlugolecki, university of east anglia)	Executive summary changed.
7-644	A	34	43	34	44	Societies are vulnerable to climate change extreme events even if they are not abrupt - I think too much emphasis is being placed on the hope that human settlements can deal with gradual change. Even if infrastructure adjusted somewhat, the settlements are still there. (Paul Kirshen, Tufts University)	We disagree.
7-645	A	34	43		44	Isn't this point obvious or implied? (Kevin Vranes, University of Montana)	Changed.
7-646	A	34				references to be chosen (p. 34, etc.), meaning further writing and development of these parts. (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Unclear.
7-647	A	35	1			Because of former experience and due to comments made earlier, the high mountain ranges and high plateaux, such as the Andean Altiplano have to be included. (Osvaldo Canziani, IPCC WG2 Co-chair)	Covered by #3.
7-648	A	35	1			as written, this phrase implies that the Sahel is thawing (Kevin Vranes, University of Montana)	Edited.
7-649	A	35	11	35	13	"often related to the magnitude and rate of climate change" or the moment in time when it is decided to adapt to changed conditions. The decision of when to adapt could be crucial for adaptation costs and cost-benefit considerations. (Pamela Heck, Swiss Reinsurance Company)	This section is focused on vulnerabilities; for responses, see 7.6.
7-650	A	35	13			A new item c) has to be included, as follows: and c) founded in cultural, worshiping and Ethnic backgrounds (Osvaldo Canziani, IPCC WG2 Co-chair)	We do not understand the concern.

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7-651	A	35	13	35	13	... (financial and economic, human, institutional) ... (Margareta E. Kulessa, Mainz University of Applied Sciences)	Unnecessary elaboration.
7-652	A	35	20	36	4	This text repeats what is in the Executive Summary (Osvaldo Canziani, IPCC WG2 Co-chair)	Executive summary changed.
7-653	A	35	34	35	34	Increased specialism does not necessarily imply reduced resilience. The converse can even be true. See above reference to the Benson and Clay paper on globalisastion. (Charlotte Benson, Independent)	Agreed' global linkages can add to adaptive capacity. Addressed in 7.6.
7-654	A	35	34	35	35	"vulnerabilities include interregional trade patterns, migration patterns", communication and transport systems. (Pamela Heck, Swiss Reinsurance Company)	Phrase says "includes"
7-655	A	35	49	35	49	"physical assets and infrastructures", as well as production chains in global markets (Pamela Heck, Swiss Reinsurance Company)	Agreed.
7-656	A	36	7			Box 7.8 Environmental Migration. To me, this is such an important issue that it deserves more than a mention in a box. (Bruce Tonn, University Of Tennessee)	A box gives it more emphasis.
7-657	A	36	8	36	34	Box 7.8 on migration: Please add a reference to the following book, and the papers therein: Unruh, J.D., Krol, M.S, Kliot, N. (2004). Environmental change and its implications for population migration. Advances in Global Change Research, Vol. 20, Springer. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Reference added.
7-658	A	36	8	36	34	This box 7.8 calls for better referencing, to include such problems as migration in other areas of the world. The impact of the "sem terra" people ´s migrations in Brazil (ref Socioeconomic Impacts of Climate Variations and Policiy Responses in Brazil, Magalhâes A & M.H. Glantz, 1992).is one. Another is regional wars arising from the use of water as a weapon of war (ref. The Atlas of Water, Earthscan, 2004, pages 80 and 81). Other sources of social instability are discussed in different studies initiated in the University of Toronto and the Institute of International Affairs, in the University of Harvard. Ambio also provided a number of case studies. The revision of this box is suggested to keep it short., through coordination with the corresponding sectoral and regional chapters.. (Osvaldo Canziani, IPCC WG2 Co-chair)	Limited by space constraints.
7-659	A	36	8	36	34	The box omits a major form of migration: Retirees trekking to Florida and Mallorca. (Richard S.J. Tol, Uni. Hamburg)	Flippancy noted!
7-660	A	36	10	36	34	this is a key issue, needs more than two references (one from 1995). Surely despoite the difficulties, more could be said. Note especially strong linkagees now	Reference added.

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						between Europe and Asia/Africa and USA/Latin America through existing ethnic minority groups resident in Europe/USA.it is no longer "us and them". (Andrew Dlugolecki, university of east anglia)	
7-661	A	36	24	36	34	risks of conflict for water supply (civil populations) (Michel Paillard, IFREMER)	Will consider, but the issue is contentious.
7-662	A	36	24		27	This point is only useful if a time scale is attached to it. There is no reason to suspect that migration due to climate change will ramp up measurably beyond the rate at which it already occurs. (Kevin Vranes, University of Montana)	Not the point here.
7-663	A	36	28	36	34	You should not miss De Soysa I. 2002 Ecoviolence: shrinking pie or honeypot? Global Environmental Politics 2: 4 November. (Ton Dietz, University of Amsterdam)	Will consider.
7-664	A	36	36			Reference ABI study "Financial Risks of Climate Change" June 2005 and Munich Re 2005. (Pamela Heck, Swiss Reinsurance Company)	Is already referenced elsewhere and will cross reference.
7-665	A	36	38	40	31	Section 7.5 - I suggest the authors refer to the following paper (especially Chapter 2) for a more structured discussion of factors determining the economic impacts of disasters. Benson, C and E J Clay, 2004, "Economic and Financial Impacts of Natural Disasters: An Assessment of their Effects and Options for Mitigation", Disaster Risk Management Series No.4. Washington, D.C.: World Bank. http://www.wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000012009_20040420135752 (Charlotte Benson, Independent)	Will reference.
7-666	A	36	38			Section "Costs and other socioeconomic issues": see publication Schwierz, Heck, Zenklusen, Bresch and Schär (2005), Impact of Climate Change on European Wind Storm Damages, to be submitted to Climatic Change. This study compares the insurance costs on a European-wide property portfolio in the time period 2070-2100 against the period 1960-1990. It is the first study that couples a climate model to an insurance loss model to quantify the climate impact at the European and the individual country scale. (Pamela Heck, Swiss Reinsurance Company)	While it might be referenced, we are suspicious about this work first because there is a wide range of variation among climate models as to European windstorm activity under conditions of doubled CO2 and second because the most extreme and damaging windstorms are missing from the output of the study.
7-667	A	36	38			Section 7.5: mainly drawing on anecdotal and isolated estimates, often not (directly) related to climate change but taken from natural disasters in general, the section hardly allows for any statements on costs of climate impacts on the targeted sectors. Everyone knows disasters are costly events, as the examples from Central America illustrate, but greater care must be taken in presenting tese results in a climate change context.	Section substantiële reorganized.

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						(Tom Kram, MNP-RIVM)	
7-668	A	36	40	40	31	Note two works sponsored by ABI on this issue (Dlugolecki 2004 on UK, ABI 2005 on regional aspects).Note also effects of Hurricane Katrina 2005 on US GDP- and also global oil prices. (Andrew Dlugolecki, university of east anglia)	Will include mention of these ABI reports and also the impacts of Katrina in the new Katrina Box.
7-669	A	36	50	36	50	"climate -related extreme events" -> an extreme event cannot by definition by climate-related! (Pamela Heck, Swiss Reinsurance Company)	Accepted.
7-670	A	36	50			Really? Recent data are best for recent events? Older data for newer events are pretty bad (bar Nostradamus)! (Richard S.J. Tol, Uni. Hamburg)	Section redone.
7-671	A	37	1	39	29	There is lack of several references. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Noted.
7-672	A	37	2			Annual insurance losses due to natural catastrophes (without EQ) have increased by a factor of 7 since the 70s (from 2.5 bn USD per year to 18 bn USD per year), see Swiss Re sigma database (Pamela Heck, Swiss Reinsurance Company)	Will clarify in Chapter 1 the difference between economic loss trends and trends after economic losses have been normalized.
7-673	A	37	2	37	2	"economic damges" - please add a sentence on how uncertain economic figures are, especially as it is not even clear what an economic damage should encompass. You should consider giving figures on insured losses (in combination with insurance penetration, the Swiss Re sigma database provides insurance losses per country over the last 30 years, see also below). (Pamela Heck, Swiss Reinsurance Company)	Will clarify; topic is addressed in more detail in Chapter 1.
7-674	A	37	4	37	7	"US $ 318 million (…) 11 times higher than the US $ 28 million" - please specify what is defined as disaster (trigger, …?). Reference is important, as it needs a check! (Pamela Heck, Swiss Reinsurance Company)	Section revised.
7-675	A	37	4			strikes' is fatalistic / deterministic wording (Daniel Scott, University of Waterloo)	Changed.
7-676	A	37	10			Is "only" appropriate here? (Kevin Vranes, University of Montana)	Changed.
7-677	A	37	16	38	13	These paras concern a highly specific example about water supply. I suggest they are put into a box. (Charlotte Benson, Independent)	Text revised.
7-678	A	37	16	37	29	risks of conflict (Michel Paillard, IFREMER)	Will consider.

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7-679	A	37	23	37	29	The poorest in many developing countries do not have access to municipal water. They often pay for their water by walking many miles to gather surface water or to obtain supplies from a standpipe. I am not sure that the statement – the poorest in the population pay the most – is technically correct. The point that the poor do not have adequate access to water is accurate and that they pay more in some (as opposed to all) communities is correct, but the way this paragraph is worded is an oversimplification (Henry Lee, John F Kennedy School of Government)	Section revised.
7-680	A	37	24			is worth half of the income of a poor family … where specifically (globally, north america, africa)? (Daniel Scott, University of Waterloo)	Section revised.
7-681	A	37	31	37	45	This is a too economic-prone approach with little human and social sense. (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-682	A	37				references to be chosen (p.37,etc.), meaning further writing and development of these parts (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Noted.
7-683	A	38	0			what is the criterium for choosing the described examples? Any event? (Pamela Heck, Swiss Reinsurance Company)	Section revised.
7-684	A	38	5	38	11	The text in this section is contradictory. It first says that that the number of people exposed to coastal flooding will increase to 2020. It then says that the number could then increase or decrease. Finally it says that the additional number of people exposed to coastal flooding "is not apparent until the 2080s". A clearer explanation is needed. (Lenny Bernstein, IPIECA)	Section revised.
7-685	A	38	15	38	18	This paragraph might well miss the impact of El Niño on anchovy fishing and the fish-flour industry. El Niño has historically caused the bankruptcy of many stakeholders, and the statistics show the adverse economic effects on fisheries (SciAm The Anchovy Crisis, by Idyll C.P, June 1973). Further, the economic impacts attributed to El Niño 1982-1983, due to floods amounted to U$S 300 millions in Bolivia, U$S 650 million in Ecuador and North Peru. Therefore, it is recommended to check and clearly formulate this paragraph. (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-686	A	38	15		24	I don't find these paragraphs to be particularly relevant, as we are talking about a cyclical climate phenomenon well known by society (and thus not unexpected). Unless you're going to continue with the point that climate change is expected to force the tropical Pacific to behave much more closely to El Nino than La Nina	Section revised.

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						over the long haul. (Kevin Vranes, University of Montana)	
7-687	A	38	20			Factual inaccuracy p38 line 20 – Hurricane Mitch was 1998 not 1989 (could just be a typo). (Claire Hanson, University of East Anglia)	Agreed.
7-688	A	38	26	38	28	see also Hurricane Katrina with impacts on the whole (worldwide) economy (Pamela Heck, Swiss Reinsurance Company)	Section revised; also see Box 7.4.
7-689	A	38	26	38	28	Please complete, if additional examples available (Pamela Heck, Swiss Reinsurance Company)	Section revised.
7-690	A	38	26	38	28	This comment relates primarilly to Figure 7.3 which is cited in this paragraph. It might be worth trying to present the figures directly in terms of GDP rather than growth rates, as it gets a bit confusing when the lines cross. Also, it is not quite clear how this and other discussions on economic costs fit into the topic of the chapter. Is there no other chapter where economic costs are going to be summarized? The ones presented here are not limited to Industry, settlement and society, except if society is defined to become a catch-all (Gordon McGranahan, International Institute for Environment and Development)	Both text and figure revised.
7-691	A	38	27			Hurricane Mitch was in October 1998. (Hitoshi Hayami, Keio University)	Agreed.
7-692	A	38	28			Figure 7.3: Would be helpful to have translated labels. (Charles Watson, Kinetic Analysis Corporation)	Done.
7-693	A	38	35	38	43	This paragraph is rather obscure (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-694	A	38				references to be chosen (p.38, etc.), meaning further writing and development of these parts (Antoaneta Yotova, National Institute of Meteorology and Hydrology)	Noted.
7-695	A	39	1	39	27	All characters are in Espaniora. (Toshiaki Ichinose, National Institute for Environmental Studies)	Changed.
7-696	A	39	1			Figure 7.3 : captions should be translated into English (Hideyuki Kobayashi, Ministry of Land, Infrastructure and Transport)	Changed.
7-697	A	39	1	39	27	Spanish. (Richard S.J. Tol, Uni. Hamburg)	Changed.
7-698	A	39	1		27	Obviously these figures need to be translated to English, but they also need y-axis labels. (Kevin Vranes, University of Montana)	Modified.
7-699	A	39	2	39	27	Figure 7.3. is unclear. It needs explanations in English. Units for y-axis must be done as well.	Modified.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	
7-700	A	39	3	39	26	The captions on Figure 7.3 need to be translated into English. My Spanish is very limited, so I do not know what sequia means. Figure 7.3 needs a better explanation in the text. While Hurricane Mitch caused a downturn in the economies of Central American countries, the impact appears to have been limited to one year, 1999, except in the case of Nicaragua, whose economy was quite volatile. However, this is very different from the dire forecasts made at the time. It was predicted a loss of half the GDP of Honduras in the short term and that the country would take 10 years to recover. (Lenny Bernstein, IPIECA)	Modified.
7-701	A	39	28			Figure 7.3: Need an English version! (Rohinton Emmanuel, University of Moratuwa)	Modified.
7-702	A	39	31	39	43	Careful reading suggests that this paragraph ´s concepts should be checked to achieve better convergence with lines 35 to 38, in page 38 (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-703	A	39	31	39	48	All other paragraphs deal with "costs" in a more narrow sense. Although this paragraph is somehow covered by the section's title ("costs and other socioeconomic issues") this paragraph might be better shifted to section 7.4.2.4 social issues (p. 32-34). (Margareta E. Kulessa, Mainz University of Applied Sciences)	Section revised.
7-704	A	39	34	39	43	Attributing all of the economic problems of Central America to climate variability and natural disasters is an overstatement. The drop in the international price of coffee was due to over production, not climate related factors. If anything, climate related factors should have reduced the production of coffe and acted as a countervailing factor to overproduction. A more complete analysis of the economic situation in Central America is needed in this section. (Lenny Bernstein, IPIECA)	Section revised.
7-705	A	39	45	39	48	Same situation stems from reading this paragraph vis à vis what is said in Box 7.8 (Osvaldo Canziani, IPCC WG2 Co-chair)	Section revised.
7-706	A	40	1	40	31	Non-economic costs of societies (e.g. change of traditional life style, mealing and wearing habits) shoud be pointed as well. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Will consider.
7-707	A	40	2	40	5	Meaning is not clear (Gordon McGranahan, International Institute for Environment and Development)	Section revised.
7-708	A	40	4			Do climate change scenarios require additional investment? Or should climate changes scenarios be adjusted so as to improve projections? It is necessary to check this paragraph also.	Section revised.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Osvaldo Canziani, IPCC WG2 Co-chair)	
7-709	A	40	7	40	13	Important information, though not quite clear how it fits in to the topic of the chapter. Generally, as noted above, this section is not limited to the three topics of the chapter. (Gordon McGranahan, International Institute for Environment and Development)	Section revised.
7-710	A	40	7	40	13	Time period is 1900 to 2000. Literature reference is Mechler (2004: p. 23). Mechler, R. (2004). Natural Disaster Risk Management and Financing Disaster Losses in Developing Countries, Verlag für Versicherungswirtschaft, Karlsruhe. Data sources as indicated in text: CRED (2004). EM-DAT: International Disaster Database. Brussels, Belgium, Centre for Research on the Epidemiology of Disasters, Université Catholique de Louvain. Maddison, A. 1995. Monitoring the World Economy, 1820-1992. Paris: OECD Development Centre. (Reinhard Mechler, IIASA)	Noted; section revised.
7-711	A	40	7	40	13	Please refer to the work of Pielke et al., who show that the trend is entirely due to increases of population and wealth. Madison is not in the reference list. CRED is data only, no analysis. (Richard S.J. Tol, Uni. Hamburg)	Noted.
7-712	A	40	7		13	A major caveat should be mentioned: the losses due to climate change almost certainly are really due to demographic settlement patterns toward coastal areas which are much more vulnerable to extreme weather events than interior continental areas. Reference again the publications by Pielke et al. (Kevin Vranes, University of Montana)	Noted; section revised.
7-713	A	40	8	40	11	I question this. Vulnerability to geophysical hazards is increasing too, due to factors such as expanding development of areas at risk combined with poor building practices, particularly in developing countries. Earthquakes have a much lower return period so, obviously, any analysis of trends has to be made over a longer period. However, I think the data, if properly analysed, would increase a clear rise in earthquake-related physical losses over time. (Charlotte Benson, Independent)	Section revised.
7-714	A	40	12	40	13	sigma database (Pamela Heck, Swiss Reinsurance Company)	Section revised.
7-715	A	40	15			Economic costs have been estimate worldwide, not just for the Wadden Sea. (Richard S.J. Tol, Uni. Hamburg)	Accepted.
7-716	A	40	24	40	31	as stated earlier "several percent" is in fact a very significant finding, which seems to be almost passed off as immaterial. Critics of action on mitigation cite even lower cost figures as a reason for not instigating mitigation policies! Therefore if it can be shown that climate change will cost "several percent" (and note the 2005	Noted.

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						hurricane season in USA cost around 2% of US GDP) this makesmthe case for mitigation NOW. (Andrew Dlugolecki, university of east anglia)	
7-717	A	40	24	40	31	The same for comments No.2. (Hitoshi Hayami, Keio University)	Noted.
7-718	A	40	24	40	31	25% short-run loss run value not substantiated in text, what is reference year or associated (SRES) scenario. What is basis for this? Are these direct, asset losses, or losses to GDP, if latter what time scale? Also, what are "and other human costs": loss of life? I think this is should not be in exec summary and with high confidence tag, if not substantiated, which is anyway difficult and associated with uncertainty (Reinhard Mechler, IIASA)	Section revised, but see earlier exempels of losses from extreme weather events.
7-719	A	40	26	40	31	I'm amazed that you can reach this first conclusion with high confidence without a comprehensive review of the literature. The second conclusion (25% in the short run) suggest that you indeed did not read this literature. (Richard S.J. Tol, Uni. Hamburg)	Based on LA interpretator of the literature, including grey literature.
7-720	A	40	29	40	31	Totally unclear what "evidence" supports this statement made with HIGH CONFIDENCE; see also #13 (Tom Kram, MNP-RIVM)	See above.
7-721	A	40	30	40	31	This is an example of a very weak statement given with high confidence. Of course 'economic and other human costs of climate change impacts for some economic sectors in some smaller locations... could in the short run exceed 25%'. They could presumably reach 100% in a small inundated location. (Gordon McGranahan, International Institute for Environment and Development)	Stronger statements would mean lower confidence levels. Cost destinaties are an area where the research literature is not strong.
7-722	A	40	34			Section 7.6 Adaptation. Time component for adaptation should be dealt with: when does a society decide to adapt? prospectively or once conditions have dramatically changed? A system might be able to adapt today to changed conditions, while in a couple of decades this might become very costly or even impossible anymore. Also in the light of dual-use technologies, win-win strategies. (Pamela Heck, Swiss Reinsurance Company)	Comment added.
7-723	A	40	34			Section 7.6 Adaptation. Please mention the implementation of "dual-use technologies that offer societal benefits even if anticipated disaster never occur" (see eg Science volume 309, page 1034, Allenby and Fink. (Pamela Heck, Swiss Reinsurance Company)	Addressed in 7.6 and 7.7.
7-724	A	40	36	40	44	Jared Diamond's popular book "Collapse" (2005) may be an additional source on society's adaptability to environmental changes worth to be cited. (and the references in chapter 17, p. 3, or the chapter 17 itself) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Noted.

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7-725	A	40	37			Regulated industries in the developed world, even ones wanting to plan and adapt to climate change, may have trouble doing so if the government regulators are not willing to accept the need for such changes. Shareholders must also be convinced of the need to make such adaptations, especially if they involve capital investment, or directors will be reluctant to do so. (Charles Watson, Kinetic Analysis Corporation)	Good point, but lack space to add elaboration.
7-726	A	40	41	40	44	This paragraph deserves careful analysis. Does it mean that adaptations are probably most notable? It would be better to say the results of some adaptation strategies are outstanding.Further, the text mentions that remarkable examples are those undertaken in the Netherlands' coast and in some arid regions short of water supplies. As a matter of fact, not all similar undertakings have a similar degree of success. Further, adaptation to extreme events could also be recognized as valuable. However, the fate of adaptations to cope with the climate change trend, bringing new climate systems under which the everyday needs of the whole world population have to be satisfied in a sustainable manner, is a complete different issue. Natural climate variability has provided throughout human history quite a number of examples of success and failure. From now onwards to feed an increasing number of people, provide them and their systems with the necessary water resources, ensure appropriate health conditions, etc, requires as stems from UNFCC Article 2, the choice of appropriate sustainable development trajectories which, in essence, are the only way to adapt societal behavior to all possible climate variations. There is no doubt, as it is mentioned in chapter 1, that new mean climate variables are affecting, for instance wine production calling for new vineyards regions. In a near or remote future food, fiber and forestry outputs will have to be considered depending on their cultivars ´genetic conditions and atmospheric CO2 concentrations, on the new ranges of meteorological, hydrological and climate variables. Something similar would happen regarding the well-being and sanitary conditions in urban and rural environments. (Osvaldo Canziani, IPCC WG2 Co-chair)	Editorial change made; unfortunately, space limitations prohibit adding more of these points about detailed issues.
7-727	A	41	0	51	0	I found the material in the last ten pages to be very clear and quite persuasive. (Henry Lee, John F Kennedy School of Government)	Thank you.
7-728	A	41	4	41	4	Are the years correct? If this study only compared two years (almost consecutive) it may not be very valid? (Susanne Becken, Landcare Research)	Correct; refereed article based on field work.
7-729	A	41	4			should be "1979 with 1997"? (Kevin Vranes, University of Montana)	Correct as is.

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7-730	A	41	13	41	15	It seems that this statement is only applicable in developed areas. Lack of reliable geophysical data and socio-economic information on impacts and vulnerabilities of natural and human systems in developing regions indicates that such a statement is too generalized. (Osvaldo Canziani, IPCC WG2 Co-chair)	Editorial comment added.
7-731	A	41	15			Another key problem is that many interactions and responses to climate change are nonlinear; adding 0.5 meters to sea level does not cause a 0.5m increase in storm surge from a given event. It may cause much more or less, depending on the details of coastal topography and land cover (Watson, 2002, "Implications of climate change for modeling coastal hazards", Solutions to Coastal Disasters '02 conference proceedings, Amer. Soc. of Civil Engineers). (Charles Watson, Kinetic Analysis Corporation)	Another good point, but space limitations again.....
7-732	A	41	24	42	22	reference to vulnerability of SMEs needs to be added. Vulnerability mentioned for indutry built in ladslip areas is true for human settlement also which needs tobe mentioned and which is more important for human settlement planning and loss of human life in pages 44-45 line 21-24. This can be adapted through various policy actions. (Joyashree Roy, Jadavpur University)	Very limited literature on this.
7-733	A	41	26	42	22	The evident effect of climate change is change in needs of clothing insulation (Blazejczyk and Twardosz 2002). It needs adaptation of textile and clothing industry (new fabrics and fasions of clothing). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	See new discussion of retail service impacts: 7.4.2.2.
7-734	A	41	30			an increasing proportion of manufacturing and retail-distribution industries. (Maureen Agnew, University of East Anglia)	Will consider..
7-735	A	41	40	41	40	Transportation is mentioned as part of the industry sector although t was taken out by definition on p. 15 (line 31) (see my comment no. 19) (Margareta E. Kulessa, Mainz University of Applied Sciences)	Trying to be consistent, but impacts of the transportation sector on industry are not the same as impacts of climate change on the transportation sector.
7-736	A	41	47	41	50	This is not really industry (Gordon McGranahan, International Institute for Environment and Development)	Construction is a part of industry under standard industrial classificatieons.
7-737	A	42	6	42	8	"For more structural adaptations (…) planning guidance and risk management by insurers will play a major role". The government will also play a major role in town planning, setting standards for building codes, etc… (Pamela Heck, Swiss Reinsurance Company)	Accepted.
7-738	A	42	25	43	32	Concerning adaptation options for tourism, the distinction between "technological" and "behavioral" attitudes is perhaps too restrictive. Operators (destinations or private operators) can adopt non technological options too, such as diversifying	Will consider.

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						their tourism supply, so as to rely not only on winter sports, rather than trusting technology for artifical snow making. (Ghislain Dubois, Tourism Environment Consultants (TEC))	
7-739	A	42	25			The financial services industry will play a major role in the adaptation by industry to a business environment influenced by the consequences of climate change. Mitigation measures and adaptation measures adopted by industry in many cases will require capital investment. The cost of capital is directly related to the risks associated with its utilisation. A major barrier to the implementation of the Clean Development Mechanism (CDM) initiative has been the high cost of investment capital required due to the high risk associated with the investment (McClellan, K. 'Securing Investment for Climate-Friendly Projects: Uses and Limitations of Carbon Trading', pp.65-76, Tang (2005)). The financial risk management sector, which includes insurance but also other approaches, is already addressing these issues (Walker, C. and Thomas, B. 'Protecting Your Carbon Asset Risk: Risk and Insurance in the Greenhouse Gas Markets', pp.293-302, Tang (2005)). Although only in its initial stages of development at the moment, it is anticipated that this will become a core activity in the development and implementation of mitigation and adaptation processes well before the 2030's. (George Walker, Aon Re Asia Pacific)	Will consider, subject to space limitations; good points.
7-740	A	42	27	43	29	Retailing: it is likely that enterprises will capitalise on long-term changes in consumer demand and lifestyle (through the expansion of markets for such goods as electric fans, barbeque equipment and equipment for outdoor recreation in higher latitude countries). (Maureen Agnew, University of East Anglia)	Added as chapter CA.
7-741	A	42	27	42	28	surely should include insurance as sensitive. (Andrew Dlugolecki, university of east anglia)	Will consider.
7-742	A	42	28			the following reference discusses all of these factors specifically for one tourism/recreation sector: D. Scott. 2005 (in press). Ski Industry Adaptation to Climate Change: Hard, Soft and Policy Strategies. In: Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (Daniel Scott, University of Waterloo)	Gossling and Hall cited. Otherwise, see response to 7-230.
7-743	A	42	36	43	1	In temperate climates tourism industry reacts to climate change also by investment in new facilities for indoor/outdoor recreation as well as by organizing new forms of tourism (e.g. Conferences, meetings, schools etc) (Blazejczyk 2003). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Incorporated.
7-744	A	42	36			Regarding the future of the tourism sector, it is better to say " might" instead of "may"	Changed.

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						(Osvaldo Canziani, IPCC WG2 Co-chair)	
7-745	A	42	49	42	50	I am not sure that the statement about small businesses is correct; if it remains in the text it would be necessary to add a reference. (Susanne Becken, Landcare Research)	Deleted.
7-746	A	43	5	43	5	The real price of air travel has fallen. Why do Goessling and Hall think this trend will reverse? What do more authoritative authors say about this? (Richard S.J. Tol, Uni. Hamburg)	True, but there are many reasons to think that this trend may not continue: e.g., rising energy prices especially if mitigation policies penalize the use of fossil fuels.
True	A	43	5		6	I can see how this could be due to climate change, but you have not spelled it out and the cause-and-effect linkage between increased cost in air transport and climate change is not at all obvious. (Kevin Vranes, University of Montana)	See Working Group III report and precieus comment.
7-748	A	43	10			While this may be true, the limited evidence we have thus far, suggests a great deal of environmental change is required before it becomes meaningful to tourists and affects their travel intensions. See: (1) Scott, D., Jones, B., Konopek, J. (in review – July 2005) Implications of climate and environmental change for nature-based tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. Tourism Management. (2) D. Scott. 2005 (in press) Global Environmental Change and Mountain Tourism. In: Tourism and Global Environmental Change. S. Gossling and M. Hall (eds). London: Routledge. (Daniel Scott, University of Waterloo)	Nevertheless, it is essential to raise the issue here.
7-749	A	43	10	43	11	"most substantial" compared to what? What are "changes in economic costs"? (Richard S.J. Tol, Uni. Hamburg)	Compared with other forms of tourism.
7-750	A	43	13	43	13	"changes in storm tracks and intensities" - please replace by "increasing storm surges" as figures on storm track changes are still highly uncertain. (Pamela Heck, Swiss Reinsurance Company)	We believe that the statement is valid as is. The evidence about intensities is strong, and changes in tracks are considered likely.
7-751	A	43	14			Add, within brackets, Chapter 3 and all regional chapters. (Osvaldo Canziani, IPCC WG2 Co-chair)	Changed.
7-752	A	43	21	43	29	This section deals with adaptation for the financial services sector. Some important documents could be included, suggestions are given below. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will consider.
7-753	A	43	21	43	21	Please replace contracts by "policies". (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will consider.
7-754	A	43	21	43	29	this understates the potential problem. Insurers base their total exposure on calculations relating to rare events (ie this understates the problem Insurers caluclate their exposure on the basis of a rare event happening (ie 1 in 200 years). If the probability of such rare events increases rapidly , as seems likely with climate	Will consider.

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						change, they could be wiped out BEFORE they can respond. recent examples of very rare events are Europe 2003 summer (not much insured though) and Katrina, wopuld have been disastrous if a second equally strong event had followed, as seemed likely with Rita at one point. (Andrew Dlugolecki, university of east anglia)	
7-755	A	43	21	43	29	Science volume 309, p. 1043 "Insurance is a form of adaptive capacity for the impacts of climate change, although the sector itself must adapt in order to remain viable". (Pamela Heck, Swiss Reinsurance Company)	Discussion of the adaptive capacity of insurance will be expanded here.
7-756	A	43	21	43	29	One danger: if the trend is hidden by natural variability (see eg higher activity cycles of hurricanes in the Gulf of Mexico), it could happen that it is only recognized once it has reached a substantial level (ie many lines of business are affected), and adaptation has become very costly. It is crucial for the sector to initiate measures in time, and not only once adaptation has become very costly or even impossible (withdrawal of coverage), see also Opportunities and risks of climate change. Risk Perception series, Swiss Re, 2002 (www.swissre.com -> Research & Publications -> Property & Casualty -> Publications overview). (Pamela Heck, Swiss Reinsurance Company)	It is important first to clarify where there is evidence for some change in activity. There are regions and perils for which there is no evidence to date – and therefore it would not make sense to anticipate changes that do not happen. At the same time, as with Hurricane there are clearly perils for which evidence of change is already visible. The background to this topic (the evidence for changes in the occurrence of extremes) is discussed in chapter 1.
7-757	A	43	21	43	29	Insurance can play a substantial role in giving incentives for adaptation. Through risk-adequate rates and insurance conditions it can encourage loss prevention In collaboration with the governments which controls town planning and enforces building codes it can influence effective risk and catastrophe management. See also Science Volume 309, p. 1042-1043: Insurance can "become more proactive in formalizing social solidarity to prevent and, when necessary, endure and adapt to extreme events that individuals cannot manage independently (...) This is the highest form of insurance, with roots in its centuries-old tradition of loss prevention". (Pamela Heck, Swiss Reinsurance Company)	Need to clarify the degree to which insurance can give incentives for adaption through pice differentials as well as the way in which these may become frustated through regulation.
7-758	A	43	21	43	29	Adaptation potential of "insurance sector" could be expanded a bit: There are number of instruments for sharing and spreading risks such as insurance, funds, credit lines, catastrophe bonds that hold considerable potential for financial adaptation to extreme event risk as potentially affected by climate change. However, as risk increases, may become difficult for industry to bear risks, need for public-private partnerships etc. Also, risk transfer does not reduce the risk per se, but transfers which is different from physical adaptation.	The adaptation potential of the insurance sector and the degree to which insurers are already taking adaptive steps to protect their industry will be mentioned.

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						(Reinhard Mechler, IIASA)	
7-759	A	43	21			Applies to property/casualty insurance, but less so to term life insurance (Evan Mills, Lawrence Berkeley National Laboratory)	Will clarify.
7-760	A	43	21		29	This paragraph is redundant and can be cut. (Kevin Vranes, University of Montana)	Will consider. Other reviewers suggest erpanding.
7-761	A	43	21			Same comment as for p24 ln6 - in the United States the insurance industry is highly constrained by regulatory issues, and probably cannot react as easily as is assumed here. A distinction must be made between the highly regulated primary insurance market and reinsurance, which may be more flexible. (Charles Watson, Kinetic Analysis Corporation)	Will clarify the situation in the US and the impediments to the insurance industry acting uniaterally, subject to page limits.
7-762	A	43	22	43	25	This strongly depends on the size and location of the (re)insurance company. Smaller local companies might face greater challenges as worldwide operating reinsurance companies. (Pamela Heck, Swiss Reinsurance Company)	The issue around Reinsurance company solvency is around capital adequacy and diversification rather than size.
7-763	A	43	25	43	29	Should point out here (and in Box 7.5) that these models have real limitations for forward-looking analysis, and are only available for a subset of the perils of interest. RMS has an interesting post-Katrina report that gets at some of the issues. Other discussion here: http://eetd.lbl.gov/EMills/PUBS/PDF/ceres-insure_report.pdf (Evan Mills, Lawrence Berkeley National Laboratory)	See new Katrina box.
7-764	A	43	26			In view of the fact that there are tropical cyclones in different geographical regions, where they receive different names, it is better to use a general approach saying Seasonal tropical cyclone forecasts (i.e. hurricane forecasts) This line suggests another small change. After and, read as follows: "real time modeling for slow-onset climate hazards, such as droughts, etc" (Osvaldo Canziani, IPCC WG2 Co-chair)	Will use Tropical Cyclones generically but Hurricanes in the Atlantic and agree with these two proposed edits.
7-765	A	43	29	43	29	This reference is not listed. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will include.
7-766	A	43	29	43	29	The financial services sector may have a role to play as well in synergies between adaptation and mitigation, see e.g. Mills, E. (2003). The insurance and risk management industries: new players in the delivery of energy-efficient and renewable energy products and services. Energy Policy 31(12), 1257-1272. http://dx.doi.org/10.1016/S0301-4215(02)00186-6 (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will mention the degree to which financial services may influence corporate policy around adaptation and mitigation.
7-767	A	43	29	43	29	Some papers on product development and the use of new tools: Barrieu, P., El Karoui, N. (2002). Reinsuring climatic risk using optimally designed weather bonds. The Geneva Papers on Risk and Insurance Theory 27(2), 87-113.	Will give appropriately balanced coverage around new risk transfer instruments.

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						http://dx.doi.org/10.1023/A:1021944109402; Freeman, P.K. (2001). Hedging natural catastrophe risk in developing countries. The Geneva Papers on Risk and Insurance 26(3), 373-385. http://dx.doi.org/10.1111/1468-0440.00123; Freeman, P.K., Kunreauther, H. (2002). Environmental risk management for developing countries. The Geneva Papers on Risk and Insurance 27(2), 196-214. http://dx.doi.org/10.1111/1468-0440.00164 (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	
7-768	A	43	29	43	29	Options for financing adaptation and disaster losses could be discussed here as well. For example, some papers have linked the financing of disaster risk reduction to the funding of adaptation: Bouwer, L.M., Aerts, J.C.J.H. (in press). Financing climate change adaptation. Disasters 30(1); Bouwer, L.M., Vellinga, P. (2005). Some rationales for risk sharing and financing adaptation. Water Science and Technology 51(5), 89-95. http://www.iwaponline.com/wst/05105/wst051050089.htm; Nutter, F.W. (2002). The role of government in financing catastrophes. The Geneva Papers on Risk and Insurance 27(2), 283-287 (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	The adaptation section relating to insurance will be expanded and some material moved from the earlier insurance discussion.
7-769	A	43	29	43	29	For developing countries, the links between climate adaptation and disaster risk reduction are getting increasing attention: Sperling, F., Szekely, F. (2005). Disaster Risk Management in a Changing Climate. Discussion paper, World Bank, Washington D.C. http://www.climatevarg.org/; Hoff, H., Warner, K., Bouwer, L.M. (2005). The role of financial services in climate adaptation in developing countries. Vierteljahrshefte zur Wirtschaftsforschung 74(2), 196-207; Freeman, P.K., Warner, K. (2001). Vulnerability of infrastructure to climate variability: how does this affect infrastructure lending policies? Provention Consortium, Geneva. http://www.proventionconsortium.org/files/vulnerabilityofinfrastructure.pdf; Bouwer, L.M., Vellinga, P. (2002). Changing climate and increasing costs: implications for liability and insurance. In: Beniston, M. (ed.) Climatic Change: Implications for the Hydrological Cycle and for Water Management. Kluwer, Dordrecht, 429-444. (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will mention, subject to length constraints.
7-770	A	43	29	43	29	Disaster risk reduction can be a good strategy for developed countries as well, see e.g. ABI (2004). Flood resilient homes: what homeowners can do to reduce flood damage. http://www.abi.org.uk/Display/File/Child/553/Flood_Resilient_Homes.pdf (Laurens Bouwer, Institute for Environmental Studies, Vrije Universiteit)	Will mention.
7-771	A	43	29			Malmquist… not in bibliography (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Noted.

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7-772	A	43	34	44	18	Possible changes in climate could need adaptation of power suply systems and structure of energy consumption. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Paragraph edited.
7-773	A	43	34	43	36	Adaptation can also take place by demand management, land use management (like CZM), etc. (Paul Kirshen, Tufts University)	Noted.
7-774	A	43	37			Pl edit….water, sanitation..drainage, transportation (Joyashree Roy, Jadavpur University)	Will consider in editng.
7-775	A	43	39		44	This definition and discussion of resilience should be featured much more prominently and earlier in this chapter. Isn't the point of resilience central to this chapter? Yet it was not emphasized until page 43. (Kevin Vranes, University of Montana)	Will consider.
7-776	A	43	50	43	50	also a strategy is demand management. (Paul Kirshen, Tufts University)	Noted.
7-777	A	44	4			I don't remember reading about British water companies in a previous section (in fact, does Section 7.4.2.3.1 even exist?). (Bruce Tonn, University Of Tennessee)	Will revisit.
7-778	A	44	21			Section 7.6.4: Adaptation practices / strategies specific to tropical/developing cities need to be mentioned. These could be specific to urban form manipulation, reductions to urban fossil-fuel powered transport, urban vegetation enhancement and air pollution mitigation (Rohinton Emmanuel, University of Moratuwa)	Will consider.
7-779	A	44	21			This section may be relevant to Comment No 12 (Hitoshi Hayami, Keio University)	Done.
7-780	A	44	21	45	24	mention may be made of solar pasive/active housing as strategy in human settlement planning which will be cost effective (Joyashree Roy, Jadavpur University)	Done.
7-781	A	44	25			After emissions add : "and industry effluents as well as improving waste handling" (Osvaldo Canziani, IPCC WG2 Co-chair)	Done.
7-782	A	44	35			How are open air festivals relevant to a discussion on climate change? (Kevin Vranes, University of Montana)	Edited.
7-783	A	44	42	45	1	What about water bodies inside urban areas? (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Added/
7-784	A	44	47			After conditioning demands. , the following comment should be added "In this regard the effect of Earth´s warming trend on space cooling requirements suggests the study of comfort rates for different fed and clothed persons or communities of persons. The excessive space cooling observed in certain affluent societies is a	Done.

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						drawback to GHG mitigation". (Osvaldo Canziani, IPCC WG2 Co-chair)	
7-785	A	44	47	44	48	Note that the City of Chicago is extremely active in incorporating urban heat island mitigation techniques such as living roofs into their planning and building codes. These are recent developments over the past two years. Possible reference for the significant amount of work done by Chicago is: Illinois. City of Chicago. 2003. "Chicago Energy Conservation Code, Chapter 18-13." Municipal Code. February 5 revisions; available at the ICLEI website: http://www.hotcities.org/CoolRoofs.html#anchor816449; accessed 25 March 2004. Also, a reference here includes: McPherson, Gregory. 1994. "Cooling Urban Heat Islands with Sustainable Landscapes". In The Ecological City (R.H. Platt, R.A. Rwontree, & P.C. Muick, Eds.). (Amherst: University of Massachusetts Press.) (Joyce Klein Rosenthal, Columbia University)	Accepted, subject to length constraints.
7-786	A	44	50	44	50	Line edit -- add words: "…,the use of vegetation and environmentally sensitive materials…" (NB: reflective, and highly emissive roofing materials form a substantial basis of urban adaptions currently in the U.S.) (Joyce Klein Rosenthal, Columbia University)	Done.
7-787	A	44		45		section 7.6.4 Shouldn't there be more attention for engineering solutions to higher risk (e.g. floating houses to counter flood risk; temporary underground shelters against storm risks) and to early warning institutions? (Ton Dietz, University of Amsterdam)	No references found.
7-788	A	45	3	45	9	The impact of vegetation for reducing of urban heat island was observed also in Warsaw (Poland) by Blazejczyk and Blazejczyk (1999). (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Accepted.
7-789	A	45	3			Add urban thermal property manipulation strategies (albedo enhancement strategies - see, Akbari, H., S. Bretz, D.M. Kurn & J. Hanford, (1997). "Peak power and cooling energy savings of high-albedo roofs," Energy & Buildings, 25(2): 117-126; Shade enhancement - Emmanuel 2005) (Rohinton Emmanuel, University of Moratuwa)	Done.
7-790	A	45	3	45	9	Here only a model are refered, please insert additional references, here the reference is only for Israel (Andreas Matzarakis, Meteorological Institute, University of Freiburg)	Done.
7-791	A	45	10	45	10	Add references and new text. There has been much additional modeling-based research on the cooling effect of reflective pavements and increased urban	Text changed to reflect these comments, sensitive to space limitations.

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						vegetation, especially by Taha for the Los Angeles metropolitan region. For the Los Angeles region, a study projected the effects of increasing citywide albedo levels on mitigating the regional heat island (California's South Coast Air Basin, or SoCAB). Taha et al. measured the effect of increasing albedo surfaces by .15 and a more ambitious .30 in the SoCAB (1997). By increasing the albedo of all possible surfaces by .15, the 3 p.m. air temperatures were decreased by up to 3.6ºF (2ºC), while the surrounding areas decreased by about 1.8ºF (1º C). By increasing the albedo by .30, the temperatures in the central and west basins decreased by up to 4.5ºF (2.5ºC), while the surrounding areas decreased by an average of 3.6ºF (2º C) (Ibid). Increasing urban vegetation levels has also been projected to significantly mitigate the UHI and improve air quality. Taha projected that a moderate increase of tree vegetation by .15 (10 million trees) would result in up to a 3.6ºF (2ºC) reduction in ambient air temperature, while an extreme increase of .30 (20 million trees) simulated a reduction of up to 6.3ºF (3.5ºC) in the west basin and 2.7ºF (1.5ºC) in other areas. More of the study area was projected to experience a decrease in ozone concentrations than an increase, and the largest decrease in ozone concentrations was greater than the largest increase (1996). Taha, H. (1996). Modeling the Impacts of increased Urban Vegetation on Ozone Air Quality in the South Coast Air Basin. Atmospheric Environment, 30(20) 3423-3430. Taha, H., Douglas, S., Haney, J. (1997). Mesoscale meteorological and air quality impacts of increased urban albedo and vegetation. Energy and Buildings, 25(2) 169-177. (Joyce Klein Rosenthal, Columbia University)	
7-792	A	45	14	45	14	Correct name of Rosenzweig ! (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Done.
7-793	A	45	16	45	18	Is this not a social issue (7.6.5)? please add also to section 7.6.5 (Pamela Heck, Swiss Reinsurance Company)	Appears here as a driver of how settlements operate.
7-794	A	45	18	45	18	see comment #4 above - the interactions of impacts and adaptation strategies will also affect institutions. (Paul Kirshen, Tufts University)	Noted.
7-795	A	45	27		29	Social issues need to mention about social classes like marginalised groups in the society (e.g homeless, footpath dwellers, people with less acess to basic needs etc..) and their vulnerability. Secondly high affluence and lifestyle defined by energy intensive technology consumption pattern are indicators of vulnerability.	See 7.4.2.5.

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						Vulnerability indicators maybe used for assessment (Joyashree Roy, Jadavpur University)	
7-796	A	45	27			7.6.5 Social Issues (as related to adaptation). The authors might consider working into this section the issues of risk perception and risk communication. It is known that people often do not correctly perceive low probability, high consequence events. It could also be that communicating to the public about climate change could be particular problematic. Do we need to suffer through a few disasters before people's risk perceptions about climate change match the scientific findings? (Bruce Tonn, University Of Tennessee)	Will consider.
7-797	A	45	47			There is social science concessus that building adaptive capacity is difficult in the context of policy systems (Kim Ritman, Bureau of Rural Sciences)	Already included in the chapter.
7-798	A	46	1	46	50	too detailed (Pamela Heck, Swiss Reinsurance Company)	Edited.
7-799	A	46	6	46	6	Referring to my comments above (comments no. 10-13, concerning p. 13) I suggest to alter the wording (esp. regarding "growing inequalities") (Margareta E. Kulessa, Mainz University of Applied Sciences)	Edited.
7-800	A	46	10			Focus of national governments losing power to lower levels and to the private sector, should be combined with mentioning that national governments at the same time also trasfer power to higher-level agencies and to global public-private partnership arrangements. (Ton Dietz, University of Amsterdam)	Done.
7-801	A	46	12		22	Decentralisation often means that local level minorities are no longer adequately protected and are pushed out. The West African pastoral Peulhs or Fulbes are a clear example, losing access to water and pastures, in the hands of settled agricultural people, who gained local power in the process of decentralisation. (e.g. see Van Dijk, Han, Mirjam de Bruijn, and Wouter van Beek in "Pathways to mitigate climate variability and climate change in Mali", pp. 173-206 of our book.) (Ton Dietz, University of Amsterdam)	Done.
7-802	A	46	12	46	12	theoretically' decentralization is a good thing? Surely it depends on your theory. Why not 'While decentralization is often intended to allow for better decision-making at the local level...' (Gordon McGranahan, International Institute for Environment and Development)	Done.
7-803	A	46	34			Adger, Huq and Mace not in bibliography (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Done.
7-804	A	46	41	41	42	What does it mean to enhance the differentiation of well being? (Gordon McGranahan, International Institute for Environment and Development)	Done.

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7-805	A	46		46		More attention deserves to be given to the fact that certain adaptations would benefit selected groups at the expense of others. (Gordon McGranahan, International Institute for Environment and Development)	Included in the text.
7-806	A	47	0			Outdated references have been used in some cases e.g., p47 Rees 1992 and Tarr 1996 and p46 Bauer 1997. (Claire Hanson, University of East Anglia)	Corrected.
7-807	A	47	1	47	4	As shown by recorded socio-economic disasters, like the Sahelian drought in the 1970s, the adaptation possibilities and resilience, within households, agriculture, etc, the capacity developed by local communities, either in western Africa or in the Andean high plateau, is a matter of the drought´s scale. A substantial amount of bibliography, mainly WMO, FAO and UNESCO, so shows. In Chapter 13 there is a table with extremes showing drought disasters in Latin America. (Osvaldo Canziani, IPCC WG2 Co-chair)	The literature shows that response patterns are much more complex than this.
7-808	A	47	20			There are examples of societies/cultures in less developed countries that have adapted well to climate variability (e.g. through their traditional housing design); stating that economically developed countries have a higher adaptive capacity is probably only true for specific adaptation measures (e.g. those that involve capital and construction of hard structures etc.)? (Susanne Becken, Landcare Research)	Text deleted.
7-809	A	47	20	47	24	"In general, the capacity to adapt to climate change tends to be related to levels of economic development, including economic productvity and access to investment resources. However, other social, economic, political, institutional, environmental and cultural factors can either promote of contrain adaptation." One feels slightly cheated after putting in the time to work out what this sentence is saying, and finding that the answer is very little. (Gordon McGranahan, International Institute for Environment and Development)	Text deleted.
7-810	A	47	36		50	An example of an exception (see above) is that adaptations to reduce vulnerabilities to climate change are place-based and focussed on realities in local areas as they are viewed by local people, whether in an isolated rural area of a developing country or in an urban neighbourhood in an industrialised country (Kim Ritman, Bureau of Rural Sciences)	Will consider.
7-811	A	47	37	47	49	This box is about local knowledge, not indigenous knowledge as implied in the title. (Gordon McGranahan, International Institute for Environment and Development)	Box deleted.
7-812	A	47	38			Box 7.9 Indigenous knowledge for adaptation should be cross-referenced with the Chapter 13 case study on Adaptation of the Altiplano´s indigenous communities to	Box deleted.

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						climate change, having a similar aim. (Osvaldo Canziani, IPCC WG2 Co-chair)	
7-813	A	47	45	47	45	Add reference for local knowledge: Corburn, 2005. Corburn, J., 2005. Street Science: Community Knowledge and Environmental Health Justice. Cambridge, MA:MIT Press, 2005. 256 pp. (Joyce Klein Rosenthal, Columbia University)	Box deleted.
7-814	A	48	1	49	13	The whole section should have a title such as Summary of key issues or something similar (Pamela Heck, Swiss Reinsurance Company)	Added.
7-815	A	48	3	48	4	"costs of adaptation strategies" which must be considered under the cost benefit point of view (Pamela Heck, Swiss Reinsurance Company)	Agreed.
7-816	A	48	7	48	7	is likely or willing to act (Pamela Heck, Swiss Reinsurance Company)	Unnecessary.
7-817	A	48	11			As noted in other places, a key constraint on individual or corporate autonomous action is that the present regulatory framework does not recognize the need for climate change adaptation. Regulations may have to be modified in order to permit adaptation, so until the public and governments accept the need for adaptation, even those who desire to be proactive may be constrained from doing so. (Charles Watson, Kinetic Analysis Corporation)	See the industry section.
7-818	A	48	21	48	21	add: insurance incentives such as considering risk location, protection measures, internal risk management … when calculating the premiums (Pamela Heck, Swiss Reinsurance Company)	Added.
7-819	A	48	23	48	26	Please mention also in this summarizing paragraph dual-use strategies which create "win-win situations (reduction of both present-day vulnerability, and vulnerability to climate variability and change)" (see page 47, l.10-11). In this case adaptation will be most effective, if it reduces both current stresses and potential future impacts. (Pamela Heck, Swiss Reinsurance Company)	A different point being made here; see 7.7.
7-820	A	48	23	48	26	A failure of public action may not be a good example of sub-optimal adaptation, since it could also be interpreted as a lack of adaptation, and the point is that adaptation itself may not be optimal. Also, this seems a rather weak claim, given that one would expect some adaptations to cause more harm than good, and not simply fail to be optimal. (Gordon McGranahan, International Institute for Environment and Development)	Editorial change made.
7-821	A	48	28	49	13	I still find this rather non-specific, despite the statement that it is specific. (Andrew Dlugolecki, university of east anglia)	Lack specific relevant literature.

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7-822	A	48	30	49	13	I would add that the extent of success of adaptation depends in part on to what extent adaptation concerns and measures are mainstreamed into development strategies and individual investmnets. The mainstreaming of disaster risk is currently receiving considerable interest from some IFIs, bilaterals, UN agencies and NGOs. Broadening of these efforts to take on related adaptation needs as well could be highly beneficial. For further information see Benson, C and J Twigg, 2004, "Measuring Mitigation – Methodologies for assessing natural hazard risks and the net benefits of mitigation – a scoping study", ProVention Consortium, Geneva. http://www.proventionconsortium.org/files/measuring_mitigation/Measuring_Mitigation_report.pdf (Charlotte Benson, Independent)	See section 7.7; mitigation is treated by WG III.
7-823	A	48	30			Under bullet 1 the addition of the important role played by the geophysical characteristics of the environment is badly needed (Osvaldo Canziani, IPCC WG2 Co-chair)	Not appropriate here in this context.
7-824	A	48	30	48	33	My hypothesis is that prospects for drastic adaptation only improve after major devastating events with high media coverage, and that moderate, gradual climate change does not produce the levek of urgency to push for break-through institutional change. So I do not at all have Very High Confidence in this first specification! (Ton Dietz, University of Amsterdam)	Change made.
7-825	A	48	30	48	32	The danger could be that during the next decades, the trend is hidden by natural climate variability (see eg cycles of hurricane activity in the Atlantic) and only appears once it has attained a substantial magnitude, and adaptation become very costly or even impossible (eg withdrawal of insurance cover, location wich becomes inhabitable) (Pamela Heck, Swiss Reinsurance Company)	Agreed, but too subtle for here given space limitations.
7-826	A	48	30	49	13	Most of these are such weak conclusions that their high confidence is quite irrelevant. Just read the first one again: "In many cases, prospects for adaptation depend on the magnitude and rate of climate change: adaptation is often more feasible when climate change is moderate and gradual than when it is massive and/or abrupt". (Gordon McGranahan, International Institute for Environment and Development)	We believe this is an important point, not widely appreciated.
7-827	A	48	34	48	38	In general probably true, but not very instructive and missing the point that adaptation strategies are much closer connected to specific local conditions than mitigation strategies. (Tom Kram, MNP-RIVM)	Not clear how to respond.

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7-828	A	48	37	48	38	As I have said before, increased specialism does not necessarily imply reduced resilience. (Charlotte Benson, Independent)	Change made.
7-829	A	48	37			Under bullet 2, regarding the expansion of the globalised economy, the issues involved "would become" instead of "is becoming" (Osvaldo Canziani, IPCC WG2 Co-chair)	Already happening.
7-830	A	48	38			same as comment n0 2 (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Unclear.
7-831	A	48	40			Under bullet 3, what does it mean human agency? Maybe the intention is to say , which shape potential for social groups. (Osvaldo Canziani, IPCC WG2 Co-chair)	Changed.
7-832	A	48	40	48	43	Similar as #15: what do we learn from such general notions? How, why and in what respect are they different? Local control can be superior in addressing specific conditions, but may lack financial resources and/or institutional skills available elsewhere. (Tom Kram, MNP-RIVM)	The point is still valid.
7-833	A	49	2			Under bullet 5 , as already pointed out in other segments of this chapter, R&D is not the only answer, very particularly in developing regions where the lack of basic geophysical, biological and socio-economic data is the critical shortcoming. Therefore it is recommended to also address this issue. (Osvaldo Canziani, IPCC WG2 Co-chair)	Section 7.8.
7-834	A	49	11	49	15	It is assumed that the intention behind this paragraph is to highlight the value of "response policies". Therefore areas and sectors heavily dependent on fossil fuels would need to adapt their operation by reducing fossil fuel consumption, and invest in technological development, etc. If this is the correct aim, instead of "are specially vulnerable" It would be more straightforward to say : "would be affected economically, because they should modify their energy use patterns, a form of adaptation requiring assistance with capacity building, technological development and financing". (Osvaldo Canziani, IPCC WG2 Co-chair)	Cannot underestand what this refers to.
7-835	A	49	16	50	16	Could be improved by removing some of the more obvious statements. (Gordon McGranahan, International Institute for Environment and Development)	What is opvouw to some experts is not necessarily obvous to policymakers!
7-836	A	49	16	50	16	sutainabledevelopment may be discussed to refrerence to select indicators, Human settlement refres to urban settlements only . Rural settlement needs to be mentioned. While talking of climate sensitive development planning as adaptation strategy use of vulnerability zone mapping needs mention. Ecotourism service needs special mention in assesment of vulnerability and adaptation.	Comment unclear.

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						(Joyashree Roy, Jadavpur University)	
7-837	A	49	18			In view of the accepted sustainability concept, after well-being, it should be added : "at present and for the future generations." (Osvaldo Canziani, IPCC WG2 Co-chair)	Not considered essentiële.
7-838	A	49	18	49	19	...people, their well-being and equity. In other words, sustainable development is not only about nature-society imbalances but also about society's inbalances as indicated on l.43-45 (Philippe Crabbé, Institute of the Environment, University of Ottawa)	Noted.
7-839	A	49	18	49	18	Should also be noted some where that some adaptation actions, such as increased floodplain zoning, are beneficial even if no climate change. (Paul Kirshen, Tufts University)	Noted.
7-840	A	49	28			A good example of the focus on vulnerabilities (see above) is that threats to sustainability are to vulnerable localities in developing countries, or to low-probability but high-consequence climate change. (Kim Ritman, Bureau of Rural Sciences)	Will consider.
7-841	A	49	29			The recent events have made evident that climate change threats are also affecting vulnerable areas in developed countries. In consequence, this sentence should be redrafted. (Osvaldo Canziani, IPCC WG2 Co-chair)	Change made.
7-842	A	49	32			Do not use semi-arid regions, but drylands (which include the sub-humid regions). Sub-humid areas are less victims of severe drought, but if it happens people there are often far less prepared than those in semi-arid areas, and hence more vulnerable. (Ton Dietz, University of Amsterdam)	Change made.
7-843	A	49	36			On the same line of comment, after "to" and before "changes", it is suggested to add "gradual, non-abrupt". Replace"can" by "would" (Osvaldo Canziani, IPCC WG2 Co-chair)	Will consider.
7-844	A	49	46			Comparative advantage (also known as competitive advantage?): this has been mentioned at several occassions in the text before; is it possible to shorten this and focus the discussion in one single section? (Susanne Becken, Landcare Research)	It needs to be mentioned in several places.
7-845	A	50	11	50	16	increase the renewable share of energy in the energy supply (Michel Paillard, IFREMER)	Implied.
7-846	A	50	11		13	This sentence and the ideas behind it should feature more prominently in this chapter. (Kevin Vranes, University of Montana)	Thank you.
7-847	A	50	19			Section 7.8 Key uncertainties and research priorities: The feedback mechanism	UHI is not a major impact issue, compared

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						between UHI effect and global climate change needs to be included as a research prioritiy. Additionally, research on the effect of climate change (and urban health effects) in tropical urban settlements needs to be encouraged (Rohinton Emmanuel, University of Moratuwa)	with others. The tropical area issue is covered in the relevant regional chapters.
7-848	A	50	19			Developing the monitoring system for flood and water level of lake, river and sea is necessary to estimate the damage, vulnerabilities and its timming of increase of rain falls or sea level. As to economic cost, the price of weather derivative and insurance fee are worth to estimate the market value. (Hitoshi Hayami, Keio University)	Point added about data needs.
7-849	A	50	19	51		Section 7.8, needs a revision, improve structure, readability (Pamela Heck, Swiss Reinsurance Company)	Will consider.
7-850	A	50	19	51	9	Study on history of loss of civilisation and role of environmental factors needs special mention. Human settlemnet planning and development strategy must integrate rural and urban human settlements. This can be a future research agenda. (Joyashree Roy, Jadavpur University)	Too broad for here.
7-851	A	50	21			"…research on …adaptation potentials… has lagged behind". Actually there is a large body of work that has been going on for several decades related to urban heat island mitigation. It would seem that this is directly relevant to the point of adaptation potential, yet it is not addressed within this chapter. (David Sailor, Portland State University)	UHI covered in earlier settlement sections.
7-852	A	50	23	50	25	"uncertainties about climate change impacts" but also uncertainties about trends in human systems regardless of climate change (Pamela Heck, Swiss Reinsurance Company)	Considered.
7-853	A	50	36	50	38	I do not agree with this conclusion that abrupt change is the main worry for industrailized nations.firstly, Summer 2003, and Katrina, have shown there already are big problems for rich countries NOW, before adding more climate change. Second, the indirect effects of change disrupting developing/industrialising countries is a huge threat eg migration, disease, loss of production facilities at the start of the supply chain(increasingly based in those countries). (Andrew Dlugolecki, university of east anglia)	We disagree.
7-854	A	50	43	50	46	Using jargon like 'multiple stress contexts' and 'climate-sensitive thresholds for components of sustainable development paths" is not appropriate when identifying research priorities. Also, it would be very nice if clearer research recommendations could be obtained. (Gordon McGranahan, International Institute for Environment and Development)	Space limitaitos tend to reduce degrees of freedom here.
7-855	A	50	50			One research question re:insurance is the threshold at which climate events become no longer insurable because the risks can no longer be redistributred!	Too specific.

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						(Philippe Crabbé, Institute of the Environment, University of Ottawa)	
7-856	A	51	1			There is agreement that quality social research is needed in multilocational relationships to climate change, adaptation and migration. (Kim Ritman, Bureau of Rural Sciences)	Yes.
7-857	A	51	9			As reiterated in many instances, research priorities cry for data. Therefore, alongside the ideas already expressed, this section 7.8 should include such a requirement with emphasis on the data vacuum existing mostly in developing regions. (Osvaldo Canziani, IPCC WG2 Co-chair)	Added.
7-858	A	52	0	61		well referenced (Kim Ritman, Bureau of Rural Sciences)	Thank you.
7-859	A	52	0			A number of references are lacking detail (make sure these are all filled in). (David Sailor, Portland State University)	Addressed.
7-860	A	52	47	61	13	Several references must be completed. See: page 52 lines13, 47, 48; p. 53. L. 15, 38, 39; p.55 l. 46, 49, 50; p.57 l.14; p.58 l.16; p.59 l.30, 45; p.60 l.10,22,49; p.61 l.7 (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Addressed.
7-861	A	52	47	61	13	Additional references are needed: - Blazejczyk K., 2003, Weather fluctuations and tourism in Poland. [in:] B. Amelung, J. Rotmans, K.Błażejczyk, D. Viner, A. Matzarakis (eds.), Climate change and tourism, Proceedings NATO Advanced Workshop, Warsaw, 6-8 Nov. 2003, CD-ROM, pages. - Blazejczyk K., Blazejczyk A., 1999, Influence of urbanisation level on the heat load in man in Warsaw. [in:] R.J. de Dear, J.C. Potter (eds.), Proc. 15th Int.Congress of Biometeorology & Int. Conf. On Urban Climatology, Sydney, Australia 8-12 Nov. 1999, Macquire University, Sydney, Australia, (CD-ROM), pages. - Blazejczyk K., Twardosz R. 2002, La variabilité des charges thermiques de l'homme à Cracovie au XXe siecle. Publications de l'Association Internationale de Climatologie, 14, p. 413-419. - Twardosz R., 1996, La variabilité des précipitations atmosphériques en Europe Centrale pendant la période 1850-1995. Publications de l'Association Internationale de Climatologie, 9, p. 520-527. (Krzysztof Blazejczyk, Institute of Geography and Spatial Organization)	Addressed where cited in chapter.
7-862	A	55	50	55	50	Kainuma (Toshiaki Ichinose, National Institute for Environmental Studies)	Addressed.
7-863	A	56	3	56	4	citation is incomplete. Shld be: Kirshen, P.H., Potential Impacts of Climate Change on Groundwater in Eastern Massachusetts: A Case Study of the Upper Charles	Addressed.

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						River Basin, Journal of Water Resources Planning and Management, 128(3), pages 216-226, May/June 2002. (Paul Kirshen, Tufts University)	