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

Government and Expert Review of Second Order Draft

Specific Comments

EXPERT REVIEW COMMENTS

Chapter 12

August 2006

Organization of the review comments file

Comments are organized as follows:

(a) First are the comments from the Co-Chairs and TSU. These:
  (i) track the development of the ZOD and FOD, and your responses to review comments on each of these drafts, and then
  (ii) present comments on the Second-Order Draft

(b) Second are the comments from the Expert Reviewers, organized in the same format as your FOD comments file.

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 AUGUST

Substantive comments

- The chapter writing team should discuss all substantive expert review comments, by email and/or at Cape Town.
- 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 should be kept in this document, ideally electronically.
- 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 **8th December 2006**.

Chapter 12:

Comments from the Co-Chairs/TSU are laid out as follows: first we comment on whether the SOD addresses the comments we made on the ZOD; second we comment on whether the SOD addresses the comments we made on the FOD; our concluding comments on the Second-Order Draft are at the end

	Chapter 12 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
12.Z1	The ZOD is too long, by around 25 text pages.	Now shortened – see below	OK.
12.Z2	Overall, the ZOD is generally a successful attempt. It is well written and reasonably comprehensive up to and including Section 12.4. However, it tails off in the later sections. There are many missing parts of Section 12.5, and Sections 12.7 and 12.8 are minimal.	All sections complete	OK
12.Z3	The core section on impacts, Section 12.4, starts on page 9 and covers around 20 pages. This is about right - we estimate that Section 4 in all chapters should take around half of the pages. However, within Section 12.4 the balance is uneven, with too much emphasis on material which is oriented towards WGI interests, and with some sections which are far too long. For example, much of the section on Marine could be omitted as being more WGI, and this is also true for 12.4.4 (Mountains and Subarctic Regions). Sections 12.4.2 (Coasts) and 12.4.5 (Forests) are very long, and could be substantially cut.	12.4 now takes up 12 pages (about a third of the total chapter). Text is much tighter and sections much shorter.	OK
12.Z4	If the authors are to achieve the right balance, and stay within their page length, they need to think hard about prioritization and key messages. There is no space for extraneous material. They need to identify the key messages they want to get across in AR4, work out an allocation of pages to the various sections in order to get these key messages across, and work to this plan. These key messages could usefully be related back to the TAR: what conclusions from the TAR still stand, which are no longer valid, what new conclusions can be drawn.	This has been done. The key messages in the ES are all addressed in the text and the overall length of the document is very close to the target. There are only two places where it is mentioned whether the conclusions of AR4 either support/contradict, findings from TAR or are new since TAR. This is p5 line 40 (one sentence) and p6 line 7	OK More attention will be paid in FGD, and more specific mentioning to TAR will be made
12.Z5	The division between Section 4 (impacts) and Section 5 (adaptation) works well in agriculture (which is well-handled in general) but in energy there is too much overlap and confusion between the impact and adaptation sections	No overlap between the two sections.	OK
12.Z6	The authors need to think about the use of tables and figures to summarize information, and to make their message more accessible – the text is somewhat unrelenting at present. This is done rather successfully in the unnumbered table in Section 12.4.5. Authors might	Done (see below – 12.F5)	OK

	consider constructing updated tables to compare with the summary tables of impacts from the TAR: these are Table 13.8 on crop yield effects; Table 13.2 on water; and also Table 13.5 on SLR impacts.		
12.Z7	The case studies are reviews of events – however, in order to be relevant to the AR4, their implications for the future need to be identified and spelled out for the reader	Heat wave is better but it still fails to spell out the future implications	We will look at it and clear referencing made
12.Z8	Can the authors include a short section on the weakening of the thermohaline circulation, and its possible impacts on Europe? Are there other 'surprises' which could be considered?	12.6.2 addresses the possibility of an abrupt change in the THC but not a weakening	The objective was specifically to consider abrupt change, not weakening
12.Z9	You should include assessment of literature, where available, of impacts under: a) stabilisation scenarios ; and b) different development pathways (e.g. SRES scenarios)	SRES covered, stabilization not	Some scenarios used could be considered as surrogate of stabilization and these are taken into account. A mention to this will be made.
12.Z10	Can the authors be clearer about the timeframe of projected effects: e.g. 2020s, 2050s and 2080s? We have set out a timeslice framework in Blue Book Doc 6 – could Chapter 12 use this?	Done	OK
12.Z11	Are there detectable thresholds of projected impacts (which could contribute to Chapter 19)?	Not covered	There is insufficient knowledge to support thresholds at this time
12.Z12	How do effects of climate change interact (e.g. reinforce or buffer) other environmental and development trends (i.e. consider climate change as one of a number of multiple stresses)	Some mention of other stresses such as land use	It is done. At page 20 from line 6 to 11 the role of other trends (i.e. technology) is considered together climate change.
	Chapter 12 FOD comments by Co-Chairs and TSU	**Has this been addressed in the SOD?**	**Author response**
12.F1	Length: this chapter is overlength by 3-4 pages, which isn't bad. A little careful editing should bring it in at the right length.	Length is now much closer to the target (see below – see 12.S1)	OK
12.F2	The new Nature paper on the thermohaline circulation will be of interest to this chapter: Bryden et al., Nature 438 p. 655.	This paper is not cited	The new reference will be considered
12.F3	The FOD for Chapter 12 is a considerable improvement over the ZOD. Most of the material is here - it isn't necessarily displayed to the best advanatge and the authors would do well to think about the organization of their material.	Still think this applies. Material is there just needs to be better presented.	We will consider to include addition art-work, if space avails
12.F4	Contributing Authors: There are 6 CAs, which is a small number. Moreover, it's clear that they haven't been picked to fill regional gaps - rather they tend to come from the same countries as the Lead Authors. The authors need to	The number of CAs has doubled. Northern and Central/Eastern Europe still aren't represented	A new CA will be added from East Europe

	increase the number of CAs, and use this opportunity to ensure they have adequate regional representation and input. Very obvious gaps include northern Europe (Finland, Sweden and Norway) and central/eastern Europe - Poland, Czech Republic, Slovakia, Austria etc.		
12.F5	Some summarizing/synthesising tables and figures could be added. Good examples are Ch 4 Table 4.5 (impacts for increments of global temperature change) and Ch 11 Table 11.11 (Impacts at future timeslices under different SRES scenarios). If Chapter 12 could do something like this, it would be great material for the SPM/TS, and would give the chapter much more punch. For examples of the kind of figures we are looking for, I would refer you to Chapter 4 Fig. 4.9 (map of global impacts for three different temperature changes) and 4.10. Fig 4.10 is a sectoral burning embers diagram, but could be easily adapted for the regional case.	Ch12 has taken this on board and have produced a good summary figure (12.1) and table (12.7)	OK
	Chapter 12 SOD comments by Co-Chairs and TSU		**Author response**
12.S1	**LENGTH:**	32 pages long (31 target)	
12.S2	**ARE PAO HEADINGS PRESENT?**	Please make your subheading titles exactly same as those of the PAO (as other chapters have done), to enable readers to cross over easily between chapters. This would only need minor changes to what you have now.	Agreed. Will be done
12.S3	**HAVE MOST GENERAL COMMENTS OF ERs FROM ZOD AND FOD BEEN COVERED?** [square brackets and highlighted text gives indication of SOD response to ZOD and FOD reviews]	1) use of 2020s, 2050s and 2080s to summarise impacts [greatest attention is paid to the 2080s – only one summary table 12.2 with the three time slices] 2) too much WG1 in ES [now addressed] 3) too many references for non-European studies [has been addressed] 4) not the right balance across the region – ZOD too much E&C, not enough S; FOD not enough E&C. [SOD = better balance]	More is also in the text OK OK We are aware of this but we can only review the existing literature. Additional references will be included as they are available
12.S4	**ARE REFERENCES BROADLY COMPLETE?**	On the whole the references are complete. There are however 15 cases of missing or incorrectly referenced citations. These are specified in the excel review file. In a couple of cases a paper has been	References will be checked ALL, PLEASE CHECK YOUR REFERENCES CAREFULLY Checking has been done

		cited which doesn't support the statement it's attached to. Examples are given in the excel spreadsheet.	
12.S5	**IS THERE LINE-OF-SIGHT TEXT ➔ ES AND TEXT+ES ➔ TS+SPM?**	Yes, good line of sight in pretty much all cases. Only two minor exceptions where material is present but is sourced incorrectly in the ES which is then incorrectly sourced in the TS.	Will be checked again for consistency
12.S6	Could do with some polishing of the English. Not consistent re: American/English English – should all be English English and some reorganisation of sentences could save space and remove the list-like nature of some paragraphs.		Will be done (Joe Alcamo will take care of it)
12.S7	References need completing (see excel file for specifics)		OK. Will be done
12.S8	The section on transport is very short 12.4.8.2 and reads like a list. Transport and adaptation is vague p28 ln5-10		Section will be reworked
12.S9	Wetlands 12.5.5 includes no references		References will be entered
12.S10	Figure 12.1 and Table 12.7 provide good summary information		OK
12.S11	Need to more clearly state what's new since the TAR and what has been supported/confirmed in the TAR		Addressed above
12.S12	Table 12.3 could benefit from the inclusion of current numbers and area at risk from flooding		Information about this will included in the text
12.S13	**IN SUMMARY WE RECOMMEND TO THE AUTHORS**: • Please follow PAO headings exactly • More discussion of impacts for 2020s and 2050s, where literature allows • Assess literature relating to impacts under stabilisation, where this exists • References: need to be carefully checked. Some sections have no references e.g., 12.5.5 • Transport section 12.4.8.2 is weak • Need to emphasise new/reaffirmed conclusions since TAR		Section reworked

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-12-1	A	0				Compared to the previous version that I reviewed this version is a huge step forward. However, a general commet that is difficult to nail down to a specific piece of text is that I get a feeling that the presentation is not quite well balanced and to some extent exaggerates the negative and/or worst case situations. The projected impacts are certainly serious enough even without being spiced up, and the scrutiny the text will go trough once published will be the most severe one can think of. So, to my mind it is essential that the text undergoes a very careful scrutiny to remove such tendencied. This general feeling comes from three (four) specific sources: 1. There is a tendency to focus on the negative side of things (warmer temperatures will in the north have several positive effects, overall increasing precipitation in the north will have several positive effect), etc. 2. At many places in the text I read "...up to XXX billon $...", "...as much as YY deg C..." or "...as many as ZZ people..." etc. etc. This is not a prudent approach because it tells nothing about whether this number is in fact just one single extreme (outlier) or a more reasonable number on the high side. I do understand that it is a difficult balance between being unspecific (not mentioning numbers at all), just giving a mean/median (that may not convey much weight), and spend far too much space on listing several numbers (minimum,mean,median,percentiles, maximum). However this needs to carefully thought through (and coordinated with the other chapter authors and possibly even the other WGs) and then expressed clearly (text box?) 3. Some important model limitations that have been recently identified/discussed (and currently are being improved) that may to some extent play down some of projected impacts are not mentioned (Problems with soil moisture that affects daytime max temperature, recirculation of water and thus precipitation and summer drought. Wind simulations over land that affect storms etc. 4. There is not a stringent handling of the different levels of confidence (see my comment on one of the Executive Summary points (Ch.12, p.3, line 34-47) (Lars Bärring, Lund University)	This reflects reality and need to be espelled out Agreed. Text will be corrected This is WG1 material. In any case, we can revise impacts literature based on what is available, which will lag behind climate developments. OK. This is now taken into account
E-12-2	A	0				Very good text - I have very few recommendations (Andrei Kirilenko, University of North Dakota)	OK
E-12-3	A	0				Tourism is substantially dealt with in CH 1,4,6,7,91112,13,14,16 . This is a significant change compared to TAR. Overall this is done in a satisfactory manner , in particular since the regional chapters do focus on regional issues without losing space on general aspects. What is missing though, is a critical assessment of the literature quoted (even though this literature is peer reviewed), not an individual	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						assessment of papers but a critical overview of the mainstreams of methods that have been used these last years (though it must be recognised that these works have shed some light on what is a very important issue). This concerns both qualitative and speculative approaches and quantitative research. As regards the former, these confront current tourism behaviour and requirements regarding climate to the futures envisaged by scenarios. What is the degree of reliability of this kind of work knowing that the expectations of tourists regarding climates can evolve significantly, as they already have done in the past? There is at least a need for research to explore the range of possible evolutions in behaviours and introduce that into the analyses. Also, to what extent are econometric analyses concerning modifications in tourist flows (the more seducing as they yield figures…) robust and reliable? Is it, for example, acceptable to use a unique climate for the US as it is done in a paper quoted in several chapters? If it is, the coarseness of the results should be mentioned. In short, I believe that there should be in some place in the report, a caveat on the difficulties research on this topic encounters (uncertainties on future behaviours, shortcomings regarding statistics etc.) and their consequences on the results. (Jean-Paul Ceron, CRIDEAU (Université de Limoges-CNRS-INRA))	OK. A mentioned will be added in research gaps and priorities
E-12-4	A	0				This is now a good concise chapter - all my substantial comments on the ZOD have been addressed. (Paula Harrison, University of Oxford)	OK
E-12-5	A	0				This chapter has improved significantly since the FOD; omissions such as fisheries have now been rectified and the chapter now reads as a single document rather than a collection of contributions. However, the chapter still feels overly wordy (it is still a few pages over the allocated budget), a problem that could be easily rectified by the inclusion of a few more figures. The chapter also needs to be scrutinized by an English language editor as many grammatical errors remain. References also need to be polished and duplicates removed. (Matthew Livermore, University of East Anglia)	OK. Will be done by Joe Alcamo
E-12-6	A	0				There is a lot of work on the effects of climate change on biodiversity in North America but little is presented here. (Lara Hansen, WWF)	That is correct. This refers only to Europe
E-12-7	A	0				There are two sections that discuss changes in the Atlantic thermohaline circulation/MOC: one in Ch 12 and one in Ch 19. I don't think they are fully consistent with each other, and neither is fully consistent with what WGI says on the topic. Given that the impacts of MOC change extend well beyond Europe (e.g. big impact on tropical precip) I would suggest the material is consolidated in Ch 19 -	Will be checked

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						with possible improvement in usability and overall saving of space. I have made specific comments on the sections in both chapters, which I hope will be helpful wherever the material ends up. (Richard Wood, Hadley Centre)	
E-12-8	A	0				The Second-order Draft of the Chapter 12 is well improved as compared with the First-order Draft. Authors have done a good job extracting additional material on climate change in Europe and its influence on ecosystems, sectors and human health from published scientific literature. However, material in the Chapter is geographicaly unbalanced, Some publications analysed mean by Europe EU!5, or Western Europe, or Western and Central Europe. Europe in the head of the Chapter 12 is geograpical Europe. Eastern part of Europe got less attention. There are a lot of relevant publications authors may want to analyse and to include into the Chapter to equalize its content. Some of them are indicated in specific comments to the Sections. (Gregory Insarov, Institute of Global Climate and Ecology)	OK. If references are available and appropriate will be considered. Thanks.
E-12-9	A	0				The overview of impacts and vulnerability in the ecosystems and socioeconomy, as well as adaptative strategies is easy to read, and in general informative and clear. But in respect to marine ecosystems, fisheries and aquaculture the information is less developed. Two could be the reasons: first, less information about potential impacts exists in the literature; second, the economy related to marine resources is lower, and for that less interest is devoted to this aspect or, alternatively, a combination of both. But some countries have made some efforts to have a diagnosis of the potential impacts, and the possible adaptative responses to it. Is the case of Spain, which has a book from 2005 (Reference: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, 820 pp) with a specific chapter related to Impacts on Marie Ecosystems and the Fisheries Sector. This topic is very important for Spain, because many resources are obtained from the sea (fisheries, aquaculture, and recreation). As co-author of this chapter I suggest the introduction this reference on points related with sea. Reference: Anadón R, Duarte CM, Fariña C (2005) Impactos sobre los Ecosistemas Marinos y el Sector Pesquero. In: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, p 147-182 (Ricardo Anadon, Universidad de Oviedo)	References added
E-12-10	A	0				The chapter concerning Europe is exhaustive and well documented. In particular very rich is the bibliography, that is based on recent or very recent works. Only recommendation is to carry out with care the editing work because in the references	References will be checked

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						many titles cited in the report are not quoted and vice versa. (Michele Colacino, ISAC-CNR)	
E-12-11	A	0				Substantial improvement compared to previous draft! -- I don't know what's the policy, but I wondered whether there should be any 'advocay type' of formulations, e.g. " plans … urgently need to be developed". Or whether the AR should restrict itself to stating facts and actions (or the lack thereof) ... The use of "should be"s and "need to be"s should be carefully scrutinized throughout the Chapter. -- The citation of so many references (almost half of the Chapter!) in the text reduce its readability -- but I am aware that they have to be there (somewhere) ... (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	We will look up the text to avoid policy prescriptive statements
E-12-12	A	0				PLEASE BE MORE SCIENTIFIC AND ADD THE LAST CAUSES OF THE CLIMATIC CHANGE AND LOSS OF BIODIVERSITY: GEOLOGICAL EVIDENCE FROM THE ERAS, INCREASING OF THE HUMAN POPULATION, AND INCREASING OF THE LIFE STANDARD. IF THESE TWO LAST FACTORS DO NOT STOP, THERE IS NOT SOLUTION!!! (Juan F. Gallardo Lancho, CSIC)	Please, read the other chapters. We disagree with the views expressed here.
E-12-13	A	0				Most of my previous comments were addressed (Alexander Golub, Environmental Defense)	OK
E-12-14	A	0				In general this is a very good chapter and I have only a few comments. One issue that I think needs to be mentioned more is immigration and emigration. European history has many examples of how the effects of climate and economic factors have changed European demography. One possible effect of CC could be the net movement of people towards northern Europe and also the immigration of non-Europeans from more southerly countries such as those in northern Africa. This leads to consideration of whether European governments will see this as positive or negative - ie a solution to declining and ageing European population or an immigrant 'problem'. Perhaps a section on 'political and social adaptation' is needed in 12.5. the chapter needs a proof editor to correct spelling and grammar in several places. Note that 'de Witt' in the refs should be 'de Wit* and that 'Lavorell' should be 'Lavorel'. (John Porter, The Royal Veterinary and Agricultural University)	A mention to this will be made in the population section, acknowledging the fact that population in Europe is changing due to inmigration but acknowledging that no specif study is availabe to know whether climate change will affect this. Unfortunately there is no rrom for any other subsection OK. Will be checked
E-12-15	A	0				I suggest introducing an Appendix with the abbreviations, useful for no-specialists. Otherwise please give the definitions where the abbreviation is used first time. For instance, the abbreviation NPP is used first at page 3 line 31, but its definition is given at page 16, line 47. (Ileana Mares, Romanian Academy of Technical Sciences)	Yes. There will be a glossary

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E-12-16	A	0				Given my expertise I have focused on the sections on natural and managed ecosystems (Pam Berry, University of Oxford)	OK
E-12-17	A	0				For European mountains, there should be a clear reference to the listing in TAR of sensitive vegetation types (TAR WGII p. 661) as this list is now the backbone in ongoing research efforts on climate change impacts at the ecosystem level. (Ulf Molau, Göteborg University)	The listing in TAR page 661 concerns only the Scandes and is too specific to be included, because of the length reduction for the chapter.
E-12-18	A	0				Chapter is much improved on previous draft. Now well balanced, e.g., between different impact sectors and in terms of impacts/adaptation. Good summary tables. (Clare Goodess, University of East Anglia)	OK
E-12-19	A	0				As a further resource to speak about non-cliamtic trends I suggest the following paper: Metzger, M. J., M. D. A. Rounsevell, L. Acosta-Michlik, R. Leemans, and D. Schröter. 2006. The vulnerability of ecosystem services to land use change. Agriculture, Ecosystems and Environment 114, 64-85. There is also a case study of cliamet change impacts in Germany which may provide additional useful material, 2 references: (1) Zebisch, M., T. Grothmann, D. Schröter, C. Haße, U. Fritsch, W. Cramer 2005. Climate Change in Germany – Vulnerability and Adaptation of climate sensitive Sectors (Klimawandel in Deutschland – Vulnerabilität und Anpassungsstrategien klimasensitiver Systeme). Report commissioned by the Federal Environmental Agency, Germany (UFOPLAN 201 41 253), Potsdam Institute of Climate Impact Research, Potsdam, Germany, pp. 205. (2) Schröter, D., M. Zebisch and T. Grothmann 2006: Climate Change in Germany—Vulnerability and Adaptation of Climate-Sensitive Sectors. Contribution to the Klimastatusbericht 2005 (Report on the State of the Climate 2005), Deutscher Wetterdienst (German Meteorological Service), Offenbach, Germany, http://www.ksb.dwd.de, p. 44-56. (Dagmar Schroeter, Potsdam Institute for Climate Impact Research)	It will be considered
E-12-20	A	0				9. Climate change is likely to magnify regional differences within Europe in natural resources. As the precedent item, I think that other economical and social factors have more influence in solving or aggravating the inter-regional differences. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-21	A	0				8. Climate change will pose challenges to many economic sectors. I don not believe that. Probably the main factor to alter the European economy will be the shortage of energy, linked to the shortage of clean water in the Mediterranean area, aggrieved if	Please, be more specific and support your opinion with the available literature

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						the population, living there all the year or some seasons (summer time) will be increasing. An economical crack can down the economy of these Mediterranean shores if the temporal-living people can not maintain their summerhouses. I do not see any relationship between climatic change and macro-economy. (Juan F. Gallardo Lancho, CSIC)	
E-12-22	A	0				7. European bio-diversity will be severely threatened. Not by the climatic change. The cause is essentially the increase of population. Each new man on the Earth needs energy that is stolen to another species. A more rich country (e. g., Greece) need more energy to be stolen to other species, aggrieved if the number inhabitants follows increasing because need more food and fibber to be cultivated. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-23	A	0				6. The persistence and nature of some major European ecosystems is seriously endangered. Not by the climatic change. The cause is essentially the increase of population. Each new man on the Earth needs energy that is stolen to another species. A more rich country (e. g., Greece) need more energy to be stolen to the Nature, aggrieved if the number inhabitants follows increasing. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-24	A	0				5. Climate-related natural hazards will increase throughout Europe. I do not believe that. Today we have more protection about natural hazards than in the past; volcanic eruption or river overflows are unpredictable in all climates, but we have better information systems to avoid big human disasters. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-25	A	0				4. Overall European food and fibber production is not expected to be altered by climatic change. Of course…, but probably due to an international open market. The agricultural production is turning to the under-developed countries. I do not see any relationship with climatic change. Forest production will change in function of the climatic-change direction. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-26	A	0				3. Water stress will increase. Obviously. Increasing of comfort and number of inhabitants increase the water shortage. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-27	A	0				2. The climatic of Europe will continue changing. Obviously. During the Geological Era was changing. In the Quaternary, even in the Holocene the climate is permanently changing…. Are the scientists sure in what direction to…? (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-28	A	0				10. Current thinking about adaptation to extreme climate events has moved away from reactive disaster relief. But are you truly sure in the direction of the climatic	Please, be more specific and support your opinion with the available literature

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						change…? Do you have scientific basis to affirm toward what direction will go the future European climate…? Be serious, please. (Juan F. Gallardo Lancho, CSIC)	
E-12-29	A	0				1. TAR has advanced the understanding of the potential impacts: Probably…, at least has ordered the different items concerning the climatic change. But TAR does not inform the causes and without the knowledge it is impossible to correct nothing. (Juan F. Gallardo Lancho, CSIC)	Please, be more specific and support your opinion with the available literature
E-12-30	A	1	1			In several places the language is poor and ordinary spell/grammar checks should be applied as a first measure to improve it. (Erik Kjellström, SMHI)	OK. Text will be revised by Joe Alcamo
E-12-31	A	1	1			A general comment on the whole chapter is that it often cites works that rely on single scenarios. Somewhere in the beginning there should be a general discussion about this shortcoming (citing exact numbers without any uncertainty ranges). Different sets of scenarios should be mentioned (TAR-based, AR4-based, others?). (Erik Kjellström, SMHI)	In general, this is not true. Most studies these days use multiple scenarios and ranges are given. When single studies are avaialabe, in general, cualitative statements are offered. We will review this.
E-12-32	A	1	15	1	15	The country is missing from L. Phil Graham. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Thanks!
E-12-33	A	3	1			Some bulets in the Executive Summary which claim to describe situation in Europe as a whole, actually describe situation in part of Europe judging by Chapter Sections. Eastern Europe is underepresented, see comments 1 and 2 please. Authors may want to add literature and its analysis, or edit bulets. The same is true about Table 12.7. (Gregory Insarov, Institute of Global Climate and Ecology)	We used the available literature from the eastern countries as much as possible and try to take into account their reality
E-12-34	A	3	1			COMMENT: A section on impacts on the alpine and other mountain regions could be added to the ES. In some ways this is locus of many impacts. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	We have revised the Executive summary and have tried to incorporate all sections as much as possible given the space constraitns
E-12-35	A	3	7	3	14	This paragraph is not logically written. It treats future changes but includes a statement about recent observations "A warming grend …". This statement should be moved to the end of the paragraph with a comment like " … similar to the scenario results". (Erik Kjellström, SMHI)	We have revised the Executive summary and have tried to incorporate all sections as much as possible given the space constraitns
E-12-36	A	3	7	3	14	It would be useful to add examples of projected changes in extremes eg drought, heatwaves, extreme precipitation to give context to the examples discussed later in the Ex Summ (William Hare, Potsdam Institute for Climate Impact Research (PIK))	We have revised the Executive summary and have tried to incorporate all sections as much as possible given the space constraitns
E-12-	A	3	16			reword - suggestion - water stress, and thus the number of people living in stressed	OK.

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37						river basins, will increase (Clair Hanson, IPCC TSU)	
E-12-38	A	3	19		19	"…may be reduced by 80% or more…" - this doesn't tell me anything. Please be more specific. Also, here and in other places - please specify the reference time frame. I guess, it should be 1961-1990 climate, but it should be stated explicitly. Finally, please use the IPCC scale for uncertainty level; "may be" is not in this scale. (Andrei Kirilenko, University of North Dakota)	We have revised the Executive summary
E-12-39	A	3	23			may as well use SE for southeastern - this applies to the whole chapter (Clair Hanson, IPCC TSU)	OK.
E-12-40	A	3	25	3	25	The scope to expand north is not there, due to poor soils and existing land-use (forestry), etc; while plant-breeding seems unlikely to offset water limitation. Line 29. The volume as well as extent of forests must be considered. (David Viner, University of East Anglia)	We have revised the Executive summary
E-12-41	A	3	34	3	35	The headline statement sounds unbalanced to me as it suggests that no climate-related natural hazards will decrease. What about, e.g. cold spells with their associated health risks? Suggest qualifying the sentence by adding the word 'Some' or 'Many' at the start. (,)	Will be considered
E-12-42	A	3	34	3	47	The following general comment on this specific point remains valid since my first review (even more so now): "Some extremes may decrease. Clearly cold extremes will decrease in a warmer climate. I would imagine that it is particulalry important that the 'points' in the Executive Summary are careful and balanced so that they percieved as only focussing on negative aspects." (from my previous review). Specifically: 1. Despite what is expressedly stated in the first sentence in this paragraph ("very high confidence") there is a mixture of confidence levels among the hazards listed: It is reasonable to state with "very high confidence" that the risk of floods is expected to increase. But to state with "very high confidence" that the number and intensity of storms in the northeastern Atlantic may increase is contradictory because of the use of the word "may", which rather indicates a limited/modest confidence. And the latter is a much fairer assessment of the capability of the models used for producing the projections that this statement builds on. 2. "Insured losses" is certainly not a natural hazard and should not be mentioned here. And, furthermore, the confidence level ascribed to the trends of costs can per definition not be high because the insurance companies will (with very high confidence, sic!) take measures to counteract a strong trend of very high certainty. And, further furthermore, in section 12.4.10 it is specifically stated that "the	This comment on storm is a good point. It is less certain what will happen to storms than with flood. OK. We will address this comment Insured costs are a consequence. It is a fair point that the insured component of costs may reduce if insurers perceive the trend and reduce their coverage. On the other hand, total economic damage will rise, and that is what we

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						uncertainty of future climate as well as socio-economic factors leads to a wide range of estimates for the costs of future flood damage". How can this then be put in an Executive Summary bulleted point as having very high confidence ?? 3. The claim with "very high confidence" of an increased likelihood of snow avalanches is not at all supported by the main text, which by the way is 2.4.3 (and NOT 2.4.2). The main text reads as follows:"Changes in snowpack and glacial extent may also alter the likelihood of snow and ice avalanches, depending on the complex interaction of surface geometry, precipitation, and temperature [refs]." No mentioning of an increase and phrased to clearly convey low confidence. This I would argue this is the very opposite of the claim in this point. And, especially given the weight these points will be given once published, substantially stronger support is needed to go against simple arguments like "higher temperature - less snow - fewer avalanches". Of course there will be places where avalanches will be more frequent, but on average? And, furthermore, the places where avalanches are likely to become more common may be located higher up in the mountains where they may pose less of a threat to society. (Lars Bärring, Lund University)	are looking at effectively, if we assume that insurers do not react. The correct variable is total economic damage probably, what, not insured costs. Reinsurers like Munich re and Swiss Re track the total cost, so they can still provide valuable data even when insurers' share of the damage decreases (or increases for that matter). Adressed and text changed OK. Text has been changed OK. Text has been changed
E-12-43	A	3	34		35	Remove the second part of the statement or be more specific. (Andrei Kirilenko, University of North Dakota)	Text has been changed
E-12-	A	3	37		39	Use IPCC scale for confidence level	OK. Done

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44						(Andrei Kirilenko, University of North Dakota)	
E-12-45	A	3	39		40	Can't find the 2-4% annual insurance cost increase in section 12.4.10 (Clair Hanson, IPCC TSU)	I agree. This was a reference to text now deleted in 12.4.10. The underlying reference was ABI, 2004 and it related only to UK, not "some countries".
E-12-46	A	3	43	3	43	delete "-free" (unless you really mean an expected decrease in frost-free periods) (Malcolm Haylock, University of East Anglia)	Ok. Will be addressed
E-12-47	A	3	43			12.4.2 should be 12.4.3 (Clair Hanson, IPCC TSU)	OK
E-12-48	A	3	44	3	44	Replace "Increased temperate" by "Increased temperature" (Serhat Sensoy, Turkish State Meteorological Service)	OK
E-12-49	A	3	44			temperature not temperate (Clare Goodess, University of East Anglia)	OK
E-12-50	A	3	44			Should read "temperature" (Paula Harrison, University of Oxford)	OK
E-12-51	A	3	44			replace 'temperate' with 'temperature' (Clair Hanson, IPCC TSU)	OK
E-12-52	A	3	45		45	…increase fire occurrence… - Add "and severity" (Andrei Kirilenko, University of North Dakota)	Will be corrected
E-12-53	A	3	46	3	47	Sentence needs rewording - Mediterranean already has a regularly recurring dry period. (Clare Goodess, University of East Anglia)	Yes. Will be corrected
E-12-54	A	3	46		46	… will have a regularly recurring dry period" - for some regions, e.g. S European Russia, Ukraine same is true in current climate. Be more specific (e.g., the dry periods will increase in frequency and severity) (Andrei Kirilenko, University of North Dakota)	OK . See above
E-12-55	A	3	50	3	50	What does "very high confidence" mean? (Erik Kjellström, SMHI)	We follow guidelines of IPCC
E-12-56	A	3	50	3	50	should be "off beaches"? (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	It is correct
E-12-57	A	3		4		Many of the key points in the Executive Summary are phrased in a clumsy fashion making interpretation difficult without several re-reads. (Matthew Livermore, University of East Anglia)	Text has been revised
E-12-58	A	4	2	4	3	The loss of large glaciers likely over the 21st century is "very" large hence I would suggest adding this qualifier in the sentence. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Accepted.
E-12-	A	4	4		5	Delete the projections on forest migration over 1/2 of the current tundra area and	It will be clarified

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59						apply the same correction to 12.4.4.1. White, 2000 projections were done assumed unrestricted seed dispersal, which will not be the case. Also, they used highly simplified potential vegetation types and assumed no disturbance, which again will slow down the migration. (Andrei Kirilenko, University of North Dakota)	
E-12-60	A	4	12	4	12	Change "extreme" to "high" as the scenario used is not extreme but at the upper end of the range (ag SRES A1). (William Hare, Potsdam Institute for Climate Impact Research (PIK))	OK. Yes.
E-12-61	A	4	13	4	13	"decrease in the southwest" - of what? (Dagmar Schroeter, Potsdam Institute for Climate Impact Research)	Of Europe.
E-12-62	A	4	15			12.4.5 should be 12.4.6 (Clair Hanson, IPCC TSU)	Yes.
E-12-63	A	4	17	4	17	What does "range" mean (time/space?) (Erik Kjellström, SMHI)	Distribution range, which is standard
E-12-64	A	4	31		34	Be more specific (Andrei Kirilenko, University of North Dakota)	Text has bbeen changed
E-12-65	A	4	37			12.5 should be 12.7 (Clair Hanson, IPCC TSU)	It is correct
E-12-66	A	4	43	4	45	The 2003 heat wave is discussed in the main text (which by the way is 12.6.1 and NOT 12.6.2) but contruction of river flood warning system is not discussed in the main text. (Lars Bärring, Lund University)	Yes. Text has been changed
E-12-67	A	4	45			remove 12.6.2 (Clair Hanson, IPCC TSU)	Yes, see above
E-12-68	A	5	0			Figure 12.1. Among key vulnerabilities on tundra there are "adverse effects on indigenous people". This is not based on the Chapter 12 text. Figure 12.1.is taken from EEA 2004, so you may want to include correspondent literature in the References Section, and its analysis in the Chapter 12. Alternatively, you may want to exclude effects on indigenous people from the Fig. 12.1. (Gregory Insarov, Institute of Global Climate and Ecology)	OK. Deleted
E-12-69	A	5	1	5	1	Figure 12.1. Is there no permafrost thawing in the mountains? (Erik Kjellström, SMHI)	Too detail. We selected the most critical subjects
E-12-70	A	5	1		27	Figure 12.1: 1. Add effects on pests; 2. BO, ME, other (?) regions - add increased risks of forest fires; 3. TU: remove the effect on tundra (see the comment pg4/4-5); 4. SRL, NAO - explain the abbreviations; 5. ME, others (?) - add health effects; 6. ST - any effects on cattle? Esp. in the Lower Volga region. (Andrei Kirilenko, University of North Dakota)	OK. It will be addressed The abreviations are explained when first used in the text, not here

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							Please provide references!
E-12-71	A	5	1			Fig.12.1: Explain 'SLR' and 'NAO' (also in the text). (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	The abreviations are explained when first used in the text, not here eviations
E-12-72	A	5	28			Figure 12.1: the colour for Tundra is confusing as it doesn't look like light blue, but the colour used for Atlantic named medium blue does! Pink coloured area is not included in the legend. Biodiversity in northern Scandinavia is particularly vulnerable to climate change as it has nowhere to go as the climate warms beyond the tolerance range of species. (Paula Harrison, University of Oxford)	The name of the color will be changed. Pink is the Black Sea region, which is too small to be covered. It will be stated in the legend. It is implicit in the tundra threats
E-12-73	A	5	28			Figure 12.1: Excellent summary picture but very gloomy. Is it not possible to provide an impact summary that includes the positives as well as the negatives - ie as shown in Table 12.7 (John Porter, The Royal Veterinary and Agricultural University)	No, this refers to the main vulnerabilities which, per se, is negative.
E-12-74	A	5	34			Section 12.1 holds some statements about recent findings that is not a summary of TAR (these are the last sentences of the first three paragraphs). These statements should be moved to section 12.2.1 (end of line 36). (Erik Kjellström, SMHI)	Revised
E-12-75	A	5				Figure 12.1 is a good summary figure - ME (line 3) 'increased' should be 'increases' or remove 'in' (Clair Hanson, IPCC TSU)	
E-12-76	A	5				FIGURE 12.1 COMMENT: It would be useful to add to this figure or its captions a sense of the level of warming associated with the key vulnerabilities mentioned (William Hare, Potsdam Institute for Climate Impact Research (PIK))	
E-12-77	A	6	1	6	6	The section entitled "Current Sensitivities to Climate" lists the climate and weather phenomena rather than the sensitivity of any exposure units. Surely the focus is wrong? (Matthew Livermore, University of East Anglia)	Noted
E-12-78	A	6	15	6	22	Why are economic effects highlighted but no mention is made of the biophysical impacts, e.g. loss of diversity? (Matthew Livermore, University of East Anglia)	Lack of space. Biophysical impacts are covered later in chapter.
E-12-79	A	6	27	6	43	Is there a possibility to update the trends till at least 2005? Any news on climate variables other than T and P? E.g. snow cover and river discharge seasonality, floods, etc.? (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Trends updated Snow cover is treated in table 12.1 Trends in Floods and discharge are not well documented.
E-12-80	A	6	29	6	36	This section is inprecise and confusing when it comes to what specific temperature trends are referred to. Here is how I read it:	Line 29-30: Correct Line 31-32: Correct

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						Line 29-30: European annual mean T. Line 31-32: various regional annual mean T. Line 31-32: "lowest temperature trend" -- is this trend in wintertime (DJF) T, in daily minimim T (annual or seasonal?), or a least significant trend in annual mean T, or weakest trend (lowest positive slope) in annual mean T? Line 34: there is a stronger positive trend during winter than during summer in seasonal mean T. Line 34-35: "increase of temperature variability" is that an increase in the inter-annual variation of annual mean T, an increase of seasonal mean T differences (which is consistent with what is stated in line 34), or anything else? Line 35-36: what is meant by "warm/cold extremes"? Is that spells of daily mean T or is it rather trends in daily minimum/maximum temperature (there is also an ongoing trend in DTR so there are trends in daily Tmax and/or Tmin). In fact, it is this last sentence that, by introducing extremes, really makes this section difficult. (Lars Bärring, Lund University)	Line 31-32: new draft will be more precise Line 34: correct Line 34-35 : new draft will be more precise. results supported by several indices based on daily temperature Line 35-36: Results based on several indices based on daily temperature
E-12-81	A	6	29	6	29	Should "+" be "+/-"? (Erik Kjellström, SMHI)	No, tendency is +0.76
E-12-82	A	6	31	6	31	0.425 seems very (too???) precise. (Erik Kjellström, SMHI)	0.425 is the value given in the reference, but will be simplified
E-12-83	A	6	31			Check that the 2 periods listed on this line are correct - should they be different? (Paula Harrison, University of Oxford)	Yes, the periods are correct. They are now updated. 1979 is used to be coherent with WG1
E-12-84	A	6	34			The EEA (2004) report is cited many times in this chapter. As this reference is a synthesis report surely it would be better to cite the original works? More worrying this key reference is features twice in the references as EEA (2004) and EEA (2004a). (Matthew Livermore, University of East Anglia)	Accepted Original works cited where appropriate. Double reference is corrected
E-12-85	A	6	36	6	36	Significant, increasing trends have been found in the annual maximum of daily maximum and minimum temperature, the annual minimum of daily maximum and minimum temperature, the number of summer nights, and the number of days where daily temperature has exceeded its 90th percentile (Zhang, X., et al., 2005; Sensoy, S., 2006). (Serhat Sensoy, Turkish State Meteorological Service)	Informations coherent with the text presented here, both for trends and extremes indices
E-12-86	A	6	41	6	41	Frich et al is superseded by Alexander et al, 2005: Global observed changes in daily climate extremes of temperature and precipitation. Journal of Geophysical Research, 111, D05109, doi:10.1029/2005JD006290. (Malcolm Haylock, University of East Anglia)	This new reference is included
E-12-	A	6	41	6	41	After klein Tank et al, 2002) insert ",although there are regional contrasts (Osborn	Sentence indicates "most parts", not all., there

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87						and Hulme, 2002) Osborn TJ and Hulme M (2002) Evidence for trends in heavy rainfall events over the United Kingdom. Philosophical Transactions of the Royal Society London series A 360, 1313-1325 (David Viner, University of East Anglia)	is no space to go into details.
E-12-88	A	7	1	7	3	"Table 12.1: in line 9 within the table starting with High mountains, under column Reference: you may add Walther et al. 2005 (appears to be more relevant here than Walther 2004); full reference: Walther, G.-R., S. Beißner, and C.A. Burga 2005: Trends in upward shift of alpine plants. Journal of Vegetation Science, 16, 541-548. write: Sanz-Elorza (instead of San Elorza)" (Harald Pauli, University of Vienna)	Accepted, reference changed
E-12-89	A	7	1			table 12.1. "Northward movement of range of …" what does this mean? (Erik Kjellström, SMHI)	Corrected
E-12-90	A	7	1			table 12.1. "Increased in growing season wine-grape and …" what does this mean? (Erik Kjellström, SMHI)	Corrected
E-12-91	A	7	2	7	3	Table 12.1 Terrestrial ecosystems: For southern Scandinavia an additional line might be added to this table referring to the northward range expansion of Holly (Ilex aquifolium). For details see Walther G.-R., Berger S. & Sykes M.T. (2005) An ecological 'footprint' of climate change. Proceedings of the Royal Society London, Biological Series 272, 1427-1432. (Gian-Reto Walther, Institute of Geobotany, University of Hannover)	Reference added
E-12-92	A	7	2	7	3	Table 12.1 Terrestrial ecosystems High mountains: Please add here the most recent publication to this topic: Walther G.-R., Beissner S. & Burga C.A. (2005) Journal of Vegetation Science 16, 541-548. (Gian-Reto Walther, Institute of Geobotany, University of Hannover)	Yes, same comment as E-12-88
E-12-93	A	7	2	7	3	Table 12.1 Terrestrial ecosystems Alps: The term laurophyllous refers to a special type of evergreen broad-leaved species. Hence, here I would suggest to mention either "laurophyllous species" or "evergreen broad-leaved species". An additional paper dealing with this aspect has just been published: Berger S. & Walther G.-R. (2006) Distribution of evergreen broad-leaved woody species in Insubria in relation to bedrock and precipitation. Botanica Helvetica 116, 65-77. (Gian-Reto Walther, Institute of Geobotany, University of Hannover)	Accepted “evergreen broad-leaved species” is used
E-12-94	A	7	2	7	2	Table 12.1 In the Agricultural section the following can also be included: 1 - Northern Europe - Increase Crop stress during hotter drier summers: 2 – Northern Europe, Increased risk of crops from hail, using Viner et al 2006 as the reference. (David Viner, University of East Anglia)	Accepted, Reference added

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E-12-95	A	7	2		2	You may want to also cite the 2006 paper by Steve Running in the "Increased productivity ... ". Same cell of the table, the references are for forest sector only, which should be stated explicitly. (Andrei Kirilenko, University of North Dakota)	Cell modified Reference added
E-12-96	A	7	5			Section 12.2.2 hold many numbers that are one or several years old. I assume that these numbers will be updated! (Erik Kjellström, SMHI)	The numbers have been updated where newer information is available
E-12-97	A	7	12			what is MER? (Clair Hanson, IPCC TSU)	MER had now been changed to Market Exchange Rate.
E-12-98	A	7	12			MER - I think this stands for Market Exchange Rates but this needs to be spelt out for a more general audience. (Matthew Livermore, University of East Anglia)	MER had now been changed to Market Exchange Rate.
E-12-99	A	7	20	7	20	I wonder whether the membership in NATO is important info here (?) (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	NATO is no longer mentioned
E-12-100	A	7		8		Section 12.2.2 still lacks cohesion. For example forests and carbon sequestration are mentioned but before we find out about Europe's emissions there is a paragraph on fisheries. And while trends are mentioned in the subtitle I failed to find any figures relating to historical rates of change - it's more a series of sectoral snap-shots circa 2004. You therefore don't get a sense of where Europe is coming from; the socio-economic and institutional inertias that will need to be considered when future climate policies are being formulated. This section also lacks any figures relating to energy - a highly topical issue. (Matthew Livermore, University of East Anglia)	The section has been restructured, and figures on energy use has been added.
E-12-101	A	7				Table 12.1 under Agriculture and France: replace 'increased' with 'increases' (Clair Hanson, IPCC TSU)	Done
E-12-102	A	7				Table 12.1 caption is misleading. It is not so much "ecosystems and economic sectors" as "natural and managed ecosystems". (Matthew Livermore, University of East Anglia)	Done
E-12-103	A	7				tab. 12.1 – Tab. row 9th (High mountains): Petriccione, replace 2003 with 2005 (Bruno Petriccione, National Forest Service)	Done
E-12-104	A	8	1	8	8	The role of Russia as energy resources exporter should be acknowledged . (Alexander Golub, Environmental Defense)	The large oil resources in Russia is now mentioned
E-12-105	A	8	10	8	10	"are considerably lower" than what? (Erik Kjellström, SMHI)	The text has been modified to reflect that this refers to sustainable levels of fellings
E-12-106	A	8	10	8	10	" … are considerably lower (EEA, 2002)" -- lower than what/when? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	The text has been modified to reflect that this refers to sustainable levels of fellings
E-12-	A	8	12	8	12	Insert 'n' in KankaaNp"a"a.	Addressed

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107						(Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	
E-12-108	A	8	26	8	27	spell out "2008-2012" (Erik Kjellström, SMHI)	Addressed
E-12-109	A	8	26	8	27	EU15 as a Party to the Kyoto Protocol has a reduction target of 8% for the first commitment period. Member states have the targets defined in the Decision 2002/358/EC. (Yannis Sarafidis, National Observatory of Athens)	No space available
E-12-110	A	8	27	8	28	It would be interesting to also state here the net development of CO2 emissions for EU15 from 1990 to 2003 in %, so that the increase in the transport sector can be put in perspective. (Dagmar Schroeter, Potsdam Institute for Climate Impact Research)	The change in GHG emissions from EU25 is now mentioned
E-12-111	A	8	27	8	28	"From 1990 to 2002 EU15 greenhouse gas emissions (excluding LULUCF) decreased in most sectors, as well as in total (decrease of 2.9% between base year and 2002), but … (Yannis Sarafidis, National Observatory of Athens)	The text has been chanted along the lines suggested.
E-12-112	A	8	31	8	31	Is it possible to specify the "additional countries"? (Yannis Sarafidis, National Observatory of Athens)	Additional countries has been rephrased to adjacent countries
E-12-113	A	8	42	8	42	spell out "nitrogen" (Erik Kjellström, SMHI)	Not applicable
E-12-114	A	8	47			"in" missing at end of line (Paula Harrison, University of Oxford)	Addressed
E-12-115	A	8	48	8	48	Insert 'in' before 'over 18%'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Addressed
E-12-116	A	9	10	9	10	I'm not sure what you mean by the "sensitivity of Europe to climate change". Would "vulnerability" be better? (Malcolm Haylock, University of East Anglia)	This is IPCC terminology
E-12-117	A	9	14		17	This sentence needs some editorial work (Andrei Kirilenko, University of North Dakota)	Text changed
E-12-118	A	9	16	9	16	Reference KNMI,2003 is not quoted in bibliography (Michele Colacino, ISAC-CNR)	Text changed
E-12-119	A	9	16	9	16	Insert 'lives in' after 'population'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Text changed
E-12-120	A	9	17	9	17	Would it be better with "… its territory being below sea level as of today"? (Erik Kjellström, SMHI)	Text changed
E-12-121	A	9	20	9	20	Reference Hitz and Smith,2004 is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	Noted
E-12-	A	9	20			Hitz and Smith 2004 missing from ref list	Noted

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122						(Clair Hanson, IPCC TSU)	
E-12-123	A	9	26	9	26	Does "Here" refer to all the regions mentioned in the sentence in an individual sense or in total (or for some region)? (Erik Kjellström, SMHI)	Text changed
E-12-124	A	9	33			Also in Slovakia - see detailed analysis in: Balajka, J, Lapin, M., Mindas J., Princova, H., Stastny P., Szamesova, J., Thalmainerova D. (2005): The 4th Slovak National Communication on Climate Change, Slovak Ministry of the Environment, Bratislava 2005, 138 pp., http://unfccc.int/resource/docs/natc/slknc4.pdf (Milan Lapin, Faculty of Mathematics, Physics and Informatics, Comenius University)	Text changed
E-12-125	A	9	40	9	42	At page 9, the paragraphs from the lines 40 and 42, are set in contents (page 1) at the line 10. (Ileana Mares, Romanian Academy of Technical Sciences)	Noted
E-12-126	A	9	40			Section 12.3 should be consistent with AR4 WG1 Ch11. It should be mentioned that several scenarios are needed to encompass some of the uncertainties in the climate change question. Uncertainties in cited work based on only one (or a few) scenarios should be emphasized. (Erik Kjellström, SMHI)	Noted
E-12-127	A	9	42			Section 12.3.1 is predominantly PRUDENCE work (about 90% of the references) and is therefore critically dependent on the results of just two GCMs. Also this section is identical in scope to Section 11.3.3 of WGI, which is much more comprehensive - see for example Fig. 11.3.3.2 which is a much more robust assessment of expected changes in temperature and precipitation over Europe using the 21 AR4 GCMs. No mention is made of this WGI section. I'n very concerened that there appears to be little or no coordination of the climate work between WGI and WGII. My suggested approach would be to delete this section. (Malcolm Haylock, University of East Anglia)	Addressed
E-12-128	A	9	42			Section 12.3.1 "Climate trends". This section tries to provide a summary of the essential features of various GCM and RCM projections for Europe. The presentation needs to be more clear about what is based on GCMs and what is derived from RCMs. Furthermore, two comments from my first review still remain valid: 1. The RCM results presented in this section builds to a large extent on RCM projections using either ECHAM4/OPYC3 or HadCM3/HadAM3 global models for lateral boundary forcings. One important result from Räisänen et al. is that there is a substantially different climate change signal in the SLP pattern between these two global drivers, and that this difference influences the climate change signal in other	Section revised

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						climatic elements. It is better to either discuss this difference upfront here, or to make reference to relevant AR4 WG1 sections dealing with this (as far as I understand it there will be an explicitly discussion of the difference between these two models.) 2. Both snow cover and soil moisture, that both are projected to change substantially, need to be discussed. Changes to these climatological elements will have important impact on society and environment. (Lars Bärring, Lund University)	
E-12-129	A	9	44			Section 12.3.1.1 should hold some information about sea levels, SSTs, salinity as these are discussed in 12.4.7 and 12.4.5 (Erik Kjellström, SMHI)	Discussed elsewhere in report
E-12-130	A	9	46	9	46	This is disappointing: late 21st century is far less interesting to policy makers and the general public, than its first half. Try to say something at least about the mid-21st cetury. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Information available was reviewed
E-12-131	A	9	51	9	51	Strings like 'Dec.-Jan.-Feb.' are quite awkward, why not simply 'Dec-Feb' (or 'December to February')? [also elsewhere]. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Convention of climate modelers
E-12-132	A	9	51	10	1	be consistent with use of JJA, DJF, Jun.-Aug. etc throughout entire chapter (Clair Hanson, IPCC TSU)	Noted
E-12-133	A	9		11		Section 12.3.1 is littered with Americian English spelling such as "modeled" and "centered". In itself this isn't a problem but it is not consistent throughout the chapter. (Matthew Livermore, University of East Anglia)	Will try to clean up terrible language-litter. Sorry!
E-12-134	A	9				Section 12.2.3 appears to be talking more about sensitivities to climate change rather than current adaptive capacity. There are also several serious omissions such as no mention of technological advances in agriculture or how their effectiveness is being limited by consumer opinion - the GM debate. The preference for organic produce is actually reducing yields. (Matthew Livermore, University of East Anglia)	Available information reviewed.
E-12-135	A	10	1			the scenario has already been given so don't need to mention that the range is due to the scenario, just the models used (Clair Hanson, IPCC TSU)	Noted.
E-12-136	A	10	2			reference for PRUDENCE (Clair Hanson, IPCC TSU)	Reference added
E-12-137	A	10	3		3	Reference needed. Also, specify which models where used. (Andrei Kirilenko, University of North Dakota)	Added. Info about models to be found in reference added.

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E-12-138	A	10	6	10	6	Kjellström et al 2006 should be removed as it does not discuss the mean climate but more the extreme events. (Erik Kjellström, SMHI)	Reference removed
E-12-139	A	10	25	10	27	I don't really understand this sentence. What is meant by 'in phase'? And what are the exceptions? (Clare Goodess, University of East Anglia)	Rephrased to be made more clear.
E-12-140	A	10	25			remove 'seasons', it is not needed (Clair Hanson, IPCC TSU)	Removed.
E-12-141	A	10	29	10	30	What is a "cell" of increasing pressure? Explain. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Text changed to be clearer.
E-12-142	A	10	29		35	This paragraph is not clear. E.g., line 32: differences between the models or simulated to observed; lines 34-35: either delete "UK" or add "German" when you describe the models. Or "UK" means that HadAM3H was applied to UK? Which global model was used to drive HadAM3H (it is HadCM3) and which regional model was used with ECHAM4? (Andrei Kirilenko, University of North Dakota)	UK deleted. Info on driving models added.
E-12-143	A	10	33		35	talking about pressure in this paragraph. This comment on westerly flow can be moved to the next paragraph to support the winter increase in DJF speeds in N Europe (Clair Hanson, IPCC TSU)	Text moved to next paragraph
E-12-144	A	10	35			Gordon et al (2000) is not the correct reference for HadAM3H. UKCIP 2002 would be more appropriate as there is an appendix describing this high-resolution atmosphere-only global model. (Matthew Livermore, University of East Anglia)	Reference changed.
E-12-145	A	10	37	10	46	What is "windiness"? If it is (annual) mean wind speed, this characteristic really does not deserve a special paragraph, particularly when, as one could expect, the changes are "sensitive", "small", "slight", and not "significant". Please condense. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Text made more concise.
E-12-146	A	10	37		46	see my comment on regional simulations for 10/29-45. (Andrei Kirilenko, University of North Dakota)	See answer above for 10\29-35.
E-12-147	A	11	10		17	what about the relationship between NAO and NW European precipitation (intensity, frequency and amount) (Clair Hanson, IPCC TSU)	NAO given attention in 12.4.2
E-12-148	A	11	12	11	17	There was published in: LAPIN, M, HLAVCOVÁ, K. (2003): Changes in Summer Type of Flash Floods in the Slovak Carpathians due to Changing Climate. Proceedings of the International Conference on Alpine Meteorology and MAP2003 Meeting, Brig, Switzerland, 19.-23.V.2003, Publ. Of MeteoSwiss, No. 66, 105-108.,	Text and reference added.

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						that after 3.5 °C warming in summer an increase of exceptionally high 1-5 day precipitation total up to 40% is possible in Slovakia comparing similar synoptic situations in the past (this calculation was made using simple physical model for precipitation totals in cyclonic summer weather). This increase is very probable in spite of decrease of mean summer precipitation total up to 2100. (Milan Lapin, Faculty of Mathematics, Physics and Informatics, Comenius University)	
E-12-149	A	11	19	11	29	The very large increase in Mediterranean summertime temperatures and the associated extension of the summer drought is possibly/likely to be overestimated in model projections because of the parameterisation of soil moisture in the RCM land surface schemes (basically the soil storage capacity is too small so the soil dries out too easily). There are some recent papers by Lenderink et al. (KNMI) and R.G. Jones (UKMO/HC) on this subjects. The conclusion is that the trends in summer drought and extremely high temperatures are probably somewhat lower than the RCMs project (but still very significant in terms of their impact). (Lars Bärring, Lund University)	Text changed and reference added to incoprorate soil storage capacity
E-12-150	A	11	37	11	39	The statement that increases in extreme wind speeds *would* generate more North Sea storms come across as a very strong statement. It may in some models but in light of the dependency that all RCMs have on the driving boundary conditions (as noted in the preceeding sentence) it may be better to suggest there is "some evidence" rather than conclusive proof. (Matthew Livermore, University of East Anglia)	Text changed and 'would' removed
E-12-151	A	11	38	11	38	My recollection of Beniston et al and Woth et al does not include any increase in North Sea storms although I'm out of office unable to check these papers. (Erik Kjellström, SMHI)	No. Rseference left as is
E-12-152	A	11	42	11	42	This paragraph is put in contents at page 12. (Ileana Mares, Romanian Academy of Technical Sciences)	The index has been revised
E-12-153	A	11	46	11	46	The sentence should start with "Presently, CEE and Russia …" (Erik Kjellström, SMHI)	Addressed
E-12-154	A	11	46		50	Jansen, 2004 presents the pre-TAR data (1901-1999). You definitely need a post-TAR data. The statement on the "recent reduction of life expectancy in FSU" is not true anymore, at least for Russia, Ukraine, and Belorussia. For Russia and Ukraine the lowest life expectancy since the independence was in 1994-1995. The data on fertility rate needs a reference (or a post-TAR reference if Janssen et al is cited) (Andrei Kirilenko, University of North Dakota)	The Janssen paper is published after TAR. A reference to the situation in Russia is now given,
E-12-155	A	11	46		46	CEE - define the abbreviation. Also, is it possible to include a map or a table which would show how the countries combine into the W, E, S, N, Central Europe, CEE,	CEE is defined in section 12.2.2

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						FSU, etc? (Andrei Kirilenko, University of North Dakota)	
E-12-156	A	11		12		Section 12.3.2 - no mention of future increases in energy demand need for space cooling and refrigeration and how this clashes with potential energy shortages due to a lack of water - a familiar occurrence in Europe during the 2003 heat wave. (Matthew Livermore, University of East Anglia)	A section in development in electricity use has been included
E-12-157	A	12	1	12	2	It should be acknowledged that heat waves are the most dangerous for population over 65 years. (Alexander Golub, Environmental Defense)	A reference to section 12.4.11 has been included.
E-12-158	A	12	4	12	21	despite of location in non-climate trends part not clear whether really changes of e.g. land use, crop yield and production for scenarios mentioned based only on socio-economic presumptions (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	Not applicable
E-12-159	A	12	14	12	14	I'm not sure what you mean by "agricultutal land uses". Do you mean "agricultutal land area"? (Malcolm Haylock, University of East Anglia)	"Agricultural land use" is changed to "agricultural land area"
E-12-160	A	12	15	12	16	Rounsewell et al., 2005a is quoted as Rounsewell et al., 2005 in references (Michele Colacino, ISAC-CNR)	Addressed
E-12-161	A	12	16			Only one Rounsevell et al 2005 reference so remove the 'a' (Clair Hanson, IPCC TSU)	Addressed
E-12-162	A	12	18	12	18	Rounsewell et al., 2005a is quoted as Rounsewell et al., 2005 in references (Michele Colacino, ISAC-CNR)	Addressed
E-12-163	A	12	24			Chapter 12. Sections 12.4.3 Mountains and sub arctic regions, 12.4.4 Forest, grasslands, and shrublands, 12.4.5. Wetlands and aquatic ecosystems, 12.4.6. Biodiversity can be supplemented by analysis of a number of publications on influence of climate change on phenology, floras and ecosystems in Eastern Europe and Russia. See for instance the book Climate Change impact on Ecosystems. Nature Protected Areas in Russia: Analysis of long-term observations. Edited by A.Kokorin, A.Kozharinova, A.Minin. - Moscow., 2001 (Gregory Insarov, Institute of Global Climate and Ecology)	Will be taken account if the paper vould available
E-12-164	A	12	24			Chapter 12, Section 12.4. There are subsections 12.4.3 Mountains and sub arctic regions, 12.4.4 Forest, shrublands and grasslands,12.4.5. Wetlands and aquatic ecosystems. Tundra subsection is missed, few mentions on climate change effects on tundra ecosystems are scattered across the Section 12.4, and literature about expected future impacts and vulnerabilities for tundra is underrepresented. Tundra covers a huge area in Europe, so it is worth to include more information on this subject either to Section 12.4.3, or to a new section for tundra.	Accepted: GCM projections based on various emission scenarios show that annual runoff increases in…..

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						(Gregory Insarov, Institute of Global Climate and Ecology)	
E-12-165	A	12	26			Table 12.7 is a good summary table. Why is it at the end of the chapter surely it should be in section 12.4 (Clair Hanson, IPCC TSU)	See E-12-167
E-12-166	A	12	29			Section 12.4.1 A comment on the recent paper by Gedney et al (nature 439, 835-838 (16 Feb 2006)) may be appropriate? (Michael Morecroft, Centre for Ecology and Hydrology)	Accepted. Atlantic region refers to zonality according to main biogreographic region. Better to write … in North and Northwestern Europe
E-12-167	A	12	32	12	32	Replace with "GCM projections based on various emission scenarios". Plural for GCM is "GCMs", not "GCM's" (the latter is singular genitive.) (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Accepted
E-12-168	A	12	32			GCMs not GCM's (Clare Goodess, University of East Anglia)	Accepted, see E-12-167
E-12-169	A	12	33	12	33	Please delete "- " after "Atlantic" if it has not any meaning. (Ileana Mares, Romanian Academy of Technical Sciences)	IPCC-IS92a scenario was used for climate change impact assessment on water similar to (slightly above) A1B SRES scenario, which anticipates an increase in global carbon dioxide concentration from about 360 ppm to 600 ppm, and a temperature increase of about 2,3 °C by 2070s (Lehner et al, 2005).
E-12-170	A	12	35	12	36	There are regional model results that have been used. Graham et al., 2006 (Prudence Special Issue of Climatic Change, accepted) summarizes such work from the PRUDENCE project. (Erik Kjellström, SMHI)	See E-12-167
E-12-171	A	12	45	12	46	Again, replace with "Two GCM projections under …" (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Accepted: in Mediterranean and E.Europe (Ludwig *et al.,* 2003)
E-12-172	A	12	46			IS92a - in terms of population growth, emission, climate etc. isn't A2 the most comparable scenario? I'm assuming the authors are actually using A1FI? (Matthew Livermore, University of East Anglia)	Accepted in caption to Fig.12.2: Annual change in river ….
E-12-173	A	12	46			GCMs not GCM's (Clare Goodess, University of East Anglia)	See E-12-175
E-12-174	A	12	48	12	49	Please delete "- " after " Mediterranean" if it has not any meaning. (Ileana Mares, Romanian Academy of Technical Sciences)	See E-12-175
E-12-175	A	13	17	13	17	Wrong word order in the caption. Is it "Annual change in river…" ? (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	See E-12-175
E-12-176	A	13	17	13	17	reverse "change annual" (Malcolm Haylock, University of East Anglia)	See E-12-175

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E-12-177	A	13	17			Figure 12.2: Switch first 2 words in legend to make it read more clearly, i.e. "Annual change in …" (Paula Harrison, University of Oxford)	Exactly: 2020s mean 2020-2029x
E-12-178	A	13	17			Fig.12.2: 'Annual change' instead of 'Change annual' in the caption. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	'and the Baseline-A water use scenario' will be deleted fron the caption ot Fig.12.2. The Basseline-A water use scenario was used for assessment of climate change on water stress as the later depends not only on climate change but on how the water use will be developed
E-12-179	A	13	17		19	Annual change (Andrei Kirilenko, University of North Dakota)	Will be added or will be referred to paper 'Alcamo, J., P.Döll, T.Heinrichs, F.kaspar, B.Lehner, T.Rösch and S.Siebert, 2003. Global estimates of water withdrawals and availability under current and future business-as-usuak conditions. *Hydrological Sciences Journal, 48,* 339-348.
E-12-180	A	13	18	13	23	The time slices: what is "2020s"? If it is 2020-2029, please say so. Same in the table 12.2. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Island will be deleted The box under "Floods" will be revised.
E-12-181	A	13	19	13	19	What is "Baseline-A water use scenario"? (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Occur earlier in year than now Island is Icealnd rigthly More than 25% is accepted
E-12-182	A	13	19	13	19	Reference Lehner et al., 2003 is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	Accepted: more 25% and more 10% will be changed with more than 25% and more than 10%
E-12-183	A	13	22			Table 12.2: Check box under "Floods" and "2080s" as doesn't read well, it is difficult to understand, "Island"? (Paula Harrison, University of Oxford)	To be clarify
E-12-184	A	13	23			Text on floods in 2080s: presumably mean floods occur earlier in the year? Should be Iceland rather than Island? More 'than' (Clare Goodess, University of East Anglia)	Accepted: the word and is deleted
E-12-185	A	13	23			Table 12.2. Should be "more than" at two places. (Erik Kjellström, SMHI)	By up **to** 20-30%, and by up **to** 80% is accepted
E-12-186	A	13	23			Table 12.2. "Increasing risk in flood and other types of floods" ???????????? (Erik Kjellström, SMHI)	The caption of Fig. 12.2 will be corrected: Change in annual river basin discharge …
E-12-187	A	13	35	13	35	After: withdrawals, delete the word: and (David Viner, University of East Anglia)	Accepted, see E-12-189

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E-12-188	A	13				T12.2 insert up TO 20-30% and up TO 80%. Again the consistency with abbreviations N or northern (Clair Hanson, IPCC TSU)	This is ratio without unir, or multiplying by 100 has an unit % (0,4 → 40%)
E-12-189	A	13				Figure 12.2 - caption needs to be corrected "Change annual" ? "base-line"? (Matthew Livermore, University of East Anglia)	In Table 12.2 time slice '2080s' will be changed with '2070s'. This time slice refers to years from 2070-2080
E-12-190	A	13				F12.2 caption should be 'CHANGE IN ANNUAL …' Shouldn't the 2nd time slice be the 2080s? (Clair Hanson, IPCC TSU)	*Holden et al., 2003* investigated the impact of climate change on two specific arable crops , barley and potatoes in Ireland. The baseline was 1961-1990 , for future climaet two time slieces were choosen: 2055 and 2075. As a results of climate impact assessment, potato yield in 2055 and 2075 is expected to fall for non-irrigated tubers. The impact is likely to be severe loss of yield over most of the country by 2055. The irrigation demand for potato will be very significant, possibly making the crop non-viable for farmers, particularly in the east of Ireland. Barley will remain a viable cereal crop
E-12-191	A	14	1			0.4 - what are units? (Clare Goodess, University of East Anglia)	
E-12-192	A	14	2			2080s? (Clair Hanson, IPCC TSU)	
E-12-193	A	14	8			Can you give example of countries where irrigation will become necessary? (Clare Goodess, University of East Anglia)	
E-12-194	A	14	14	14	14	This paragraph is put in contents at page 13. (Ileana Mares, Romanian Academy of Technical Sciences)	No, it sis correect as it is
E-12-195	A	14	16	14	23	This paragraph is confusing and partly incorrect: 1. Spell out the acronym NAO the first time. 2. In principle, NAO determines wind strength throughout the year. From a climatological viewpoint the NAO index (i.e. the sea-level pressure difference between Azores and Iceland) is typically smaller during summer than during winter, thus resulting in climatogically lower wind speeds (at least on the large scale). So, during summer there is typically a small pressure gradient (NAOI) that causes the	The text will be chect taking account the revier's comments and changed where appropriated It is spelled out the first time it is used Text will be checked

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						typically lower large-scale winds is in fact something that proves that NAO is also an important determinator for winds during summer (if we were to deal with temperature the situation would be completely different). To complicate things a bit, when it comes to NAOI and winds there are spatio-temporal scale issues (large spatial scale goes with large temporal scales and vise versa). 3. Unfortunately I do not have access to Woolf et al., but I cannot believe that they are suggesting that NAO has a long-term (on the time-scale discussed here) effect on the *rate* of SLR. Possibly if the NAO is in a strengthening/weakening phase (typically lasting for a few years up to perhaps a decade based on climatologies) this may be possible. But in the longer time perspective I cannot see the physical mechanisms behind one region getting a slower SLR change and another region getting a faster SLR change because of the NAO. 4. Are most IPCC-SRES scenarios showing a *continuation* of NAO --- is in fact "continuation" (as opposed to NAO disappearing) the intended word here? Or is it rather something like "continued strong variability of the NAO" or "strenghtening of the NAO" or "continued strong phase of of the NAO"? (Lars Bärring, Lund University)	Text will be checked Text to be clarified on precise meaning
E-12-196	A	14	21	14	22	Please reformulate this sentence, for me is not clear what means " climate scenarios show a continuation of NAO into the 21 century" because NAO is permanent. (Ileana Mares, Romanian Academy of Technical Sciences)	See above comment
E-12-197	A	14	22	14	22	proper reference Cubasch et al., 2001 instead of Cusbach … (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	OK
E-12-198	A	14	22	14	22	Please replace " Cusbach" with the correct name " Cubasch" (Ileana Mares, Romanian Academy of Technical Sciences)	OK
E-12-199	A	14	22	14	22	Here and elsewhere (incl. the list of refs): should be "Cubasch" (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	OK
E-12-200	A	14	22	14	22	Do you mean a "continuation of (the) NAO" or a continuation of the recent upward trend in the NAO? (Malcolm Haylock, University of East Anglia)	As above
E-12-201	A	14	22	14	22	Do you mean "continuation of NAO increase"? Otherwise what is said suggests that in some projections NAO is not existentl. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	As above
E-12-202	A	14	22	14	22	Cubasch is wrongly spelled (also in reference list). (Erik Kjellström, SMHI)	OK
E-12-203	A	14	22			"...continuation of NAO" - you mean the positive phase of the NAO? (Matthew Livermore, University of East Anglia)	As above
E-12-	A	14	22			'the continuation of the NAO' - do you mean a continuation of the positive phase of	As above

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204						the NAO? (Clair Hanson, IPCC TSU)	
E-12-205	A	14	26	14	34	these lines should be moved to 12.3.1 and 12.3.2 (Erik Kjellström, SMHI)	No. We fee it belongs here
E-12-206	A	14	28	14	28	The space between lines 27 and 29 must be erased (Michele Colacino, ISAC-CNR)	OK
E-12-207	A	14	29	14	30	Citing increases in wind speeds by the 2020s seems tenuous considering the relatively weak climate change signal at this early stage in the 21st Century. (Matthew Livermore, University of East Anglia)	A trend has been established and models show that it will continue
E-12-208	A	14	30			what's an on-coast shift of peaks in storm centres? (Clair Hanson, IPCC TSU)	Text will be clarified
E-12-209	A	14	36	14	42	Beginning talks about reduction in frequency of storm surges - then talks about higher storm surge elevations. Is this what is meant - i.e., fewer but more extreme surges? (Clare Goodess, University of East Anglia)	Text will be clarified
E-12-210	A	14	38	14	38	"higher wave heights" average? Significant? Extreme wave heights? (Erik Kjellström, SMHI)	Average, but will double check
E-12-211	A	14	41	14	42	The document about Spanish Strategy of Fight against Weather Change, based in a climatic reanalysis suggests for the mid XXI century a reduction in storminess, and changes in the orientation of winds. This model shows influence on coastal structures resistance, overhelming in ports, reduction of beach extension, and flooding in low areas. I suggest the introduction of this reference between references related to this aspect in line 41. Reference: http://www.mma.es/portal/secciones/cambio_climatico/documentacion_cc/estrategia_cc/ (Ricardo Anadon, Universidad de Oviedo)	Point interesting, but not relevant to the current text
E-12-212	A	14	42	14	42	Meier et al has been published. (Erik Kjellström, SMHI)	Will change
E-12-213	A	14	44	14	44	Change "values for" into "a" (Erik Kjellström, SMHI)	OK
E-12-214	A	14	44	14	44	"Simulations of the IPCC-SRES scenarios" is very imprecise. What are these simulations? (Malcolm Haylock, University of East Anglia)	These “simulations” are well defined in the text and elsewhere in AR4. Will check text again for clarity.
E-12-215	A	14	44		45	SLR - explain abbreviation. The statement on higher SLR rate in 2100 as compared to present: is not clear, what is compared, it looks like you compare 2000-2100 SLR to the 1961-1990? (Andrei Kirilenko, University of North Dakota)	SLR is defined first time in chapter_ thereafter abbreviation is used.

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E-12-216	A	14	45	14	45	The second SRL in the line must be erased (Michele Colacino, ISAC-CNR)	OK
E-12-217	A	14	45	14	45	SLR in Europe SLR … the second SLR should be omitted (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	OK
E-12-218	A	14	45	14	45	One "SLR" too many. (Erik Kjellström, SMHI)	OK
E-12-219	A	14	45	14	45	IPCC 2007should be specified (Erik Kjellström, SMHI)	Full named reference to be used
E-12-220	A	14	45	14	45	Delete the first 'SLR'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	OK
E-12-221	A	14	45	14	45	delete 2nd "SLR" (Malcolm Haylock, University of East Anglia)	OK
E-12-222	A	14	45			SLR is repeated (Clair Hanson, IPCC TSU)	OK
E-12-223	A	14	45			rates of what? (Clair Hanson, IPCC TSU)	Text to clarify
E-12-224	A	14	45			IPCC 2007 should be referenced as 'Authors of chapter', 2007 (Clair Hanson, IPCC TSU)	OK
E-12-225	A	14	45			"SLR" included twice (Paula Harrison, University of Oxford)	OK
E-12-226	A	14	47		47	… adds an uncertainty of another +-0.1 to 0.2 m to these estimates … - do I understand it correctly from this paragraph that the sea level can actually drop (0.09m - 0.2m)? I suggest revising this paragraph to add more clarity. (Andrei Kirilenko, University of North Dakota)	Text to be checked
E-12-227	A	14	48	14	48	The abrupt melting of Greenland in the 21st century should not be assessed as "possible". Actually, it is unlikely. As it is now, the statement is somewhat alarmistic. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Text to be checked
E-12-228	A	14				In section 12.4.2 why not use a figure to demonstrate the spatial pattern of enhanced SLR? The PRUDENCE Project produced such figures. (Matthew Livermore, University of East Anglia)	Nice point, but issues of space
E-12-229	A	15	1	15	1	Keep using the acronim "SLR" introduced in this section. (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	Will check text for consistency
E-12-230	A	15	1	15	12	I would also have expected to have seen some mention of the effects of saline penetration of coast groundwaters due to sea level rise, and some mention of the effects of sea level rise on the transport infrastructure, on industry in coastal locations, and in particular on coastal nuclear power stations.	Relevant points made, but related summary points are made in the section & chapter_ space issues will not allow more detail.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(David Smith, Oxford Univeristy, Centre for the Environment)	
E-12-231	A	15	1	15	21	I was disappointed to see no mention of the impact of sea level rise on coastlines where isostatic uplift since the last glaciation is declining, and thus where sea levels are likely to have an increasing impact in the future. This is not a local effect, but affects large areas of northern and northwestern Europe, from Northern Ireland and Scotland to Norway, Sweden, Finalnd and much of Denmark, not to metnion parts of Russia. On line 13 I recommend putting in the sentence: Over large areas of coastline declingin isostatic uplift is bringing many areas within the range of sea level rise (e.g. Smith et al 2000). (David Smith, Oxford Univeristy, Centre for the Environment)	As for 230, but will check possibility and consistency with text of the sentence insertion.
E-12-232	A	15	3	15	3	Reference Meier et al., 2004a,b is not clear since in bibliography are quoted two works of Meier et al., but in r the second the year of publication is not given (Michele Colacino, ISAC-CNR)	To check & clarify
E-12-233	A	15	6	23	20	I found this section disappointing. Much more could be said of considerable relevance, for example the need to take account of specific location factors - the "post code" approach. There is no mention of the impact of likely coastal changes on property insurance, and, for balance, no mention of the "benefits" of climate change in terms of an incease in frost-free areas. (David Smith, Oxford Univeristy, Centre for the Environment)	As for 230.
E-12-234	A	15	12	15	12	What means 'shelf -- coastal waters' ? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Clarify & Glossary insert as necessary
E-12-235	A	15	15	15	18	Does this information refer to Europe only? (Erik Kjellström, SMHI)	To check
E-12-236	A	15	18	15	18	"Devoy, in press". Is there a publication date? (David Smith, Oxford Univeristy, Centre for the Environment)	Update & change
E-12-237	A	15	20	15	21	References SEPA, 2005 and SEEG, 2006 are not quoted (Michele Colacino, ISAC-CNR)	OK & check
E-12-238	A	15	22	15	22	Small island environments are known to be particularly vulnerable to climate change. In spite of the total area and population of small islands, they constitute very important assets for the countries they integrate, for many reasons, namely for their unique landscapes and climates and for their strategic, economic and touristic values. As far as I could check there are no references on specific future impacts and vulnerabilities on European small islands either in the Atlantic or in the Meditteranean. Recently the application of a downscalling model from GCMs for small islands to the Açores and Madeira has shown that for the Madeira Islands the future climate scenarios, using different SRES, imply strong reductions in the annual precipitation ranging from 20 to 35% under the A2 and B2 scenarios.	As for 231

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						(Filipe Santos, Universidade de Lisboa)	
E-12-239	A	15	22	15	22	I suggest the inclusion of the following phrase "There are few studies of future climate change impacts on European small islands although they are likely to be vulnerable. The application of a downscalling model from GCMs to the Madeira Islands have shown a strong reduction in the annual precipitation, ranging from 20% to 35%, and significant impacts on the laurissilva forest, agriculture and tourism". (F.D.Santos, and P. Miranda (Editores), Alterações Climáticas em Portugal. Cenários, Impactes e Medidas de Adaptação, Projecto SIAM II, Lisboa, Gradiva, 2006; F. D. Santos, M.A. Valente, P. Miranda, R. Aguiar, E. B. Azevedo, A. Tomé and F. Coelho, World Resources Review, 16 (2004), 473-491). (Filipe Santos, Universidade de Lisboa)	As for 231
E-12-240	A	15	25	15	25	Reference Nicholls and De la Vega-Leinert, 2006 is not quoted (Michele Colacino, ISAC-CNR)	OK & check
E-12-241	A	15	25	15	25	"Nicholls and De la Vega-Leinert, 2006" not cited in references. (David Smith, Oxford Univeristy, Centre for the Environment)	OK & check
E-12-242	A	15	25			Nicholls and De la Vega…. (2006) missing from ref list (Clair Hanson, IPCC TSU)	As 241
E-12-243	A	15	26	15	26	Devoy, 2006 is Devoy in press in bibliography (Michele Colacino, ISAC-CNR)	As 236
E-12-244	A	15	26	15	26	"Devoy, 2006". Is this the same as "Devoy, in press"? (David Smith, Oxford Univeristy, Centre for the Environment)	As 236
E-12-245	A	15	29	16	23	General Comment: Viner et al suggest that Mountain regions will experience a loss of endemism in Mountain (and coastal zones) as a result of invasive species and displacement of those to higher altitudes or loss altogether. (David Viner, University of East Anglia)	Will be included
E-12-246	A	15	34	15	34	Maisch, 2000 is quoted as Maish in bibliography (Michele Colacino, ISAC-CNR)	Adressed
E-12-247	A	15	34			Maish in ref list and Maisch in text (Clair Hanson, IPCC TSU)	Adressed
E-12-248	A	15	45	23	45	Could there be some mention of the poleward expansion of the range of the malarial mosquito? (David Smith, Oxford Univeristy, Centre for the Environment)	There are not evidencies of the poleward expansion: only localized outbreaks. See section 12.4.11
E-12-249	A	15				Table 12.3 could benefit from the inclusion of current numbers and area at risk from flooding (Clair Hanson, IPCC TSU)	Misplaced. This table will be deleted
E-12-250	A	16	7	16	23	Should mention that change in the outcome of competition is major determinant of changes in plant community composition	Yes, but it is implicit when we say « the compostion of structure of alpine communities

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Michael Morecroft, Centre for Ecology and Hydrology)	will change)
E-12-251	A	16	8	16	9	"1) I suggest to write: snow cover duration (instead of snow cover distribution; snow cover patterns are rather conservative and climate warming may mostly change its duration); 2) changes in snow cover and growing season length may be more important than effects on metabolism, but the latter appears to be highly dependent on the former - therefore I would suggest to write for example: '...than direct effects of temperature changes on metabolism'." (Harald Pauli, University of Vienna)	Both comments accepted
E-12-252	A	16	9	12	9	insert 'of temperature' after 'more pronouced effects than effects…' (Michael Morecroft, Centre for Ecology and Hydrology)	Accepted (same as above)
E-12-253	A	16	9	16	9	what "effects on metabolism" are you referring to - the direct effect of increased CO2? (Malcolm Haylock, University of East Anglia)	Yes, see also comments E-12-251 and E-12-252
E-12-254	A	16	9	16	10	"suggest to add (in addition to Grace et al....; Koerner...): Gottfried et al. 2002 full citation: Gottfried, M., H. Pauli, K, Reiter, and G. Grabherr 2002: Potential effects of climate change on alpine and nival plants in the Alps. In: Mountain Biodiversity - A Global Assessment, (eds Körner, C. and E.M. Spehn), pp. 213-223. Parthenon Publishing, London, New York." (Harald Pauli, University of Vienna)	Many references already support this sentence The reference suggested is already cited in the same paragraph
E-12-255	A	16	11	16	12	"please add: Grabherr et al. 2001; Pauli et al. 2001; Klanderud and Birks 2003; full references: Grabherr, G., M. Gottfried, and H. Pauli 2001: Long-term monitoring of mountain peaks in the Alps. In: Biomonitoring: General and Applied Aspects on Regional and Global Scales. Tasks for Vegetation Science, Vol. 35 (eds Burga, C.A. and A. Kratochwil), pp. 153-177. Kluwer, Dordrecht. Pauli, H., M. Gottfried, and G. Grabherr 2001: High summits of the Alps in a changing climate. The oldest observation series on high mountain plant diversity in Europe. In: "Fingerprints" of Climate Change - Adapted Behaviour and Shifting Species Ranges (eds Walther, G.-R., C.A. Burga, and P.J. Edwards), pp. 139-149. Kluwer Academic Publisher, New York. Klanderud K. and H.J.B. Birks 2003: Recent increases in species richness and shifts in altitudinal distributions of Norwegian mountain plants. The Holocene, 13, 1-6." (Harald Pauli, University of Vienna)	Two references already cited in table 12.1 The third one will be added in table 12.1
E-12-256	A	16	12	16	12	add: Walther G.-R., Beissner S. & Burga C.A. (2005) Journal of Vegetation Science 16, 541-548. to the references cited here	Already cited in table 12.1 where it is more appropriate

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Gian-Reto Walther, Institute of Geobotany, University of Hannover)	
E-12-257	A	16	14			replace began with begun (Clair Hanson, IPCC TSU)	Adressed
E-12-258	A	16	14			"begun" instead of "began" (Paula Harrison, University of Oxford)	Adressed
E-12-259	A	16	20	16	20	add: Walther G.-R., Beissner S. & Burga C.A. (2005) Journal of Vegetation Science 16, 541-548. to the references cited here (Gian-Reto Walther, Institute of Geobotany, University of Hannover)	Accepted
E-12-260	A	16	33		33	On forests migrating over 1/2 of tundra area - see my comment 4/4-4. Exclude both the comment and the reference. (Andrei Kirilenko, University of North Dakota)	Will be addressed ant taken into account in a general context
E-12-261	A	16	34	16	34	Reference Virtanen and Neuvonen, 1999 is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	Will be adressed
E-12-262	A	16	34			Virtnaen and Neuvonen (1999) not in ref list (Clair Hanson, IPCC TSU)	Will be address
E-12-263	A	16	34			Forest pests aren't just moving northward. As the MICE Project has demonstrated climate change is also likely to result in a second infestation of insect pests in a single year. (Matthew Livermore, University of East Anglia)	Comment is well taken and will be included
E-12-264	A	16	37	16	39	Final sentence seems rather strongly worded given uncertainties in wind scenarios - and generally rather small projected changes. (Clare Goodess, University of East Anglia)	Will be looked up again and corrections made
E-12-265	A	16	38	16	39	This sentence does not reflects the current knowledge at all: 1. As is stated in this chapter, winds in the south/Mediterranean are projected to decrease if anything. 2. As is discussed in this chapter, further emphasised in my other comments, the projected wind increase in northern Europe is rather small and not very certain. 3. As we have shown in a couple of papers* observed variations in the wind climate very much play a subordinate role i determining recorded windthrow damage. Much more important are the forest management practices. 4. As the substantial impact of a changing wind climate is not at all certain, then a climate change effect on the tree stability and strenght could play a role. And, again, forest management practices is the main factor, as is discussed explicitly discussed in the references cited section 12.5.4 5. One of the references cited is a conference piece (that I have not been able to access), the other one is more of a test of the ForestGALES model. Any conclusion supporting the sentence here is not found in Cucci et al.	See comments above. Will be addressed

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						* a) Schlyter, P., Stjernquist, I., Nilsson, C., Jönsson, A.M. & Bärring, L., 2006: Assessment of extreme weather impacts on boreal forests. Clim. Res., 31, 75-84. b) Nilsson, C., Stjernquist, I., Bärring, L., Schlyter, P., Jönsson, A. M. & Samuelsson, H., 2004: Storm damages of Swedish forests 1901–2001. Forest Ecology and Management. <doi:10.1016/j.foreco.2004.07.031 c) and references therein (Lars Bärring, Lund University)	
E-12-266	A	16	38	16	38	"is likely to be". This statement is not evident as the changes in wind are inconclusive. (Erik Kjellström, SMHI)	See comments above
E-12-267	A	16	42			endanger' is the wrong word. (Clair Hanson, IPCC TSU)	Will be addressed and text corrected
E-12-268	A	16	44	16	46	One cannot condense all these papers into one such brief conclusion. The studies were carried out in different regions using very different species (Betula, Picea, Pinus) that react/respond differently. Furthermore, this sentence does not correctly reflect the conclusions of all papers (e.g. Jönsson et al. came to the opposite conclusion that the risk for spring frost damage may increase because of an earlier start of the growing season (this has been supported by other studies). (Lars Bärring, Lund University)	OK. Will look up the paper and change the text to accommodate differences
E-12-269	A	16	46			Might be helpful to give some examples of what is meant by 'phenology', i.e. types of changes expected. (Clare Goodess, University of East Anglia)	See the glossary
E-12-270	A	16	47	16	47	It is a questionable statement since extreme weather events could reduce productivity. (Alexander Golub, Environmental Defense)	Will be addressed
E-12-271	A	16				add Petriccione, 2005 (Bruno Petriccione, National Forest Service)	Will be considered and if it adds to what exists it will be included
E-12-272	A	17	2		3	… stimulate C losses - edit and cite White et al., 2000 here. (Andrei Kirilenko, University of North Dakota)	
E-12-273	A	17	3		4	Suggest to change this sentence to "Changing climate and increasing CO2 concentrations will have positive and negative effects on wood quality; overall effect is unknown" (Andrei Kirilenko, University of North Dakota)	Will be addressed
E-12-274	A	17	6	17	11	The issue of reduced water availability is not restricted to conifers or central and southern Europe, for example in the UK there is considerable concern over the sensitivity of beech (Fagus sylvatica) to drought (which is also likely to be an issue in central europe). See Broadmeadow MSJ, Ray D, Samuel CJA (2005) Climate	Will be considered

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						change and the future for broadleaved tree species in Britain Broadmeadow MSJ, Ray D, Samuel CJA. FORESTRY 78 (2): 145-161. (Michael Morecroft, Centre for Ecology and Hydrology)	
E-12-275	A	17	6			Sentence confusing - does this mean in the south of Central and S. Europe if so reword otherwise delete "in the south". (Paula Harrison, University of Oxford)	OK. Will be corrected
E-12-276	A	17	10	17	10	LAI … should be used full term (no other appearance in the Chapter, no explanation) (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	See glossary
E-12-277	A	17	10			Define LAI (Clare Goodess, University of East Anglia)	Glossary
E-12-278	A	17	14	17	14	Pereira et al., 2006 is quoted as Pereira et al., 2005 in the bibliography (Michele Colacino, ISAC-CNR)	Ok. Correction will be made
E-12-279	A	17	14			Pereira et al (2006) is referenced as Pereira et al (2005) in list (Clair Hanson, IPCC TSU)	OK
E-12-280	A	17	17		19	Compare to your earlier statement on pg.16/31-33 (Andrei Kirilenko, University of North Dakota)	Will be taken into account
E-12-281	A	17	25	17	25	spell out "carbon" (Erik Kjellström, SMHI)	NO applicable
E-12-282	A	17	35			Might be helpful to give some examples of what is meant by 'phenology', i.e. types of changes expected. (Clare Goodess, University of East Anglia)	See glossary
E-12-283	A	17	36	17	36	Lloret et al., 2005 is quoted as Lloret et al., 2004a (Michele Colacino, ISAC-CNR)	OK
E-12-284	A	17	36			Lloret et al (2005) not in ref list (Clair Hanson, IPCC TSU)	OK. Will be corrected
E-12-285	A	17	37		40	could join these two sentences together as the first is very short (Clair Hanson, IPCC TSU)	OK
E-12-286	A	18	8	18	8	Yes, ice melt can only occur when a lake or river is present! :-) (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	OK
E-12-287	A	18	8	18	8	replace "when" with "than" (Malcolm Haylock, University of East Anglia)	OK
E-12-288	A	18	34	19	38	Section 12.4.6 Biodiversity: This section dos not cover the field at all adequately. There are very important impacts on biodiversity occurring and predicted in all the habitats mentioned in section 12.4 but these are not desrbied either in those sections or in 12.4.6. For example: sea level rise is likely to have major impacts on the haul-out sites used for breeding nurseries and resting by seals, including the endangered	Agree. This should have been corrected in the previous version. Action was taken but apparently the reviewer

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Mediterranean Monk Seal (Monachus monachus), which uses a limited number of cave sites (Harwood, J. (2001) Marine mammals and their environment in the twenty-first century. Journal of Mammalogy, 82, 630-640.); Increased sea temperatures are associated with increased large scale disease-related mortality events of Striped Dolphins in the Mediterranean and of seals in Europe (Geraci, J. R. & Lounsbury, V. (2002) Marine mammal health: holding the balance in an ever changing sea. Marine mammals: biology and conservation. P. G. H. Evans and J. A. Raga. New York, Kluwer Academic/Plenum Publishers: 365-384.); Seals that rely on ice for breeding are likely to suffer considerable habitat loss with a decrease in sea ice extent, particularly vulnerable may be species that are confined to inland seas and lakes, such as the Caspian Seal (Phoca caspica), the Baikal Seal (Phoca siberica, and subspecies of the Ringed Seal (Phoca hispida lagodensis and P. h. saimensis) which will be limited in their ability to track the receding ice cover (Harwood 2001 - see above). Sea level rise will reduce the habitat availability of bird species that nest or forage in low-lying coastal areas, particularly where 'hard' sea-defences are in place that will cause 'coastal squeeze'. This is particularly important for the internationally important populations of shorebirds that breed in the arctic and then winter on European coasts in winter (Rehfisch & Crick 2003, see above). Lowered water tables and increased anthropogenic use and abstarction of water from inland wetlands are likely to cause serious problems for the large populations of migratory birds and bats that use these areas while on migration within Europe and between Europe and Africa (Robinson et al 2005, already in refs). (Humphrey Crick, British Trust for Ornithology)	does not seem it was enough. From line 3-4, delete the sentence: "This is because warming in some of the cooler northern ranges of species is likely to create new opportunities for colonisation". From line 6-7, delete: "This is because few amphibian species would be able to survive the expected drier conditions (see also Teixeira and Arntzen, 2002)". We would happily include references to invertebrate work but unfortunately the reviewer does not support his statement of the missing "substantial amount of invertebrate work" with useful references (I have written to the reviewer to ask further guidance concerning impacts on invertebrates).
E-12-289	A	18	36	18	39	The references provided here refer not just to plants but also to animals; so the sentence should read "….European plant and animal species". Useful additional references to include here are Robinson et al. 2005 (already in the reference list); Learmonth, J.A., MacLeod, C.D., Santos, M.B., Pierce, G.J., Crick, H.Q.P. & Robinson, R.A. (2006) Potential effects of climate change on marine mammals. Oceanography and Marine Biology: An Annual Review 44: 431-464; Crick, H.Q.P. (2004) The impacts of climate change on birds. In Rehfisch, M.M., Feare, C.J., Jones, N.V. & Spray, C. (eds) Climate Change and Coastal Birds. Ibis146 (suppl.1): 48-56; Rehfisch, M.M. & Crick, H.Q.P. Predicting the impact of climate change on Arctic Breeding waders. Wader Study Group Bulletin 100: 86-95. (Humphrey Crick, British Trust for Ornithology)	To be included.
E-12-290	A	18	37	18	38	I am surprised that none of the Menzel references on observed changes in phneology are included, given that they are heavily used in Chapter 1 e.g. Menzel et al (2005). Global Ecology and Biogeography, Menzel (2003) Climatic Change 57, 243	Include the following sentence and reference: (…) "expand nortward (supported by ground-truth example of Walther et al. 2005) (…)"

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Pam Berry, University of Oxford)	
E-12-291	A	18	37			Section 12.4.6 This section is badly put together and needs re-writing, the first paragraph starts off refering to plants but cites a number of papers such as those of Parmesan and Hickling which are principally about animal groups. The second paragraph majors on Araujo's work on amphibians and reptiles, including a figure, but doesn't deal with the substantial amount of invertebrate work which is cited inappropriately in the first paragraph. This section really MUST be changed so that other authors' work on animal groups is treated properly, at the expense of some of the space given to the Araujo study if necessary. I raised this issue more gently in the last draft and I am sorry to see that the authors have not taken this on board - given that Araujo is an author of the chapter, this will look very bad indeed if it is published in this form. (Michael Morecroft, Centre for Ecology and Hydrology)	I am afraid there are already complaints that this study (Araújo et al. 2006) uses too much space in the report (7 lines), but a reference to figure 12.3 can be made in the end of the sentence.
E-12-292	A	18	39	18	39	Reference Austin and Rehfisch, 2005, is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	OK
E-12-293	A	18	46	18	46	A ground-truth example for verification of the modelling results (-> northward range expansion of plants) mentioned in this section is provided by Walther G.-R., Berger S. & Sykes M.T. (2005) An ecological 'footprint' of climate change. Proceedings of the Royal Society London, Biological Series 272, 1427-1432 (Gian-Reto Walther, Institute of Geobotany, University of Hannover)	OK
E-12-294	A	19	8	19	9	This sentence is far too generalised and needs explanation plus supporting with references (Paula Harrison, University of Oxford)	Agree. The first sentence of the legend could end with (assuming unlimited dispersal)
E-12-295	A	19	11	19	11	delete first ")" (Malcolm Haylock, University of East Anglia)	Comment in agreement with two other comments from the governments. The suggestion is to pick up projections for only one scenario (e.g. A1) and make the correction on the Hadley centre acronym.
E-12-296	A	19	22	19	22	"Woody plants and shrubs" does not make sense. Change to either "Woody plants" or "Trees and shrubs". (Shrubs are indeed woody plants). (Ulf Molau, Göteborg University)	Legend will be changed following recommendation from the Government of Finland.
E-12-297	A	19	30			Caption to Fig 12.3 Should include (as in text) that this is with unlimited dispersal (Pam Berry, University of Oxford)	Legend will be changed following recommendation from the Government of Finland.
E-12-298	A	19				The caption for Figure 12.3 is still confusing. It's HadCM3 not HadCm3 and with there being so little visible difference between the difference SRES scenarios during the 2050s why not just use the results for the 2080s. Then the figure can be bigger.	Changed

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Matthew Livermore, University of East Anglia)	
E-12-299	A	19				Figure 12.3: The legend is not very easy to understand from line 33 to 36 (Paula Harrison, University of Oxford)	Changed
E-12-300	A	19				Fig 12.3 caption is confusing. What exactly do the blue and green areas represent? (Clair Hanson, IPCC TSU)	Changed
E-12-301	A	20	5	20	18	There is confusion about the term yields in this paragraph. The situation as described is that yield per unit area is predicted to increase (ie. productivity) but the area for agriculture is also predicted to decline - so what will be the overall effect on crop PRODUCTION in Europe? I would also expect a comment about how CC in Europe might affect food quality as well as quantity. Lower yields often mean higher quality. (John Porter, The Royal Veterinary and Agricultural University)	Crop production will be more affectred by food and fibre demand and political decisions than climate change impact. Thus, in this paragraph we reported only the impact on productivity. No spefic reference are available about the impact of CC on yield quality
E-12-302	A	20	5	20	18	This passage should give numbers for the "small" increases, insert: For winter wheat in England and Wales, Richter and Semenov (2005) have simulated increases from 15 to 23 % until the 2050s, based on the Medium-High scenario of regionalised HadCM2. These results were confirmed in a study extended to more recent climate change scenarios (HadCM3) and are summarised in a report to DEFRA (Richter et al. 2004). (www2.defra.gov.uk/science/project_data/DocumentLibrary/CC0368/CC0368_2604_FRP.doc). For sugar beet, the situation is slightly different because it is a spring-sown crop with drought risk but also positive (+14 to 20% by the 2050s and 17 to 30 % by 2080s) depending on the emission scenario (B2 or A2). (Goetz Michael Richter, Rothamsted Research)	Cheked and included
E-12-303	A	20	6	20	9	This is hardly what the Rounsevell et al 2005 article cited really shows. It seems most unlikely that there will be an increase in wheat production, due to water limitation, and lack of genuine scope to move the crop northwards. What precisely are the "better practices" to be expected in EU15? (David Viner, University of East Anglia)	In these two paragh we speak about crop productivity (yield per unit area) and not of crop production (see above comments to John Porter)
E-12-304	A	20	13		13	Cite (2005. Alcamo J., Endejan, M., Kirilenko, A.P., Golubev, G.N., Dronin N.M. Climate Change and its Impact on Agricultural Production in Russia // In: eds. E. Milanova, Y. Himiyama, I. Bicik. Understanding Land-Use and Land-Cover Change in Global and Regional Context. Science Publishers, 35-46.) for yield reduction in S European Russia (Andrei Kirilenko, University of North Dakota)	Done
E-12-305	A	20	18			No information in this sentence. Either remove or be more specific (ranges, +-effects, "best" scenario, etc.) (Andrei Kirilenko, University of North Dakota)	OK, I removed the sentence, since there is no room for additional explanetions

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-12-306	A	20	24	20	24	what are the 26 crops? (John Porter, The Royal Veterinary and Agricultural University)	I have reported the four main groups with some examples
E-12-307	A	20	24			give examples of some energy crops. Perhaps rename to biofuels? (Clair Hanson, IPCC TSU)	See above
E-12-308	A	20	26	20	28	It is not clear if the effects of extreme weather events are related to energy crops (previous sentence) or crops in general (Yannis Sarafidis, National Observatory of Athens)	It is related to crops in general, as reported in following sentence
E-12-309	A	20	27	20	27	Add Beniston et al., 2006 to these references. (Erik Kjellström, SMHI)	OK
E-12-310	A	20	43			Define BT, AHS (Clare Goodess, University of East Anglia)	These acronyms are already defined in the text.
E-12-311	A	20	47	21	26	Work by Clark et al 2003 has shown that cod stocks in the southern North Sea are extremely vulnerable to climate change and are likely, as a result of entrainment limits, to become extent. This work used the results from a number of HadCM3 based climate change scenarios. Clark R.A., Fox., C., Viner D. and Livermore M. 2003 North Sea cod and climate change - modelling the effects of temperature on population dynamics. Climate Change Biology 9. 1-12 (David Viner, University of East Anglia)	Addressed: Reference added already see page 39 line 12, corresponding to citation on p. 21 line 2
E-12-312	A	20				Section 12.4.7. No mention of the impact on economic margins or certain enterprises becoming economically unviable. Similarly no mention of whether these impacts will make is hard for producers to meet EU and national production targets. (Matthew Livermore, University of East Anglia)	Reference and slight wording change Page 21 line 11, replace “still limited (” by: “still limited but likely to be substantial for some highly dependent communities and entreprises (Anadón et al, 2005)
E-12-313	A	21	3			'exacerbate' not acerbate (Clair Hanson, IPCC TSU)	Done
E-12-314	A	21	4	21	4	How large are these "temperature changes"? What is the sensitivity? (Erik Kjellström, SMHI)	Added text after “Temperature changes”: “as low as”
E-12-315	A	21	5			Explain what is meant by 'potential trophic mismatch' (Clare Goodess, University of East Anglia)	Inserted after “mismatches”: “from different levels of response throughout the community and the seasonal cycle (Edwards and Richardson, 2004)”
E-12-316	A	21	7	21	12	Llope et all reference a change on phytoplankton as response to schanges in the stoichiometry of nutrients during winter period, asociated to changes in recurrence in coastal currents (Iberian Poleward current). Is a good example of the processes that incluence actually and in the future the trophic relationships in the pelagic communities.I suggest to introduce this reference with the reference of Heath, 2005,	Inserted after “Heath, 2005”: “;Anadón R, et al, 2005”)

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						in line 7 Reference: Anadón R, Duarte CM, Fariña C (2005) Impactos sobre los Ecosistemas Marinos y el Sector Pesquero. In: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, p 147-182 (Ricardo Anadon, Universidad de Oviedo)	
E-12-317	A	21	8	21	12	These topics are considered in the above mentioned reference on impacts of climate changes on Spanish waters. I suggest to introduce this reference in line 8, because are compiled the actual information about changes related to climate or/and due to exploitation. Some responses to future climate change driving changes were also considered. I suggest the introduction of this reference in line 8 (see Klyashtorin, 2001; Sharp, 2003). Reference: Anadón R, Duarte CM, Fariña C (2005) Impactos sobre los Ecosistemas Marinos y el Sector Pesquero. In: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, p 147-182 (Ricardo Anadon, Universidad de Oviedo)	Addressed in line 11
E-12-318	A	21	8	21	8	Reference Sharp, 2003 is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	Reference added
E-12-319	A	21	18	21	22	In the above mentioned reference somo insights about increased harmful algal bloom around the sapnish coast, and their potential impacts on mollusc aquaculture are signaled and comented. I suggest to introduce this reference in line 21, after ……pathogens (Anadón et al, 2005). For instance, referenceas about the presence of Perkinsius, and the potential damage upon mollusc cultures due to rising SST, and upwelling reduction were indicated. The problem of primary production reduction, in these case as the reduction of upwelling in the NW coast of Iberian Peninsula were also considered.In general could by included as reference at the end of point 12,4,7,2 with (Boelens et al, 2005) (Ricardo Anadon, Universidad de Oviedo)	Inserted at line 21 after “pathogens” : (Anadón et al, 2005) Precision added below
E-12-320	A	21	25			can you give some examples of aquaculture impacts on the environment? (Clair Hanson, IPCC TSU)	Inserted at line 25 after “impacts”: “locally from particulate organic wastes and the spread of pathogens to wild populations” Add reference line 26 replace “2005)” by: “2005; SECRU, 2002)
E-12-321	A	21	27	21	27	Is there no information about impacts of changing salinity? (Erik Kjellström, SMHI)	Replaced at line 14 “NAO,”: by “NAO, changing salinity,”
E-12-322	A	21	33	21	47	Rather too many 'wills' - maybe rephrase to give a better reflection of the uncertainties. (Clare Goodess, University of East Anglia)	Text rephrased to better reflect uncertainty

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E-12-323	A	21	33	21	47	Is it possible to specify the reference period for the percentages of increase / decrease in this paragraph? (Yannis Sarafidis, National Observatory of Athens)	Reference period specified.
E-12-324	A	21	34		36	I am not a specialist in energy, by unifying the UK and Russia into one winter heating demand group looks strange. A reference is needed. (Andrei Kirilenko, University of North Dakota)	References added. UK and Russia had similar changes in demands.
E-12-325	A	21	43	21	47	Due to extreme weather events the amplitude of on-peak loads for all energy systems will increase. (Alexander Golub, Environmental Defense)	Sentence added
E-12-326	A	21	50			which scenario? (Clair Hanson, IPCC TSU)	Info on scenario added
E-12-327	A	21	50			Which one scenario do you consider here? (Andrei Kirilenko, University of North Dakota)	Info on scenario added
E-12-328	A	22	1	22	2	Stress the uncertainty in the choice of GCM. (Erik Kjellström, SMHI)	Done
E-12-329	A	22	9			Hanson et al 2006 - this reference does not support this statement (Clair Hanson, IPCC TSU)	Reference corrected
E-12-330	A	22	20		28	This paragraph is too vague. How will the passenger comfort be affected and why the AC will not be preferred over changing the mode? How the mode of transportation will be affected? Will the demand for travel be changed? Energy for transport? (Andrei Kirilenko, University of North Dakota)	CA to reply
E-12-331	A	22	21	22	21	Please insert ")" after "2002" (Ileana Mares, Romanian Academy of Technical Sciences)	Ok
E-12-332	A	22	31	23	3	The section on tourism is particularly weak, tourism is probably the largest single industry in Europe yet this chapter affords less space than minor economic sectors such as aquaculture. Tourism is subject to a series of interactions between climate:the environment and tourism and these have been discussed in Viner, 2006.: (Viner D. 2006 Tourism and its Interactions with Climate Change. Journal of Sustainable Tourism Vol 14 Nos. 4). For lines 38 to 39 implicit mention of the Tourism Comfort Index could be used, the reference for this is Amelung and Viner, 2006 (already used in this section). Also there is a need to address in this section or the section on agriculture the diversification of the agriculture in N.W. Europe into new sectors such as tourism as a result not only of changing agricultural conditions but also because of an improving climate for tourism. This is described in Viner et al., 2006. (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006 Climate Change and the European Countryside: Impacts on Land Management and Response	Refs added and TCI mentioned. Text modified to incorporate suggestions.

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						Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages.). (David Viner, University of East Anglia)	
E-12-333	A	22	31	23	3	"much" does not reflect the content of 12.4.9, does it reflect the content of the research quoted? (Jean-Paul Ceron, CRIDEAU (Université de Limoges-CNRS-INRA))	??
E-12-334	A	22	34			the phrase 'will lead to' is perhaps overly certain given the possible range of climate scenarios, such a statement perhaps holds for A1F1 scenario but not likely for a B2 scenario (Daniel Scott, University of Waterloo)	Text changed to reflect uncertainty
E-12-335	A	22	36			"Greece and Spain" (Paula Harrison, University of Oxford)	Ok
E-12-336	A	22	38	22	39	The sentence starting Summer Conditions should / could be replaced with: Conditions for tourism as described by the Tourism Comfort Index (Amelung and Viner, 2006) will improve in North Western Europe (Hanson et al, 2006). (David Viner, University of East Anglia)	Text replaced with suggestion
E-12-337	A	22	38	22	38	"will improve". Get warmer? Changes in precip? In what way will it be improved??? (Erik Kjellström, SMHI)	Text changed and made clear
E-12-338	A	22	38			summer conditions for (add) 'tourism' will improve' (Daniel Scott, University of Waterloo)	Text changed
E-12-339	A	22	41	22	48	This paragraph concerns mainly the Alps. The Scandinavian mountain range may be a relative winner as the conditions will deteriorate much quicker in the Alps. (Erik Kjellström, SMHI)	Text made more clear
E-12-340	A	22	44	22	45	Altitude range is probably highly dependent on location. (Erik Kjellström, SMHI)	Location dependancy added in text
E-12-341	A	22	45	22	45	Please replace " Kundewicz" with the correct name "Kundzewicz" and "Beniston at " with "Beniston et" (Ileana Mares, Romanian Academy of Technical Sciences)	Replaced
E-12-342	A	22	45	22	45	Beniston at al. → Beniston et al. (Michele Colacino, ISAC-CNR)	Done
E-12-343	A	22	45			"et" instead of "at" (Paula Harrison, University of Oxford)	Done
E-12-344	A	22	47			changes in 'snow cover' are not equal to changes in 'ski seasons' and the two should not be used interchangably or in the same paragraph where they may be confused. No one can ski when there is just snow cover (2.5 inches or 5 cm) and the reduction in days with natural snow depth suitable for skiing (usually 30 cm or more) is typically higher. Also, that none of these studies consider impacts with	Text modified to incorporate point on snowmaking adaptation

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						snowmaking adaptation is an important point to make here (as well as in the adaptation section on page 28) (Daniel Scott, University of Waterloo)	
E-12-345	A	22				Section 12.4.8.2 reads like a list. Needs fleshing out. (Matthew Livermore, University of East Anglia)	Text changed
E-12-346	A	22				12.4.8.2 reads like a list (Clair Hanson, IPCC TSU)	Text changed
E-12-347	A	23	0	24	0	Human health section should be extended. Issues of temperatute and health should be covered more extensively, also global warming and vector diseases, etc. Temperature as confounding factor for local pollution should be discussed. (Alexander Golub, Environmental Defense)	Human health section expanded to one AR-4 page, in line with other regional chapters. There is insufficient space to discuss the interations between temperature and pollution exposures, but this and other named issue is addressed in chapter 8.
E-12-348	A	23	19			insert 'increases' after 'maximum wind speed' (Clair Hanson, IPCC TSU)	Disagree. It is OK as it is.
E-12-349	A	23	24			Foresight Programme (2004) not in ref list (Clair Hanson, IPCC TSU)	**OK**. It should be : Foresight Programme, 2004: *Future Flooding*, Flood and Coastal Defence project of the Foresight programme, Office of Science and Technology, London, UK
E-12-350	A	23	29	23	29	This sentence as it stands expresses a quite universal fact, with three Refs to back it up! Isn't meant that there is an increase in that phenomenon over the last years (decades)? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	The sentence is revised to describe current sensitivity to climate variability and not changes over decades. At present: "The mechanism by which temperature affects human health in Europe differs between cold and warm weather (Ballester *et al,* 2003; Beniston, 2002; Braga *et al.,* 2001; Keatinge and Donaldson, 2004)". .
E-12-351	A	23	34	23	36	The causal effect of cold conditions in winter is completely different to the direct impact of heat load: Cold conditions forward influenza and other infectious diseases. Correctly Ch 8, p. 29 l 9-12 are more balanced formulation is used that I suggest to adopt. (Gerd Jendritzky, Meteorological Institute, University of Freiburg)	Text has been revised to address this..
E-12-352	A	23	39	23	42	Are these observed migrations related to climate change? (Erik Kjellström, SMHI)	Text revised: "Global warming could change habitats for a number of disease-transmitting agents and

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							extend their ranges to the North and higher altitudes, but strong evidence is relatively scant (Hunter, 2003; Kovats *et al*., 2001). The integrated with environment and social situations analysis bases an opinion about the absence of climate change directional influence on today's tick-borne disease levels (Bröker and Gniel, 2003; Dept of health, 2002; Korenberg, 2004; Kuhn *et al*., 2004; Molyneux, 2003; Randolph, 2002; 2004)".
E-12-353	A	23	40	23	40	TBE… should be used full term (no other appearance in the Chapter, no explanation) (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	Adressed
E-12-354	A	23				Section 12.4.11 - no mention of Europe's aging population or the debate surrounding vulnerable sub-populations or the economic discrimination of impacts. (Matthew Livermore, University of East Anglia)	Addressed. The vulnarable populations are identified for all principal impacts.
E-12-355	A	24	3			instead of "warmer temp..." "higher air temp..." (Gerd Jendritzky, Meteorological Institute, University of Freiburg)	Text no longer present
E-12-356	A	24	4	24	4	Pirard, 2005 is Pirard et al., 2005 (Michele Colacino, ISAC-CNR)	Addressed
E-12-357	A	24	5			insert 'also' after 'might' (Clair Hanson, IPCC TSU)	Adressed
E-12-358	A	24	9	24	9	Insert 't' into 'constrains'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Adressed
E-12-359	A	24	13	24	14	Increasing water stress is not just a problem for southeastern europe e.g. it is a concern in some parts of Great Britain. (Michael Morecroft, Centre for Ecology and Hydrology)	In the subchapter 12.4.1 was mentioned that water stress might increase in Great Britain, Italy Greece, the Balkan region and large areas Central and Eastern Europe. The highest increase in water stress is
E-12-360	A	24	17	24	17	However, other options however … the second however should be omitted (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	Accepted: second however is deleted
E-12-361	A	24	17	24	17	Delete second 'however'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Accepted, see E-12-360
E-12-362	A	24	17			however' repeated (Clair Hanson, IPCC TSU)	Accepted, see E-12-360
E-12-	A	24	17			"however" included twice	Accepted, see E-12-360

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363						(Paula Harrison, University of Oxford)	
E-12-364	A	24	21	24	36	Building of dums is not a sufficient adaptation strategy. (Alexander Golub, Environmental Defense)	The building of dams was mentioned only as one of the possible measures of adaptation strategy. More over, we agrre that to build the dams has some serious limitations
E-12-365	A	24	31	24	33	Can you give an idea of where - region/in what bodies - these discussions are taking place? (Clare Goodess, University of East Anglia)	Rounswell 's article is excluded from the text
E-12-366	A	24	36			Also in: Balajka, J, Lapin, M., Mindas J., Princova, H., Stastny P., Szamesova, J., Thalmainerova D. (2005): The 4th Slovak National Communication on Climate Change, Slovak Ministry of the Environment, Bratislava 2005, 138 pp., http://unfccc.int/resource/docs/natc/slknc4.pdf (Milan Lapin, Faculty of Mathematics, Physics and Informatics, Comenius University)	Not accepted. The mentioned document more refers to mitigation of grennhouses gases, and deals less with the adaptation measures to climate change indiuced chnages in water sectors
E-12-367	A	24	41	24	42	Reference Vermaat et al., in press is quoted as Vermaat et al., 2005 (Michele Colacino, ISAC-CNR)	Check reference
E-12-368	A	24	47	24	49	This statement has not much to do with adaptation. It should be moved to the respective earlier section (or deleted). (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	This statement is in correct place
E-12-369	A	24	47	24	49	The Spanish Secretary of the Environment has modelled the coast of Spain (see Spanish Strategy of Fight against Weather Change, page now in construction http://www.mma.es/portal/secciones/cambio_climatico/documentacion_cc/estrategia_cc/index.htm) and several impacts on coast including beach losses, delta subsiding, docks and other coastal, structures were described. The prognosis is based in a modelled climate change scenario and support detailed description of the vulnerabilities in each Spanish coast: North Atlantic and Bay of Biscay, South Atlantic and Mediterranean, as well on islands, Canary and Balearic archipelagos. I suggest introducing this reference on line 48 (Ricardo Anadon, Universidad de Oviedo)	This reference will be taken into consideration
E-12-370	A	25	2			Nicholls and Klein, in press not in ref list (or should this be N&K, 2004?) (Clair Hanson, IPCC TSU)	will be checked
E-12-371	A	25	5	25	5	Hansom → Hanson (Michele Colacino, ISAC-CNR)	accepted
E-12-372	A	25	5			Hansom et al (2004) not in ref list (or should this be Hanson et al (2004)?) (Clair Hanson, IPCC TSU)	accepted
E-12-373	A	25	5			Hansom et al (2004) not in ref list (or should this be Hanson et al (2004)? - if so, this reference does not support this statement)	accepted

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						(Clair Hanson, IPCC TSU)	
E-12-374	A	25	10	25	10	Devoy et al., 2000, in press must be correct as Devoy et al., 2000, Devoy in press (Michele Colacino, ISAC-CNR)	accepted
E-12-375	A	25	14			should this be Vermaat et al, 2005? If not then Vermaat et al, in press isn't in the ref list (Clair Hanson, IPCC TSU)	will be checked
E-12-376	A	25	18	25	18	Change from "sub arctic" to "subarctic" in the heading. (Ulf Molau, Göteborg University)	Addressed
E-12-377	A	25	23	25	29	The idea of managed high elevation gardens is new and appealing, and should be developed further. There are botanical gardens in mountain areas in Europe but at lower elevations and not really in situ. These gardens also host large numbers of locally alien species. To be successful for in situ conservation, hotspots of alpine species richness should be selected (easy task) for implementation of managed gardens for native species only (to remove the threat of aliens and genetic erosion), where the pressure from immigrating boreal species can be released through maintenance. I eagerly support this idea! (Ulf Molau, Göteborg University)	A wider discussion on this idea cannot be placed here because of lack of supporting paper on this topic.
E-12-378	A	25	26	15.5	26	(Guisand Theurillat, 2005 must be corrected as (Guisand and Theurillat, 2005) (Michele Colacino, ISAC-CNR)	Addressed
E-12-379	A	25	35	25	46	It is not just mixed species but the combination of mixed spp with an uneven-aged structure that promotes resilience, eg the Couvet example.Viner et al., 2006. (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006 Climate Change and the European Countryside: Impacts on Land Management and Response Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages.). (David Viner, University of East Anglia)	Will be addressed. The text will be changed
E-12-380	A	25	35		46	The last sentence should be moved to line 37, right between the double commas as an example of changing the species composition to more suitable for the new climate. (Andrei Kirilenko, University of North Dakota)	Will be addressed
E-12-381	A	25	49	25	51	Capacity increase for forest fire fighting should be mentioned as an element of the adaptation strategy. (Alexander Golub, Environmental Defense)	Will be addressed
E-12-382	A	25	50			grater --> greater (Clair Hanson, IPCC TSU)	Addressed
E-12-383	A	25	50			"greater" spelt incorrectly (Paula Harrison, University of Oxford)	Addressed

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E-12-384	A	26	15	26	29	Statements in this section on the adoption of better management practices can be supported by the results from the CLIO Project , Viner et al, 2006 (Viner D., Sayer M., Uyarra M., and Hodgson N., 2006ÊClimate Change and the European Countryside: Impacts on Land Management and Response Strategies. Report Prepared for the Country Land and Business Association., UK. Publ., CLA, UK 180 pages.) (David Viner, University of East Anglia)	Addressed
E-12-385	A	26	17	26	29	Are there any references which could be given in this section? (Clare Goodess, University of East Anglia)	References has been included
E-12-386	A	26	17		29	Some references would help here. (Andrei Kirilenko, University of North Dakota)	References has been included
E-12-387	A	26	27	26	27	insert "could" before "re-locating" (Malcolm Haylock, University of East Anglia)	Addressed
E-12-388	A	26	27			Word missing - "This could involve?" (Paula Harrison, University of Oxford)	Addressed
E-12-389	A	26	27			relocating --> relocate (Clair Hanson, IPCC TSU)	Addressed
E-12-390	A	26	32	27	5	Section 12.5.6 Biodiversity: A key element that needs to be mentioned here is that the majority of international and national legislative instruments and treaties do not take climate change into account within their working. The Convention for the Conservation of Migratory Species and the Ramsar Convention on Wetlands have both explicitly passed resolutions that require signatories to take climate change impacts and the impacts of conservation measures on climate change into account, within the context of the conventions. Such measures are very important and will alllow the exploitation of synergies between treaties and conventions, such as joint work programmes, that will provide increased value, focus and facilitate the development of key priorities (Robinson et al 2005). A further point that would be valuable to make is that in most cases policies aiming to permit biodiversity adapatation to climate change needs to be integrated with other economic, social and conservation priorities. In Europe, particularly, there is scope for the incorporation of the needs of climate change adaptation into the agri-environment schemes that are prevalent. It is much more likely that conservation goals will be achieved if theyr are part of ecosystem managemenet with wider aims such as floodpalin management, coastal protection and prevention of deforestation. Frameworks for integrated landuse planning may well be the key here (Robinson et al 2005). The key for the conservation of many species is to maintain large population sizes and to reduce other anthropogenic pressures on wildlife populations and their habitats - for	Reference to the international conventions was added

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						marine species there is little scope for adaptation except through reduction in exploitation, through, for example marine protected areas (Robinson 2005) . A final point with respct to marine species is that the lack of potential scope for adapation measures strengthens the need for climate change mitigation to preserve the biodiversity and economic value of this biome. (Humphrey Crick, British Trust for Ornithology)	
E-12-391	A	26	32	27	5	Migratory species are particularly vulnerable to loss of habitat outside of Europe, for example the Pink Footed Goose, of which over 50% of the World's population winters at Holkham UK is likely to be impacted by the loss of its summer habitat in the tundra (Viner et al, 2006). It is unlikely therefore, that adaptation through establishment of reserves is going to be of much benefit. (David Viner, University of East Anglia)	Ref to migratory species added.
E-12-392	A	26	32			Section 12.5.6: Would benefit from reference to EU conservation policies mentioned earlier in this chapter (page 8, lines 46 to 48). Climate change threatens the assumption of static species ranges which underpins current conservation policy. The ability of countries to meet the requirements of EU Directives may be compromised by climate change, and a more dynamic, holistic, international strategy for conservation is critical for sustaining biodiversity in the context of climate change. See "Policy implications" section of Harrison et al. (2006) paper (listed on page 45) for discussion on these issues and other adaptation strategies. (Paula Harrison, University of Oxford)	Reference to EU policies added.
E-12-393	A	26	32			Another adaptation option is translocation e.g. Edgar, P.W., Griffiths, R.A. Foster, J.P., 2005. Evaluation of translocation as a tool for mitigating development threats to great crested newts (Triturus cristatus) in England, 1990–2001. Biological Conservation 122, 45-52. (Pam Berry, University of Oxford)	Ref to translocation added.
E-12-394	A	26	37	26	39	Confusing sentence - seems to state that little has been done on both 'in situ' and 'ex situ' conservation strategies but worded for each in different ways - needs rewriting to make clearer. (Paula Harrison, University of Oxford)	Rewritten
E-12-395	A	26	50	26	51	Harrison et al. (2006) quote that the expansion of reserves should be focussed towards or immediately beyond the northern or north-eastern edge of the species' current range. (Paula Harrison, University of Oxford)	Not always true. Analyses actually suggest that most conservation areas should be selected in the south of Europe where southern ranges of several rare species might contract.
E-12-396	A	26				12.5.5 there are no references in this section (Clair Hanson, IPCC TSU)	
E-12-	A	27	1			Minimising large east-west barriers may also be helpful. Also, much species'	

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397						movement will be across managed land and here more environmentally friendly management techniques would help - link to new CAP. (Paula Harrison, University of Oxford)	
E-12-398	A	27	8			Metzger, M.J., Rounsevell, M.D.A., Leemans, R., Schröter, D. The vulnerability of ecosystem services to land use change. Submitted to Agriculture, Ecosystems and Environment, February 2005 (Pam Berry, University of Oxford)	The reference was considered
E-12-399	A	27	13		16	Insert: Simulated yield advantages for wheat varieties with higher drought resistance and longer grain-filling can be as high as the yield increase due to climatic effects (T * CO2); Richter and Semenov, 2005. (Goetz Michael Richter, Rothamsted Research)	OK
E-12-400	A	27	14		16	Add …however this option may be limited by soil fertility, e.g. in the N. Russia. (Andrei Kirilenko, University of North Dakota)	Done
E-12-401	A	27	16	27	16	The Rounsevell et al 2006 article has been misunderstood. It does not support the preceding sentence at lines 14 to 16. (David Viner, University of East Anglia)	The sentece was removed
E-12-402	A	27	19	27	19	In our paper (Schröter et al. 2005) we also suggested to use the opportunity to extensify. (Dagmar Schroeter, Potsdam Institute for Climate Impact Research)	OK, we inclused also your reference
E-12-403	A	27	24	27	24	Is there any adaptation strategies for extreme weather events? (Alexander Golub, Environmental Defense)	The strategies reported in the first sentence of the section can be used for mean extreme changes in climate.
E-12-404	A	27	40	27	41	I wonder whether the phrase 'and urgently need to be developed' (with ref! -- or is the ref for the fact that these plans are lacking?) should be in the Report. Is it the remit of the authors to tell the reader what should be done? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	I will conctact the contributing author Sophie de Clers
E-12-405	A	27	46	27	47	I suggest to interchange the order of the measures, since the modification of human behavior is by far the most difficult (and unlikely, unless forced) (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Order changed to follow suggestion
E-12-406	A	27	50	28	1	It is clear that unfavorable climate affects both energy users and producers. However, I think that it would be more helpful if you split this sentence into two, one refering to energy use and the other to energy production as the effects are different though related. Energy users could face unsatisfied demand resulting in lower comfort levels while security of supply and high investment costs for covering peak demand are issues related to the energy producers. (Yannis Sarafidis, National Observatory of Athens)	Text left as is
E-12-	A	27	50			the Hanson et al (2006) reference would be better placed at the end of the paragraph	Reference placed at end of paragraph

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407						on p28 line 3 (Clair Hanson, IPCC TSU)	
E-12-408	A	27	51	27	51	Insert 'impacts of' before 'unfavorable'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Inserted
E-12-409	A	28	7	28	10	This sentence does not make sense (Malcolm Haylock, University of East Anglia)	Sentence made clear
E-12-410	A	28	7		7	I can't recall this kind of climate change impacts in the literature. Use less dramatic examples - such as increased incidents of high wind and high rainfall events. (Andrei Kirilenko, University of North Dakota)	I will conctact the contributing author Abigail Bristow
E-12-411	A	28	8			reword (Paula Harrison, University of Oxford)	Sentence reworded
E-12-412	A	28	13	28	30	Little research has been undertaken on how tourism resorts can adapt in a sustainable manner to climate change. The bullet point starting: "Adaptation of seaside tourism to sea level rise....." can not really be justified and is not based upon any published research. There is also the option for managed retreat, redesign of coastal defences to provide an enhanced soft-option for coastal defence. Also if we follow the underlying socio-economics of the A1 scenario would could see the development of offshore barriers that would expand the tourism sector (see Pinnegar, J.K., Viner D., Hadley D., Sye S., Harris M., Berkhout F. and Simpson M. 2006 Alternative future scenarios for marine ecosystems. Technical Report. CEFAS, Lowestoft 109pp). (David Viner, University of East Anglia)	Text rephrased to follow suggestions
E-12-413	A	28	13			Section 12.5.9: Reading this section I get the impression that the impacts on the tourism industry are a major problem for humanity. Certainly the tourism industry will adapt, but does this need 'scientific' encouragement (... "will need to promote ...")?. And isn't LESS tourism also an option, with many positive side effects for the environment!?? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Text rephrased but less tourism will not help the economy of a nation
E-12-414	A	28	15	28	18	This paragraph can be further supported by use of the Amelung and Viner, 2006 reference (See above). (David Viner, University of East Anglia)	Reference added
E-12-415	A	28	21	28	23	It is more an issue related to resources requirement (water , energy), and efficiency (snowmaking will not be easier with higher temperatures, and this is a factor which seems specifically important for Europe, more than for America, see Scott) than to environmental impacts (on flora & fauna etc.)This is why I suggest to replace "environmental protection" by sustainability or sustainable development (Jean-Paul Ceron, CRIDEAU (Université de Limoges-CNRS-INRA))	Suggestion followed and text modified accordingly

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E-12-416	A	28	27	28	28	There is a typo in Line 27 it says “an made”, this should be “man made”. Also this bullet point is irrelevant, research suggests that as temperatures increase there is a decline in cultural tourism. It is likely that cultural tourism (as with other forms of tourism) will increase in the next decade or so irrespective of climate change. (David Viner, University of East Anglia)	Typo corrected
E-12-417	A	28	27	28	27	man-made' instead of 'an-made'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Typo corrected
E-12-418	A	28	27		27	man-made? (Andrei Kirilenko, University of North Dakota)	Typo corrected
E-12-419	A	28	27			man-made (Paula Harrison, University of Oxford)	Typo corrected
E-12-420	A	28	27			Man-made (Clare Goodess, University of East Anglia)	Typo corrected
E-12-421	A	28	45		51	references required (Clair Hanson, IPCC TSU)	I agree. Insert after first sentence (West and Gawith, 2005). The new reference details are: West, C.C. and Gawith, M.J. (Eds.) (2005) Measuring progress: Preparing for climate change through the UK Climate Impacts Programme. UKCIP, Oxford.
E-12-422	A	28	48	28	49	The sentence "Hence …retrofitted." could be deleted. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	I agree, it adds nothing.
E-12-423	A	29	6	29	6	Delete 'rescue'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Addressed
E-12-424	A	29	8	29	8	Delete 'serious'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Addressed
E-12-425	A	29	28			Please note that the case study of the 2003 heat wave in Europe is also used as a box illusatration (box 5.1) in chapter 5. (John Porter, The Royal Veterinary and Agricultural University)	Cross references to boxes in other chapters have be included
E-12-426	A	29	34			instead of "(Schär et al…)" (Schär and Jendritzky, 2004) because this publication adresses both the extreme summer in a long-scale climatological context and a mortality time series. (Gerd Jendritzky, Meteorological Institute, University of Freiburg)	Addressed
E-12-427	A	29	43	29	43	Reference EC 2005 is not quoted in the bibliography (Michele Colacino, ISAC-CNR)	Reference changed to Fink et al. (2004)
E-12-	A	29	43			EC, 2005 not in ref list	Reference changed to Fink et al. (2004)

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428						(Clair Hanson, IPCC TSU)	
E-12-429	A	29	45	29	45	I think is useful to describe here in few words the severe situation in the Danube basin in 2003 and I propose to introduce the following:" Also in September 2003, discharge level in the Danube lower basin reached the second extreme minimum since 1840 (Mares et al., 2006). This extreme event affected in Romania natural ecosystems, agriculture, water supply, energy demand, navigation, etc." (Ileana Mares, Romanian Academy of Technical Sciences)	Some text on the Rhine and Danube rivers have been included, indicating also the importance of glacier melt for river flow in these rivers based on Fink et al. (2004)
E-12-430	A	29	46			This estimate of 50,000 deaths seems very high, compared with others. Maybe also quote some other estimates or at least comment that estimates vary and this is at upper end. (Clare Goodess, University of East Anglia)	The main part of the mortality figures will be dealt with in the health chapter and lower figures are used here
E-12-431	A	29	46			The figure of 50,000 deaths seem high. The health chapter attributes a more conservative 35,000 deaths to the heat wave. Consistency? (Matthew Livermore, University of East Anglia)	See response to E-12-430
E-12-432	A	29	46		48	Line 46 Is 50,000 deaths correct? Figures I've seen are around 25-35000 and in 8.2.1.1 states it's 35000. Line 48 France is repeated (Clair Hanson, IPCC TSU)	See response to E-12-430
E-12-433	A	30	4	30	4	insert ", Portugal (Nogueira, 2005)" after (Michelozzi et al., 2005). Reference (Nogueira, 2005) is Nogueira, P.J., Examples of heat warning systems: Lisbon's ICARO's surveillance system, summer 2003, in Extreme Weather Events and Public Health Responses (Editors, W. Kirch, B. Menne and R. Bertollini), 2005, p. 141-160. (Filipe Santos, Universidade de Lisboa)	Addressed
E-12-434	A	30	5	30	33	Please insert a), b) c), etc. on the picture and please revise the description of Fig. 12.4, for me is not clear (Ileana Mares, Romanian Academy of Technical Sciences)	Addressed
E-12-435	A	30	30	30	33	I don't understand the caption labelling - especially the "a-d)" (Malcolm Haylock, University of East Anglia)	Addressed
E-12-436	A	30	30			Figure 12.4: The figure legend and graphs need to talk to each other. There are 4 graphs (a-d) but only (a-c) are described in the legend. (John Porter, The Royal Veterinary and Agricultural University)	Addressed
E-12-437	A	30	30			Figure 12.4: (a), etc. missing from figure and probably assigned incorrectly in legend, but difficult to know as currently shown. (Paula Harrison, University of Oxford)	Addressed
E-12-438	A	30	36			Section 12.6.2: Analyses of the changes in MOC in 15GCMs are covered in detail in WGI section 10.3.4. No mention is made here of this section and again shows no communication between WGI and WGII. Also the results here and Table 12.5	Section to be checked and syncronized

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						suggesting cooling over Europe contradict the findings of WGI which say that MOC negative feedback is far overshadowed by positive radiative forcing changes. I suggest delete this section and refer to WGI. (Malcolm Haylock, University of East Anglia)	
E-12-439	A	30	36			How does the results in 12.6.2 fit with the results in Ar4 WGI? (Erik Kjellström, SMHI)	Same E-12-438
E-12-440	A	30	39			Vellinga et al (2002) not in ref list (Clair Hanson, IPCC TSU)	check reference
E-12-441	A	30	40	30	40	Some of these references seem inappropriate. I don't think either Schaeffer et al 2002 or Gregory et al. 2005 discuss the impacts of rapid MOC change. On the other hand, an important reference to add here is [Jacob D., H. Goettel, J. Jungclaus, M. Muskulus, R. Podzun, J. Marotzke (2005), Slowdown of the thermohaline circulation causes enhanced maritime climate influence and snow cover over Europe, Geophys. Res. Lett., 32, L21711, doi:10.1029/2005GL023286.] This is the only study to date that uses a regional model to provide more detailed discussion of the impacts of a major MOC reduction on Europe. Also, while I hate to self-cite, I think it could be useful to add a reference to [Vellinga, M. and R.A. Wood, 2006: Impacts of thermohaline circulation shutdown in the twenty-first century. Climatic Change (in press)]. As far as I know this is the only study that studies the combined effect of a hypothetical MOC shutdown, after 50 more years of increasing greenhouse gases. I will send a copy to the TSU. (Richard Wood, Hadley Centre)	accepted and to update text
E-12-442	A	30	41	30	43	This statement is incorrect as it stands. The Vellinga and Wood 2002 paper discusses a (hypothetical) MOC shutdown in the preindustrial climate, while Wood et al. 2006 discusses a (hypothetical) shutdown in 2049 under IS92a. Neither discusses A2 explicitly. For a more complete reference for the IS92a experiment (showing many more fields) you might want to replace the Wood et al. 2006 reference with [Vellinga, M. and R.A. Wood, 2006: Impacts of thermohaline circulation shutdown in the twenty-first century. Climatic Change (in press)]. I suggest that [Jacob D., H. Goettel, J. Jungclaus, M. Muskulus, R. Podzun, J. Marotzke (2005), Slowdown of the thermohaline circulation causes enhanced maritime climate influence and snow cover over Europe, Geophys. Res. Lett., 32, L21711, doi:10.1029/2005GL023286.] should also be cited here. When their regional model is used to downscale the impacts of MOC shutdown, the cooling signal appears to penetrate further into Europe than the global model studies suggest. (Richard Wood, Hadley Centre)	accepted and to update text
E-12-	A	30	43	30	43	I don't think there is any evidence that an MOC shutdown would impact the NAO	point to check

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443						(certainly not from the papers cited). I suggest simply deleting ", as would the operation of the NAO" (Richard Wood, Hadley Centre)	
E-12-444	A	30	43	30	44	I don't think the results quoted on the impact of MOC shutdown are at all contentious. Similar results have been seen in a number of different model studies, and there is some consistency with palaeoclimatic evidence. This sentence seems to be mixing information on the impact of an MOC shutdown with the probability of its occurrence, which is generally believed to be low in the 21st Century. (Richard Wood, Hadley Centre)	the same
E-12-445	A	30	43			is any of the reduction in temperature for Europe, due to THC shutdown, offset by global warming? (Clair Hanson, IPCC TSU)	same as E-12-441
E-12-446	A	30	45	30	49	The evidence on the likelihood of MOC shutdown, and the implications of recent MOC observations, are discussed by WGI. Results are summarised in WGI Ch 10 Box 10.1, and WGI Ch 5 Box 5.1, respectively. I suggest taking these boxes (and the respective statements in the chapter Executive Summaries) as the source material for this discussion. At present the connection with the WGI discussion is not clear. (Richard Wood, Hadley Centre)	This chapter will be syncronized wit boxes in other chapter
E-12-447	A	30	45	30	46	Is this really relevant? (Erik Kjellström, SMHI)	The published assessment is a relevant information
E-12-448	A	30	45			Of the scientists…'. This needs to be reworded as it comes a bit out of the blue (Clair Hanson, IPCC TSU)	text to check
E-12-449	A	30	48	30	48	Delete 'should'. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	text to check
E-12-450	A	30	48			delete "should" (Paula Harrison, University of Oxford)	text to check
E-12-451	A	30	49	30	49	The impacts would extend well beyond Europe, indeed some of the largetst impacts could be outside. So I think it's important to recognise somewhere that MOC shutdown is not important for Europe alone. (Richard Wood, Hadley Centre)	useful point.Text to check and change, space permitting
E-12-452	A	30	49	30	49	"these impacts should be considered in climate policy" sounds policy-prescriptive to me. Would a slightly more neutral phrase be more appropriate? (Richard Wood, Hadley Centre)	wording to check
E-12-453	A	30				Fig 12.4 needs to be properly labelled to match caption (Clair Hanson, IPCC TSU)	
E-12-454	A	31	2	31	2	The impacts depend on the base state (i.e. how much the climate has changed before the MOC shutdown occurs). I realise you are limited on space here, but if the	Useful point. Text to check

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						impacts given are for MOC shutdown relative to preindustrial climate, that needs to be clearly stated. [Vellinga, M. and R.A. Wood, 2006: Impacts of thermohaline circulation shutdown in the twenty-first century. Climatic Change (in press)] gives information on impacts of MOC shutdown after another 43 years of increasing greenhouse gases (IS92a). The two climate effects add linearly in most, but not all cases. (Richard Wood, Hadley Centre)	
E-12-455	A	31	3	31	3	The effects of rapid MOC shutdown on sea level are not discussed, yet they could be one of the most important impacts around the North Atlantic. See [Levermann, A., A. Griesel, M. Hofmann, M. Montoya and S. Rahmstorf, 2005: Dynamic sea level changes following changes in the thermohaline circulation. Clim. Dyn., 24, 347-354] and [Vellinga, M. and R.A. Wood, 2006: Impacts of thermohaline circulation shutdown in the twenty-first century. Climatic Change (in press)]. (Richard Wood, Hadley Centre)	Very useful point. Text to check
E-12-456	A	31	3	31	3	Table 12.5, 5th bullet. What about decreases of heat-related deaths/ill health? Text seems unbalanced. (Richard Wood, Hadley Centre)	No information published
E-12-457	A	31	3	31	3	Table 12.5, 3rd bullet. Do you mean "Major changes in Mediterranean temperature and ecosystems" ? Not clear where the temperature changes are. (Richard Wood, Hadley Centre)	To clarify
E-12-458	A	31	6	31	35	It is not convicing. (Alexander Golub, Environmental Defense)	OK. Text will be changed OK. Text has been eliminated
E-12-459	A	31	6	31	35	I think it would be important to mention the opportunities arising from decreasing land demand as described for example in Schröter et al. 2005. If this is not discussed, the pisture for Europe is much to alarmist. The message that wise land management can counteract climate change impacts and unsustainable trends is really important and motivating for policy makers. (Dagmar Schroeter, Potsdam Institute for Climate Impact Research)	OK. Text has been changed.
E-12-460	A	31	38	31	38	This paragraph is put in contents at page 32. (Ileana Mares, Romanian Academy of Technical Sciences)	OK. Text will be changed
E-12-461	A	31	38			Section 12.8: Uncertainties in future climate projections are discussed in great detail in WGI Section 10.5 (13 pages c.f. 1 page here). No mention is made here of this work anad again highlights the lack of communication between WGI and WGII. I suggest referring all mention of climate uncertainty to this section and concentrating here on assessing the uncertainty in impacts. (Malcolm Haylock, University of East Anglia)	Accepted. The text in 12.8 will be shortened and will be referred to WGI
E-12-	A	32	1	32	1	It would be correct to replace "low resolution" with something like "still insufficient	OK. 'Still insufficient resolution1 is accepted

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462						resolution". (Vladimir Kattsov, Voeikov Main Geophysical Observatory)	
E-12-463	A	32	2	32	2	Downscaling is not just RCMs - many downscling comparisons have shown that we need to use both statistical and dynamical methods. e.g. Haylock, M. R., G. C. Cawley, C. Harpham, R. L. Wilby, and C. Goodess, 2006: Downscaling heavy precipitation over the UK: a comparison of dynamical and statistical methods and their future scenarios. International Journal of Climatology, In Press. DOI: 10.1002/joc.1318 (Malcolm Haylock, University of East Anglia)	OK. The phrase will be cancelled only reffering to WGI (see E-12-461 or reworded: …' the uncertainties associated with the low resolution of GCMs (….) and with different downscaling techniques, e.g. using RCMs (Merans et al., 2003).
E-12-464	A	32	2	32	2	Add Déqué et al., 2006 (PRUDENCE special issue in Climatic Change) to Mearns et al. (Erik Kjellström, SMHI)	OK. Déqué's article is referred
E-12-465	A	32	2			there are uncertainties involved with all types of downscaling - i.e., statistical as well as dynamical (Clare Goodess, University of East Anglia)	OK, see E-12-463
E-12-466	A	32	5	32	5	The word "that" has been repeated twice. Please remove one of them. (Serhat Sensoy, Turkish State Meteorological Service)	OK
E-12-467	A	32	5	32	5	"some scientists" needs at least one reference!! (Erik Kjellström, SMHI)	OK
E-12-468	A	32	12			Section 12.5.6 I don't feel this section does justice to the issues. The most important point is surely the one made well in the summary (page 4, lines 45-47) - that other threats to biodiversity must be minimised. Corridors are controversial and not universally accepted. Larger more heterogeneous reserves are a more promising option - improving chances of species persisting by maximising microclimate variability and allowing larger population sizes. It is also important to refer to European conservation policy framework more. I recommend reading the recent report by Brooker and Young (2005) Climate change and biodiversity in europe: a review of impacts, policy, gaps in knowledge and barriers to the exchange of information between scientists and policy makers (available at http://www.ceh.ac.uk/sections/ed/documents/Backgroundpaper_final.pdf). A lot of other offical reports have been written on this in European countries (if little scientific literature) and further reference to them would be useful. The role of ex-situ conservation is currently over-stated in my view. (Michael Morecroft, Centre for Ecology and Hydrology)	Sentence added to address this comment just after the ref on corridors: although large heterogeneous reserves that maximize microclimate variability might be a suitable alternative. Ref to EU policy was also added in the beginning of the paragraph. The role of ex-situ was slightly downlplayed in the text.
E-12-469	A	32	18	32	18	I suggest inserting after "ENSEMBLES" the web-site address for this project: "[http://www.ensembles-eu.org]". (Ileana Mares, Romanian Academy of Technical Sciences)	OK

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E-12-470	A	32	18	32	18	Eu Projects ENSEMBLES are cited but no reference is done (Michele Colacino, ISAC-CNR)	OK
E-12-471	A	32	18			Could include reference to ENSEMBLES web site http://www.ensembles-eu.org/ (Clare Goodess, University of East Anglia)	OK
E-12-472	A	32	23			Add Holman et al. (2005) reference here as this describes an integrated assessment between water resources, agriculture, biodiversity and coasts - already listed on page 45. (Paula Harrison, University of Oxford)	OK
E-12-473	A	32	40			Table 12.6: under Biodiversity, the second point should be "Maintain and improve monitoring…" - currently long-term montioring scheme are the key to understanding how biodiversity is responding to climate change, but may of these scehemes are under as much threat as the biodiversity they monitor. (Humphrey Crick, British Trust for Ornithology)	Agree with the suggested change. Also the first line should be changed to: "Quantification and reduction of uncertainties from bio-climatic models
E-12-474	A	32	40			Table 12.6 Biodiversity - include Assessement of provision of goods and services (as for forests) (Pam Berry, University of Oxford)	OK
E-12-475	A	33	3	63	1	The meaning of the stars in table 12.7should be explained in a better way. What is the meaning of positive and negative in this respect. (Sten Bergström, Swedish Meteorological and Hydriological Institute)	Ok
E-12-476	A	33	3			Table 12.7: Under biodiversity sector, it is important to list Birds with (** negative in North and Atlantic), due to loss of tundra breeding habitats and coatsal wintering wetlands and (* negative in the other regions) due to expect declines of migrants innbresponse to harder migratory journey and mismatches with food supplies on breding grounds; Also include marine mammals with (** negative in Mediterranean and Atlantic) due to changes in food supplies and increased prevalence of disease. (Humphrey Crick, British Trust for Ornithology)	Ok. Very useful suggestions
E-12-477	A	33	3			Table 12.7 how does these areas relate to Figure 12.1? (Erik Kjellström, SMHI)	Will mention that regions as as in Fig 12.1
E-12-478	A	33	3			Table 12.7 I am concerned to see that under biodiversity no animal group is considered apart from amphibians and reptiles - what about insects at least? Under plants I am surprised that nothing is mentioned for the Atlantic region - at least for mountain plants a negative impact is expected in the same way as central europe. (Michael Morecroft, Centre for Ecology and Hydrology)	Birds will be added following comment E-12-477. We would be please to include projections for invertebrates. Please provide references or make specific suggestions. The plant query is correct. Add ** (red) with Mt for Atlantic region.

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E-12-479	A	33	40			Table 12.6: Section on Biodiversity. Add: "The development of innovative pan-European conservation strategies that take account of the dynamic nature of ecosystems and the services they provide". (Paula Harrison, University of Oxford)	Ok. Good suggestion.
E-12-480	A	33		34		First of all, if Central in Area, include the Coast of Iberian Peninsula In the summary table of chapter 12 results from Spanish coast do not agree or are incomplete in relation with some of the impacts considered on Spanish documents. Some new information could be included on the Coastal and marine systems. I introduce the conclusions from Spanish Strategy of Fight against Weather Change, above cited, and from Cendrero, et al, (2005), and Anadón et al, (2005). SLR and surge driven floods, **red; Reduced river sediment supply to estuaries and deltas **red; Rising SSTs **red; Northward migration of marine biota **red to *blue. In relation with agriculture and fisheries in line Marine fisheries, including aquaculture (very important for NW Spain socio economy), the conclusions are not very clear but a general negative trend could detected. This negative trend must be due to three factors, direct exploitation, effects of ecosystem changes on larval survival and changes on coastal circulation, and pathogens development. Probably the best estimation goes from **red to *blue. If prediction on CC, including ocean acidification, and the end of the century the impacts arrive to ***red References: Cendrero, A., Sánchez-Arcilla, A., Zazo, C. Impacts on coastal areas In: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, p 451-504 Anadón R, Duarte CM, Fariña C (2005) Impactos sobre los Ecosistemas Marinos y el Sector Pesquero. In: Moreno JM (ed) Evaluación Preliminar de los Impactos en España por efecto del Cambio Climático. Ministerio Medio Ambiente, Madrid, p 147-182 http://www.mma.es/portal/secciones/cambio_climatico/documentacion_cc/estrategia_cc/index.htm (Ricardo Anadon, Universidad de Oviedo)	This issue referes to the Atlantic coast. The proposed changes have been taken into consideration in the new table.
E-12-481	A	33				Table 12.7: (a) I do not see the advantage of the color coding (blue/red) as opposed to simply using +/- !? (b) Does an empty cell mean there is no impact OR that it is not known? (c) "Development of ICZM" is not an impact (d) More general, some of the entries are not impacts. E.g. "Duration of snow cover": What would be a positive impact here?? (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	Table will be changed
E-12-482	A	33				Table 12.7 should be the first table in this chapter - it is an excellent summary of the potential impacts. (Matthew Livermore, University of East Anglia)	OK

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E-12-483	A	35		62		SEPA (2005) and SEEG (2006) not referenced as SEPA and SEEG in the ref list (Clair Hanson, IPCC TSU)	
E-12-484	A	35				GENERAL - check in press references in text, that they are cited correctly in reference list (Clair Hanson, IPCC TSU)	Accepted
E-12-485	A	37	53	37	53	For uniformity please delete the brackets from "2005" and insert "," after "Ritter" (Ileana Mares, Romanian Academy of Technical Sciences)	Accepted: … and N.Ritter, 2005
E-12-486	A	37	53	37	53	(2005) → 2005 without parenthesis (Michele Colacino, ISAC-CNR)	Accepted: … and N.Ritter, 2005
E-12-487	A	39	1	39	5	The work is not cited in the text (Michele Colacino, ISAC-CNR)	
E-12-488	A	39	38	39	38	reference Cubasch, U., …, move alphabetically (Tomas Halenka, Charles University in Prague, Fac. of Mathematics and Physics)	
E-12-489	A	39	38	39	38	Please replace " Cusbach" with the correct name " Cubasch" and please move this reference before line 33. (Ileana Mares, Romanian Academy of Technical Sciences)	
E-12-490	A	41	36	41	38	This reference is not cited in the text (Michele Colacino, ISAC-CNR)	
E-12-491	A	43	31			Good et al (2006) is Climate Research not Climate Dynamics (Clair Hanson, IPCC TSU)	
E-12-492	A	44	6	44	10	The journals where the papers are published are not written everywhere in italic characters, only two examples you can find at the lines 6 and 10. (Ileana Mares, Romanian Academy of Technical Sciences)	
E-12-493	A	44	25	44	28	It is something wrong with this reference. Huber, Bugmann and Reasoner from page 27 are editors? (Ileana Mares, Romanian Academy of Technical Sciences)	
E-12-494	A	47	20	47	22	The work is not cited in the text (Michele Colacino, ISAC-CNR)	The paper is cited in 12.5.1 (page24, line 35)
E-12-495	A	51	16	51	17	If you agree my suggestion from No. 11, please insert after line 16: "C. Mares, I. Mares, and A. Stanciu, 2006: On the possible causes of the severe drought in the Danube lower basin in 2003. International Conference on Water Observation and Information System for Decision Support, downloadable at http://balwois.mpl.ird.fr/balwois/administration/full_paper/ffp-659.pdf [Europe, Extreme events] " (Ileana Mares, Romanian Academy of Technical Sciences)	I suggest to accept
E-12-496	A	52	18			Please change the name Strelkova to Strelcova (Milan Lapin, Faculty of Mathematics, Physics and Informatics, Comenius	

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						University)	
E-12-497	A	53	14	53	17	The work is not cited in the text (Michele Colacino, ISAC-CNR)	
E-12-498	A	54				replace with 152 (4), 545-561 (Bruno Petriccione, National Forest Service)	
E-12-499	A	54				replace 2003 with 2005 (Bruno Petriccione, National Forest Service)	
E-12-500	A	55	47			Insert references to Richter and Semenov (2005) [Richter, G.M. and Semenov, M.A., 2005. Modelling impacts of climate change on wheat yields in England and Wales: assessing.drought risks. Agricultural Systems, 84(1): 77-97] and Richter et al. (2006) [Richter, G.M., Qi, A., Semenov, M.A. and Jaggard, K.W., 2006. Modelling the variability of UK sugar beet yields under climate change and husbandry adaptations. Soil Use and Management, 22(1): 39-47.] (Goetz Michael Richter, Rothamsted Research)	
E-12-501	A	56	8	56	8	Rockel and Woth reference is incomplete (Malcolm Haylock, University of East Anglia)	
E-12-502	A	56	8	56	9	Rockel and Woth (2006) is incomplete (Clair Hanson, IPCC TSU)	
E-12-503	A	57	21	57	22	include Schär, Chr. and Jendritzky, G., 2004: Hot news from Summer 2003. news and views. Nature. Vol.432, 559-560. (Gerd Jendritzky, Meteorological Institute, University of Freiburg)	
E-12-504	A	57	46	57	48	The report is not cited in the text (Michele Colacino, ISAC-CNR)	
E-12-505	A	57	49	57	49	Sensoy, S., 2006, Producing Climate Indices and Climate Change Monitoring In the Middle East, BALWOIS conference paper published at http://balwois.mpl.ird.fr/balwois/administration/full_paper/ffp-574.pdf (Serhat Sensoy, Turkish State Meteorological Service)	
E-12-506	A	58	38	58	40	The report is not cited in the text (Michele Colacino, ISAC-CNR)	
E-12-507	A	59	49	59	49	I believe the initials of Bouwman are A.F. (Maximilian Posch, Netherlands Environmental Assessment Agency (MNP))	
E-12-508	A	62	12	62	12	Zhang, X., et al. (2005), Trends in Middle East climate extreme indices from 1950 to 2003, J. Geophys. Res., 110, D22104, doi:10.1029/2005JD006181 (Serhat Sensoy, Turkish State Meteorological Service)	