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

Government and Expert Review of Second Order Draft

Specific Comments

GOVERNMENT REVIEW COMMENTS

Chapter 5

August 2006

includes late Govt comments at the end of the file

Discussion of Government 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 Govt 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-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
G-5-1	A	0				What is the probable impact of climate and or CO2 on pest management? Why is no mention made of this? Isn't management and human responses to pests an important factor with respect to their impact? For example, there are a number of studies (e.g. Ziska et al. Weed Science, 47: 608-615) that illustrate a reduction in chemical efficacy with increasing CO2. Isn't his important? (Government of USA)	We will reinstate this issue in the text. FNT
G-5-2	A	0				What are the probable consequences of rising CO2 and climate on food quality? How will this affect nutrition (e..g. reduction of cereal protein with increased CO2), or changes in micronutrients? Was this addressed in the TAR? (Government of USA)	There is material on this in 5.4.3 and this was covered in the TAR. JFS
G-5-3	A	0				Two general comments. 1. Please quote in the report recent measured trends in forest productivity with comparisons to those predicted by models. 2. Beneficial effects of global change appear to be minimized (as if every change was necessarily for the worse). It would be nice to achieve some balance between the adverse effects (quite real) and the benefits. (Government of France)	We disagree with both statements. Trends are considered in 5.4.5., also positive effects on forest productivity are stated. AK Both statements are not true. A large Steve Running's study on measured trends is included and it is specifically mentioned that it shows an increase in forest production. Similarly, for forests the beneficial impacts on production (e.g. through carbon fertilisation) are included. FNT, AK
G-5-4	A	0				The Chapter is difficult to read as it frequently jumps from the climate change issue to meteorological variables and back to CO2, UV radiation and Ozone. (Government of Germany)	We are following a prescribed outline.
G-5-5	A	0				The chapter gives very uneven treatment to the various sectors discussed with agriculture receiving the bulk of the attention. Uneven treatment in regional implications is also evident. (Government of Canada)	Our treatment is proportional to the evidence available in the literature in both cases.
G-5-6	A	0				Some possible topics to think about: should we promote efficient work division and production specialisation in order to increase farm production potential before we face adverse effects of CC? Is specialisation risky and where?, Where not? Should we encourage farmers in taking higher risks if prices and weather conditions become more volatile? In general, the chapter implicitly calls for a more systematic and analytic framework in which different causes and impacts are linked together. The task of deciding what is relevant to food prices is solely left to reader Is the large literature base cited most relevant to the issues at hand ? Links between	Some of the topics mentioned here are intentionally excluded from the SOD chapter as they appear elswhere in the report. E.g., the impacts on biodiversity, forest ecosystems and species migration are considered in WG2 Chapter 4. The role of forests in biofuel production is considered in Chapter 9 of WG3. <to include a few words here?>. Role of forests in climate feedbacks (hydrology,

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						food and energy sector ? Main observations: CC is predicted to have highest positive impact in the boreal region that is positive, in tropical area prediction is dificult due to variation in rainfall pattern, still conclusion that present pattern of production shift to tropics witout any wondering how this will influence eg. the wood based energy utilization. Level of treatment in whole report is very superficial, no consideration of possible requirement of species changes due to climate and what is the impact from this to both forest management patterns and also to industry processes. The FACE -experiment receive disproportionally high weight in the conclusions although they account for only a limited number of ecosystem processes and represent a limited set of conditions. The long time planning perspective of forestry is not fully anticipated in the report, the problem of long term decision making in a high risk environment and how that is impacting the industry is not addressed. Where is the role of forest based bio fuel in the future ? Forest management methods with species selection has an important role in the biodiversity reduction mitigation that the report does not consider. Climate change will also influence the rainfall patterns and forestry has an important role in the hydrological cycles. Recent observations has shown that forests have potentially very important role in the cloud nuclei formation and thus in decreasing the greenhouse effect. Maintenance and increase of the forest cover would thus be an important goal for forestry also from carbon sequestration point of view. The forest feedback to greenhouse effect through aerosol formation need further studies. Generally the impacts on boreal forests are rather weakly considered. The Chapter covers well the food, fibre and forest product related ecological trends, sectorial implications, regional distrbution of implicaions, implications to different groups in society, etc., but fails to cover these topics in the summary in a comprehensive manner. This summary should have more focus on sectors, industries, distribution of effects between regions, sectors, groups, and particularly on socio-economic impacts. (Government of Finland)	cloud formation) is WG1 topic. This chapter concentrates on production, management and industries. FNT, AK We are trying to avoid policy prescription. We think so. The topic of biofuels is covered by WG III and biodiversity is covered by Chapter 4. Forestry feedback to the water cyle is covered by WG I.
G-5-7	A	0				A general comment about the effect of elevated CO2 on forest growth. As has been said, increased CO2 stimulates photosynthesis and growth in trees more than in crops or perennial grasses. Some concern has been expressed that this stimulation might be a short-term effect because most forests are nitrogen limited, which will limit production under elevated CO2. Recent evidence shows that elevated CO2 stimulates carbon and nitrogen accumulation in land ecosystems (Luo et al., 2006, Ecology 87: 53-63), which leads to a more optimistic view than expressed in	To include this publication FNT, AK We include references to a number of recent publications on CO2 growth simulation. However another concern, not mentioned by the reviewer, is no CO2 effects on stem growth of mature trees, demonstrated by web-

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						chapter 5 about the effects of global change (at least for temperature increase below 3 °C) on natural (or close to natural) ecosystems. (Government of France)	FACE. AK We are trying to achieve a balance of positive and negative impacts.
G-5-8	A	1	30	1	30	Change "Important findings of the TAR" to "Important findings of the Third Assessment Report (TAR). Definition of the agronym is needed here, not on page 6. (Government of Finland)	Defined elsewhere in the report.
G-5-9	A	3	1	5	14	The executive summary is in a different format to other chapters- bullets rather than prose. (Government of UK)	Will be fixed. WE
G-5-10	A	3	10	3	14	The two bullets listed here are more about future impacts and less about future underlying non-climate trends. Suggest moving these to either Key Future Impacts, or listing them under a heading that states 'Key future climate changes'. Text should differentiate significant climate and non-climate trends with climate implications. (Government of USA)	But climate trends are a prescribed topic for this section.
G-5-11	A	3	10	3	10	write June/Juli/August instead of JJA (Government of Germany)	OK WE
G-5-12	A	3	10	3	10	'JJA' seems northern-hemisphere centric. (Government of Australia)	Will change.
G-5-13	A	3	10			Need to spell out what JJA precipitation means. (Government of UK)	OK.
G-5-14	A	3	10		10	Does JJA apply only to the northern hemisphere? If not, "JJA" should be replaced with "summer rainfall". (Government of USA)	See above.
G-5-15	A	3	10			"JJA precipitation" should it be explained? (Government of Finland)	See above.
G-5-16	A	3	16	3	17	Is not the expected growth of world population during the coming decades likely to exacerbate the importance of FFFF ? (Government of France)	We think so and such is addressed in the chapter.
G-5-17	A	3	18		20	This is an important Executive Summary point. However, the conclusion is not supported by the text in the cited section (i.e., 5.3.2.1). Suggest adding supporting references. Also consider increasing the confidence level. (Government of USA)	Will be inserted in 5.4.7. JM
G-5-18	A	3	18		20	Missing from the list of key trends are statements about projected trends in food demand, changing diet preferences, and changes in water resources. Appears there	We do have changing food demand and water resources, and are considering adding dietary

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						is information in the underlying chapter to draw from. (Government of USA)	preferences in 5.3. JS
G-5-19	A	3	23	3	52	It would help the reader to gather the conclusions in single, integrated themes ; effects on crops; effects on pastures;… And to insert cross-cutting points at suitable locations (eg pests). (Government of Australia)	We will re-order the summary by confidence level. WE
G-5-20	A	3	23	3	41	Is there a need to qualify this conclusion in terms of limitations of water availability, nutrient availability and quality of crop (eg wheat protein)? (Government of Australia)	This is a little too detailed to make sense including.
G-5-21	A	3	23	3	23	fertilization …throughout chapter spelling differs from that used in the rest of the report. (Government of Canada)	Will fix. WE
G-5-22	A	3	23	4	27	It is not clear what criteria were used to include items under “Key future impacts.” For example, it would seem that the “New Knowledge” from page 17 (line 20) that, “stabilization of CO2 concentrations reduces damage to crop production” merits inclusion as a key impact. Are the criteria noted at some point in the report? Add to key impacts: Stabilization of CO2 concentrations and subsequent stabilization of temperature will limit the degree of heat stress and maintain crop production. (Government of USA)	Will add to Exec. Summ. FNT
G-5-23	A	3	23		27	For crops, an increase of +17% is suggested. But, for trees only "smaller effects than is simulated by some of the forest sector models", this may not be very clear or helpful. In p. 14, FACE results indicate clear biomass increase (even +28%), maybe that should be indicated. Same applies to p. 40 L 23-24. (Government of Finland)	FACE biomass increase estimates included. The message was edoted for clarity. AK We will include the percentage increase (including the full range of estimates) AK
G-5-24	A	3	23		25	Clarify text - Crop yields increase 17 % with respect to what? (Government of USA)	Will clarify the reference period. FNT
G-5-25	A	3	23		52	An important summary point that is missing is that, according to the underlying chapter, there is a lack of information about the important interactions among temperature, precipitation, CO2 effects, tropospheric ozone, water resources, and pests, and that most future impacts projections take only some of these factors into account. Also include in Section 5.8.2 (Government of USA)	Will include as summary point and/or research gap. AK
G-5-26	A	3	24		24	Replace “confirm” with “support”. (Government of USA)	We prefer to remain consistent with accepted WG II language—i.e., confirms TAR.
G-5-27	A	3	26			Need to spell out FACE (Government of UK)	Is already spelled out.
G-5-28	A	3	27	3	28	the wording is misleading, since no increase percentage is given for these forest	Norby et al. dealt with the earlier FACE

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						sector models. We suggest using the recent figures given by (Norby et al., 2005, PNAS 102, 18052-18056): an average increase of 23% in NPP (Government of France)	results with no water and N limitations taken into consideration. Smaller effects are found in recent FACE publications. Insert numbers. FNT Spelled out in 5.4.5 AK We will include the percentage increase (including the full range of estimates AK
G-5-29	A	3	27	3	29	clarify in what there is now high confidence. Is it that there is a smaller effect of CO2 on trees? Or is it that there is high confidence that the results of the models and the results of FACE experiments are different? Or is it that the model results are highly confidental? If no direct comparisons between forest sector models have been done, how is it possible to come to the high confidence statement? (Government of Germany)	Smaller effect, of course. Wording changed. FNT, AK We will clarify the sentence. AK
G-5-30	A	3	35	3	38	This statement is silent about assumptions regarding changes in variability and extreme events, which according to sections in the underlying chapter are currently some of the most important factors that currently affect agriculture. If this statement is covering studies that do not consider changes in variability or extremes, that caveat should be inserted. Change “can have” on line 36 to “is projected to have”. (Government of USA)	Will include discussion of variability in the text, leading to a bullet point in the Exec. Summ. FNT
G-5-31	A	3	35	3	41	It remains unclear which is the baseline for the local temperature increase considered here- present temperature or pre-industrial? (Government of Germany)	Clarified elsewhere in the report.
G-5-32	A	3	35			Is the quoted increase in local temperature the annual mean temp? If so may want to spell this out. (Government of UK)	See previous statement.
G-5-33	A	3	49	3	52	clarify which statement is "medium to high confident" If it is the poleward spread of deseases, shift "medium to high confidence" to the end of the second sentence in line 51. (Government of Germany)	Now totally rewritten.
G-5-34	A	4	9	4	12	change the reference in line 12 to chapter 5.4.3.1 and delete "affected" in line 11, insert instead "decreased" see page 20, lines33-35. (Government of Germany)	Now rewritten.
G-5-35	A	4	13	4	17	Statement too vague and thus useless. We suggest saying an increase in forest products is expected during the first half of the 21th century (driven by CO2 increase, and by higher temperature for latitudes above 42° or so), and this could be adversely affected by too high temperatures at least at low latitudes (presently the productivity of tropical forests seems to be increasing)	Obsolete. AK

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						(Government of France)	
G-5-36	A	4	13	4	17	clarify, what statement is made with "medium confidence". At page 40 lines 26 to 28 it is stated that there is "high confidence" with regard to the statement in lines 13-15 at page 4. Furthermore, there is no text about traditional forest production in chapter 5.4.5.1, include right reference or delete last sentence. (Government of Germany)	Obsolete. AK
G-5-37	A	4	18		21	The key impact stated does not follow from the text in sections 5.3.2.3, 5.4.6.2, or 5.4.6.3. Additionally, there is no consistency within or between these three sections. (Government of USA)	Key impact follows from 5.4.6.2 para 1. Changes have been made to make these sections more consistent. (Brander)
G-5-38	A	4	23	4	23	Do you reallly mean that we have high confidence that meridional circulation slowing down wil not have serious potential consequences for fisheries ? (Government of France)	No, it means what it says (Brander)
G-5-39	A	4	34		36	The phrase "changing varieties" is mentioned here and elsewhere as an adaptation strategy. (please provide a reference as to how they "avoid" a 10-15% reduction in yield.) Couldn't a positive response to climate change also be possible? (Rather than just avoidance) For example, no systematic evaluation of a given crop has been conducted to find the most CO2 responsive cultivars; yet such an analysis would indeed provide a positive adaptation, as would an evaluation of temperature sensitivity. Why not list these as specific adaptation strategies? (Government of USA)	Will fix. MH MH and LE to provide references.
G-5-40	A	4	36	4	36	10-15% yield reduction avoided under what set of climate conditions (eg extent of temp rise). Indicate what key factors are not considered in arriving at this conclusion - for example does it cover relationship of CO2 fertilisation and water availability. (Government of Australia)	Clarified.
G-5-41	A	4	38		38	Change "will be needed to" to "can" (Government of USA)	Would change the meaning of the statement to do this—we disagree.
G-5-42	A	4	48		48	Change "mask substantial regional differences" to "include significant changes in regional agricultural production potentials". Nothing will be hidden or unseen here. The regional changes will be obvious, well known, and probably will motivate more policy and farm-level responses than the global total. (Government of USA)	Will reword. JS
G-5-43	A	5	11	5	13	The section on sustainable development adds little value to the Executive Summary and is not of high enough significance to be included in the Executive Summary. (Government of Australia)	Will revise section and hence Exec. Summ. Bullet to contain more substance. JS
G-5-44	A	6	5	6	5	Please replace "surface" by "continental surface (ice excluded)", and give the percentage for crops (10%) and for pastures (30%?)	We will stick to the Foley et al and FAO numbers and have revised to clarify the land

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						(Government of France)	surface.
G-5-45	A	6	5		5	Word missing: "At present, 40% of the Earth's *land* surface…" (Government of USA)	Yes, accepted.
G-5-46	A	6	5			Need to make clear that it is 40% of the LAND surface that is managed for cropland. (Government of UK)	Ditto.
G-5-47	A	6	50	6	51	Is this a well documented finding? (Government of France)	Was included in the TAR, so we presume that it was.
G-5-48	A	7	2	7	3	This is not what is commonly observed since in average there is an increase of 28% (Ainsworth and Long, 2005 quoted in chapter 5) or 23% (Norby et al., 2005, PNAS 102, 18052-18056). FACE studies show trees respond more to CO2 increase than all other plant types (see also Nowak et al., 2004 quoted in chapter 5) (Government of France)	Again, the cited studies report the earlier results under no water or nutrients limitations and also no pullutions. The recent FACE results () show smaller increase later in the experiment. Insert the data FNT True, Norby et al. reported mean response of +23% (cited in this chapter). However, web-FACE publications (not covered by Norby et al.) found no stem growth stimulation. Notice that only web-FACE reported growth stimulation in mature trees. Other factors reported as limiting growth stimulation include increased troposphere ozone and nitrogen limitation. AK
G-5-49	A	7	5		5	Change "SAR" to "Second Assessment Report (SAR)" (Government of USA)	Done. FNT, AK
G-5-50	A	7	18	7	32	need some more text explaining how uncertainties of scaling from local to regional scenarios are dealt with rather than just saying they exist. (Government of UK)	Fair enough—mention of multi-level modeling is made. Space limits preclude fuller treatment.
G-5-51	A	7	31		32	Needs clarification. Increased complexity is due to the increased number of scenarios and input to those scenarios. As written, it reads like the added complexity is related to the growth in published scenarios. (Government of USA)	Clarified.
G-5-52	A	7	35			explaining the relation sensitivity, vulerability and adaptive capacity at the start of section 5.2 will improve the section. Now the relation is explained on page 9 lines 43 -- 46, which is a bit late.	Apologies, but this is the prescribed format by the IPCC Plenary.

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						(Government of Netherlands)	
G-5-53	A	8	3	8	3	Insert "negative" between "with" and "impacts" for the sake of clarity. (Government of Australia)	Will revise in the final editing step.
G-5-54	A	8	26	8	27	Please round the figures off to the nearest 1000 ha, they are not accurate to the ha (Government of France)	We are reporting precisely from the literature.
G-5-55	A	8	27	8	29	Clarify in line 27 where the agricultural land burned reached 44,123ha. In Portugal? Spain? In both countries? (Government of Germany)	OK—will revise in the final editing step.
G-5-56	A	8	27		29	Not clear if the 44,123 ha and 8,973 ha refer to Portugal or Europe. (Government of USA)	Ditto.
G-5-57	A	8	33	8	33	The headings of the columns in Table 5.1 are missing. (Government of Pakistan)	Fixed.
G-5-58	A	8				Box 5.1: Too much detail. Could be shortened by saying "losses range from _ to _ …. The information in the box would also be more useful if compared to other extreme years in Europe and incorporated discussion of adaptive responses. (Government of Canada)	No way to accommodate the latter part of this request.
G-5-59	A	9	4	9	4	Loss of biodiversity is not a stress but a consequence of management and climate change (Government of Finland)	Debatable point.
G-5-60	A	9	4	0	14	Another factor adding to the sensitivity is the decline of agricultural extension services and investments in science, technology and education. (Government of Netherlands)	Interesting point, but we have no basis for inclusion.
G-5-61	A	9	4		14	Current sensitivity to multiple stress fails to acknowledge the dynamic context and multiscale interaction of these stresses.For example droughts strike after a period of good rainfall the sensitivity of the agriarian systems is different from when droughts hit more frequently. In West Africa livestock numbers have been growing during years of good rainfall before the droughts in the 70ies making the livestock system highly vulnerable to drought. (Government of Netherlands)	We agree with this point, but space limits kept us from getting into these fine points.
G-5-62	A	9	5	9	6	These stresses don't make the system more sensitive, they make it less resilient. (reduce capacity to cope) (Government of Canada)	We understand the point, but sensitivity seems to be the broader term we were seeking.
G-5-63	A	9	11	9	12	Should it not be the other way around: climate variability increases the susceptibility to fire and so on ? But the evidence on this is meager (Government of France)	Could be either way, but we have the literature to support how it is stated in the chapter.
G-5-64	A	9	11			please check spelling: Karnosky (Government of Finland)	Will do.

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G-5-65	A	9	17	9	38	Cited references are not listed in the reference list (Government of Finland)	Fixed.
G-5-66	A	9	18	9	38	The importance of BVOCs (Biogenic Volatile Organic Compounds) released by crop plants and forest trees are not mentioned in this chapter. Probably BVOCs can be added here. Elevated temperature promotes emissions of BVOCs which have crucial role in tropospheric ozone formation, but also in plant defence against ozone and ozone transformation in stomatal cavity and plant atmosphere into secondary organic aerosols. (Government of Finland)	Although this is an important issue, it is outside of the main charge for this chapter.
G-5-67	A	9	18	9	38	Box 5.2. Add references (e.g. Ashmore 2005, Kaakinen 2004) in the reference list (Government of Finland)	Done.
G-5-68	A	9	18			Box 5.2. indicates lack of knowledge of air pollutant and uv-b interactions with plants, to me this sounds a clear knowledge gap which maybe should be added - before combined effects of weeds, insects etc (Government of Finland)	Not sure what is being suggested here.
G-5-69	A	9	18		37	Box 5.2 mentions air pollutants and UV-B. One air pollutant mentioned is NOx. It is implied that NOx would be bad for crops. However N deposition from air pollution results or can result in increased plant productivity. As to the idea that ozone concentrations in future decades will negatively impact plant production with or without increased CO2, with or without climate change is illogical. CO2 mitigates ozone damage and will increase concurrently with urbanization; conversely if precipitation increases in the future, ozone damage may be reduced (i.e. ozone levels are near zero on cloudy days). To my knowledge only the Rhinelander FACE project shows greater damage from CO2 and ozone than from ozone alone (and not for all tree species), all other reports (see McKee et al. New Phytologist 146: 427-435) show less damage. Consequently these findings should not be over-emphasized. As for UV-B, recent overviews of experimental results suggest that the response of UV-B on plant function is minimal (see Allen, Nogues and Baker J Exp Bot. 49: 1775-1788). In this section, also make sure that all the references cited are listed at the back of the chapter (e.g. Ollinger 2002, Kaakinen 2004). (Government of USA)	Our focus in this box is on NOx as immediate stressor. Fertilization from N deposition is surely a positive, but another step removed from the NOx stressor. Morevoer, ozone is, by any measure, a stressor, whether with or without higher CO2. We note that CO2 mediates ozone damage, but does not eliminate it altogether. We stand by our statement. References fixed.
G-5-70	A	9	20	9	20	The evidence for forests in natural conditions is meager (Government of France)	Accepted.
G-5-71	A	9	27	9	27	delete "should be viewed" insert "is". As the explanation follows, the statement makes it evident that a fact is described not a possible view. (Government of Germany)	Disagree.

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G-5-72	A	9	27	9	27	(Kaakinen et al. 2004, Riikonen et al. 2004, Kostiainen et al, unpublished) (Government of Finland)	OK.
G-5-73	A	9	30	9	33	This statement is important and should be pulled out into the main body of the chapter. (Government of Canada)	We agree to its importance, but cannot think of a way to lift this out of context and insert into the text without substantial lengthening of the section.
G-5-74	A	9	30		33	This statement, “Current risk assessment tools …” should be elevated to the Executive Summary. (Government of USA)	We will consider this at the final editing stage.
G-5-75	A	9	35		36	“narrowed uncertainty” should be something like “narrowed this uncertainty” (Government of USA)	OK.
G-5-76	A	9	49	9	52	Needs clarification - what processes related to globalization, what elements of the processes of reform. As written it is too general and sweeping. (Government of Canada)	This has been clarified. O’Brian
G-5-77	A	9	49		52	This is an ambiguous statement. It needs to clarify the nature of the “process of reform”. Additionally, the choice of the word “must” is very strong and so it has to clear why the “process of reform” needs to be “linked” reducing vulnerability and facilitating adaptation. (Government of USA)	This sentence has been revised, thus the comment no longer applies. O’Brian
G-5-78	A	10	26	10	26	"fewer people dependent on agriculture"? Misleading since everyone depends on agriculture. Do you mean "less people directly involved in agriculture"? (Government of France)	No, it means fewer people must practice agriculture to deliver adequate food to meet demand.
G-5-79	A	10	37	10	46	Fischer et al. 2002 is not well defined in the reference list (Government of Finland)	Fixed.
G-5-80	A	10	42	11	8	Indeed timing of rains may become worse so that increasing precipitation does not help crops to utilise higher temperature. I could not see Figure 5.1a, to be examine side by side with Fig. 5.1.b. In fact I do not believe that just looking at the figures tells much about how rains fit intensive growth period of field crops. In Finland the crucial weeks are weeks 2 and 3 in June; if land is dry during these weeks decreases then it does not help if there are rains earlier or later. Dry land in June is already one of the main crop limiting factors. Please encourage european-wide research on this subject. Increasing precipitation, possibly in winter, may require better field drainage systems. (Government of Finland)	We now comment in more details the two maps which are, however, at a global scale and therefore do not cover only Europe; JFS
G-5-81	A	11	3	11	3	check reference to figure, it might be figure 5.1a, as figure 5.1b doesn't show projections of rainfall but currentsuitability for rainfed crops. (Government of Germany)	This has been checked. JFS

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G-5-82	A	11	6	11	8	Authors should more clearly highlight that the current gap in research knowledge concerning impact models for food, feed and fibre and projected precipitation changes. (Government of Australia)	Agreed. Will be done; JFS
G-5-83	A	11	9	11	9	The predicted variation in the rainfall patterns is not considered in connection with the present tendency of increasing fast growing plantation in the tropics and their future performance. (Government of Finland)	This is not the purpose of the section on climate trends. JFS
G-5-84	A	11	10	11	26	Fig 5.1(a) is a positive aid for the reader. (Government of Australia)	Agreed JFS
G-5-85	A	11	31	12	3	An important factor in agriculture, i.e. land use change from food production to non-food production (biomass, bioenergy, fibre) should be mentioned here. Biomass and bioenergy production may increase the income of farmer, when conditions (including economical ones) are not favourable for food production. (Government of Finland)	This shift is important and has been mentioned in several sections (e.g. 5.4.4.) of the document. However, the need to adhere to strict space limitations militates against further repetitions. Schmidhuber
G-5-86	A	11	33	11	35	The importance of food and fibre quality will grow. (Government of Netherlands)	Agreed. Schmidhuber
G-5-87	A	11	33	11	45	Increase in food production potential in the next 20-30 years is very important and closer analysis is needed how to utilise this production potential so that future challanges threatening productivity can be tackled; at which condition a sustainable increase in productivity can be reached? (Government of Finland)	Such analysis is available from the sources quoted in the chapter. The most important is FAO 2003 “World agriculture: towards 2015/30”. Not explicitly mentioned here for space reasons. Schmidhuber
G-5-88	A	11	33	12	3	Somewhere in this section it should be noted that the demand for energy could drive significant conversions of land to agriculture for production of energy crops. (Government of USA)	Important point,but mentioned already elsewhere; e.g. in 5.4.4 Schmidhuber
G-5-89	A	11	43		44	The sentence about increasing cereal yields in developing countries appears to contradict the trends represented in Fig. 5.2 b, d, f (pp.18-19) which show declining cereal yields in the tropics both with and without adaptation. Should the sentence read, “In the absence of climate change, cereal yields are projected to…”? (Government of USA)	Comparison is not valid. Would be a comparison of national/regional average yields with experimental yields. Schmidhuber
G-5-90	A	11	44	11	45	It should be made clear that the increase in cereal yields in developing countries mentioned here on the basis of FAO, 2006 is essentially all due to non-climatic factors. Otherwise, as a result of climate change, the yields in tropical/subtropical arid and semi-arid areas are likely to decrease. In this connection reference is also invited to Section C on page 7 of "Summary for Policymakers" where the projections explicitly state "reduced yields at lower latitudes" even for temperature increases up to 1 oC and "global decreases in agricultural production potential" for	Yes, valid point. FAO projections are without CC assumptions. This has been mentioned previously and should be clear from there. Schmidhuber

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						temperature increases of 3 to 4 oC or more. (Government of Pakistan)	
G-5-91	A	12	5			This section on forests reports nothing with respect to disease of trees, which may also become worse if trees are stressed by heat and lack of moisture (e.g. Juric and Ogris 2006 Plant Pathology 55(2). Bergot et al. 2004. Global Change Biology 10 (9)). (Government of Canada)	This effect is considered later, in the second paragraph of 5.4.5.2.
G-5-92	A	12	5			Recent papers by Malcolm et al. (J of Biogeography 2002 29 (7) and North et al. 2005 Forest Science 51 (3) detail the effects of climate change on the ability of tree communities to migrate and suggests that communities will undergo change. Such changes have implications for forest productivity. (Government of Canada)	Vegetation shifts are accomodated into Chapter 4 and not discussed here to avoid duplication. Forest industry adaptation through shifting to the species better suited for the changed climate is considered in 5.4.5 and in 5.5.1.
G-5-93	A	12	7	12	16	I do not see any consideration of the climate change impact on these trends. What happens if the predicted climate change of several degrees will enhance the growth of boreal forests to the global balance in the production, if growth increases and demand is low the price goes down and the products can be used for other purposes, the fuelwood is mentioned as a potential product but the trend is already taking place. And where is the role of forestry and the ecosystem services in the assumptions? (Government of Finland)	The quantitative estimations are obviously limited to the existing modelling analyses, which are limited and considered later, in 5.4.5.2.
G-5-94	A	12	19	12	20	Does B m3 mean billion m3? This may be the abbreviation in economy but in the other science fields we use G for giga, which is the accepted SI prefix (see e.g. http://physics.nist.gov/cuu/Units/prefixes.html). This has to be discussed with the whole of IPCC, as it occurs many times in chapter 5. (Government of France)	Disagree: I have never such unit as a Gm3 used in forest – related literature, and for a reason: 1B m3 is equal to 1 km3. At any rate, I have never seen the forest products to be measured in km3, either.
G-5-95	A	12	25	12	28	I found this an understatement (Government of Finland)	I don't understand this comment. Please expand if there should be an relevant service not included into the review, for which an assessment of the future demand exists.
G-5-96	A	12	30		35	The reference to climate change in line 30 seems out of place here – the above two paragraphs do not mention it and focus on human impacts. To maintain a similar structure, suggest changing to, "Finally, land-use change and deforestation in tropical zones …" (Government of USA)	Disagree. This is an important point to make that anthropogenic activity other than related to climate change (e.g., LUC) is relevant for estimation of the future timber supply. Since further discussion is concentrated on climate change, we elected to make this point here.
G-5-97	A	12	46		46	Revisit the literature. The statement seems to suggest that global fisheries are not at	These are statements about supply and

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						risk. In addition, other confounding factors should be accounted for - such as, ocean acidification, PDO, and the interactions between climate and aquaculture (marine and coastal). (Government of USA)	demand to 2020, as clearly stated. Other issues (acidification, PDO) are dealt with elsewhere and in the TAR. (Brander)
G-5-98	A	12	50	13	35	This is an example of uneven level of detail within this chapter. This section contains a lot of detail describing S & S Agric but does not address northern subsistence Ag. (e.g. berry harvesting). Should be reviewed in terms of length concerns. (Government of Canada)	It was felt that subsistence and smallholder agriculture based on *domestication* was fundamentally different from hunting/gathering systems, though the use of wild resources by S&S farmers is noted. Northern subsistence populations are already extensively covered in the Polar Regions chapter. This section had already been substantially reduced, but space was necessary to introduce the complexity of S&S farming system and the current trends affecting them.
G-5-99	A	13	5			…of these categories. It is unclear which categories and meant. (Government of Netherlands)	The categories refers to the subjects of this section, smallholder and subsistence farmers
G-5-100	A	13	5		5	"population" should be "populations" (Government of USA)	Either seems acceptable
G-5-101	A	13	11			complex, diverse and risk prone… and page 5 line 23 ...livelihood diversity allowing spreadin of risk… seem to state the opposite but use the same argument of diversification. It seems diversification it not the best strategy in all cases but this is not made clear. (Government of Netherlands)	To state that these systems are in general diverse and risk prone, does not contradict the point that diversification, *in some circumstances*, is a way of managing risks
G-5-102	A	13	12		12	"diverse : in" should be "diverse in:" (Government of USA)	Either seems acceptable
G-5-103	A	13	17	13	17	The phrase "as well" may be replced by "as well as". (Government of Pakistan)	Change now made
G-5-104	A	13	20	13	35	The energy requirement of subsistence and smallholder forestry should be considered here as well and the role of small scale forestry projects (feasibility of fuelwood plantations, agroforestry) (Government of Finland)	Energy needs of smallholder and subsistence farmers are already mentioned. Space would not allow discussion of this possible trend
G-5-105	A	13	20	13	35	Decreasing number of subsistence farmers may be positive development in terms of work division, specialisation and farm land productivity under certain conditions; sufficient incentives to increase productivity (Government of Finland)	This is not denied, but the space does not permit full discussion of the trade-offs between such specialisations and the welfare of current farming populations.
G-5-	A	13	27	13	35	Here should be mentioned that agriculture can include also cultivation of biomass	Biofuel cultivation by smallholders is not

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106						for pulp (eucalyptus) or energy (elephant grass), oil (oil palm) or ethanol (sugar cane). If food production shifts to temperate areas, the tropical areas have still the possibility to produce other products. Energy will be more and more important in the future. (Government of Finland)	prominent in the litearture, either currently or as future trend, and space did not permit discussion of this.
G-5-107	A	13	33		35	Delete or clarify this sentence. (Government of USA)	On reflection, sentence seemed clear, but was clarified by addition of "long-term".
G-5-108	A	13	42	13	46	Here I find missing the theme of species diversity alteration and the co-effect of climate change and forest management (Government of Finland)	
G-5-109	A	13	48	14	6	As with any methodology, FACE experiments have both benefits and shortcomings. While such systems are useful in looking at plant communities, it is also clear that rapidly fluctuating CO2 concentrations within a FACE system may, in fact, **underestimate** plant responses (e.g. Holtum and Winter, Planta 218:153-158). That is, the response of plants to elevated CO2 is less when the CO2 environment is changing between ambient and elevated values than if elevated CO2 were given at a constant concentration. (Worse for tree compared to crop experiments since trees are a 3D impediment to air movement and CO2 distribution in FACE rings). In any case, a review of ONLY FACE experiments will emphasize that previous findings have over-estimated crop responses. Make clear that no one methodology, including FACE, will give ultimate answers with respect to CO2 fertilization of crops. (Government of USA)	Revised text in 5.4.1 no w makes this point clearer. Reviews reported include both FACE and non-FACE studies. FNT, AK
G-5-110	A	14	1	14	24	The authors should address the following inconsistency; Lines 1-6 states confirmation of the TAR (with expected productivity boost of elevated CO2); however, lines 16-24 indicates recent views showing earlier assessments over-estimate response, and that the responses are not well understood, suggesting that a productivity increase may not be expected in all cases. See also page 18, line 6-16 demonstrating that recent results do not confirm the TAR position. (Government of Australia)	There is no question that elevated CO2 stimulates photosynthesis. However, 5.4.1 clearly states that responses at the plant and yield level may vary significantly due to a variety of reasons, from management to species. The debate on FACE responses being apparently lower than earlier estimates has been addressed in view of recent work showing no real difference between FACE and non-FACE results. FNT, AK
G-5-111	A	14	4	14	6	There is no real support for this sentence. The quoted paper says the reverse when comparing fast-growing and slow-growing clones of Betula pubescens, and from other experience, Fagus sylvatica (slow-growing) has a stronger response to CO2 than Castanea sativa (that grows faster) (SAUGIER B., DUFRENE E., EL	Disagree. The studies cited are the most recent available post-TAR research results. This sentence referes to commercial forestry species where diferent climates also control

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						KOHEN A., MOUSSEAU M. and PONTAILLER J.Y., 1993. CO2 enrichment on tree seedlings and branches of mature trees. In: Design and execution of experiments on CO2 enrichment (E.-D. Schulze and Mooney H.A., eds., Publ. n° EUR 15110 EN, CEC DGXII, Brussels, p.221-230.). The response to CO2 depends on the capacity to use newly formed assimilates but this capacity, in relative terms, may be as large or larger in slow-growing species than in fast-growing ones. So drop this sentence. (Government of France)	the observed response, which in any case is reported with respect to the plantation rotation period. FNT, AK
G-5-112	A	14	4		5	(Vanhatalo et al. 2003; Kostiainen et al. 2004) (Government of Finland)	One reference was deemed sufficient (the first one was laready included in 5.4.1) FNT, AK
G-5-113	A	14	5			Suggested change: …+15-25% at high N… (Government of Finland)	The revised range is in line with this suggestion FNT, AK
G-5-114	A	14	5		6	(…Riikonen et al. 2004; Kostiainen et al unpublished) (Government of Finland)	Again, the included references seem appropriate FNT, AK
G-5-115	A	14	8	14	8	How current AGRICULTURAL models…. (Government of Canada)	Revised sentence more clear to this end FNT, AK
G-5-116	A	14	16	14	24	The section is unclear as concerns: Are the models overestimating yields, or are there no actual fields that corresponds to the fields that the model predicts the yield of? This is of interest to know, because in the first case the models do wrong, whereas in the second case the models need to be complemented by others, or are used for sites they do not represent (Government of Sweden)	The revised sentence is clearer. In any case, the simulated yields discussed here are under elevated co2, so there is no famr-level data that can be used to test the models; only experimental results form a variety of sources. FNT AK
G-5-117	A	14	20	14	20	What is a leading model? (Government of Sweden)	Dropped in revised text. FNT, AK
G-5-118	A	14	31		31	Replace “, and size” with “, size”. (Government of USA)	Does not apply to edited sentence. FNT
G-5-119	A	14	32		32	A mention of the role of soil nitrogen in limiting the CO2 fertilizer effect would be helpful. Suggestion for line 32 after the sentence that begins on line 30 with “For instance,”: *Additionally, the N limiting conditions that exist* ***in unmanaged grassland systems and some agricultural systems*** *may* ***limit*** *the plant growth stimulation effect from elevated CO2.* (Reich, P. B., S. E. Hobbie, T. Lee, D. S. Ellsworth, J. B. West, D. Tilman, J. M. H. Knops, S. Naeem, and J. Trost. 2006. Nitrogen limitation constrains sustainability of ecosystem response to CO2. Nature. 440, 922-925. (Government of USA)	This is old, pre-TAR knowledge and was not discussed here at length, since our focus was on new knowledge. FNT,
G-5-120	A	14	33	14	35	The authors should review this sentence as they risk an individual result being extrapolated to generalisation. The work of Xiao et al. (2005) is conducted under	This study is only given as an example and we see no risk of generalization. FNT

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						very specific conditions that is unlikely to reflect in-field conditions. It does not take into account the greater risk of elevated temperature at different states of ontogenetic or phenological development. (Government of Australia)	
G-5-121	A	15	4	15	4	Add a reference to the severe heat and drought event that struck Europe in 2003 (Ciais etal., 2005, Nature 437: 529-533. (Government of France)	Reference already included in proper place (5.4.2, carbon pools). FNT
G-5-122	A	15	7		10	This statement that "most assessment studies continue to only include effects on changes in mean variables" should be highlighted in the Executive Summary. (Government of USA)	It is in the executive summary, with different wording. FNT
G-5-123	A	15	14		30	Missing in sections 5.4.1.2 and 5.4.3.1 is consideration of climate change and elevated CO2 on the distribution of invasive species in pasture land or the distribution of native plants with negative impacts on pasture/grazing land. Such changes impact pastures directly by changing species composition and indirectly through changes in fire regime. (Government of USA)	References to species distribution change and invasive species is included in revised version both in reference to pasture, and more in general in the section on pest weeds and disease. Most of this was laready discussed in TAR. FNT
G-5-124	A	15	18	15	23	A reference on mammal damage could be added here: Kuokkanen, K., Niemelä, P., Matala, J., Julkunen-Tiitto, R., Heinonen, J., Rousi, M., Henttonen, H., Tahvanainen, J. and Kellomäki, S. 2004. The effects of elevated CO2 and temperature on the resistance of winter-dormant birch seedlings (Betula pendula) to hares and voles. Global Change Biology 10:1505-1512. (Government of Finland)	Will consider.
G-5-125	A	15	19	15	23	Studies of temperature effects on pest insect interactions on forest trees are important without CO2 addition, if temperature extremes come more frequent before significant increase of atmospheric CO2 xoncentration. Defence capacity of tree proveniences might not be as adaptive as pest potential of insects. E.g. in Scots pine seedling biomass gain and chemical defence is highest at low (+2 C) increase of temperature, while the optimal growth of aphids (potential pest insects) take place at 2 to 6 C degrees temperature increase (Holopainen, J.K. & Kainulainen, P. 2004. Reproductive capacity of the grey pine aphid and allocation response of Scots pine seedlings across temperature gradients: a test of hypotheses predicting outcomes of global warming. Canadian Journal of Forest Research 34: 94-102.). During "heat waves" reduced plant defence might lead significant pest problems. Defence potential of economically important major tree species under elevated temperature conditions should be screened. (Government of Finland)	Agree. Yet some of the discussion on forestry and pests included is indeed in reference to temperature effects alone. New revised text in extreme events section mentions the links of climate variability and pest outbreaks. FNT
G-5-	A	15	51	16	7	Key is understanding man environment inteactions (e.g. farm household systems)	Agreed. FNT

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126						as at this level crucial decisions are made that affect both the biophysical and socio economic environments. (Government of Netherlands)	
G-5-127	A	16	1	16	7	These wishes are extremely general, current understanding would allow more specific wishes for research (Government of Finland)	Disagree. They are based on the current-state-of-the art research, as also discussed throughout these sections in more detail. FNT
G-5-128	A	16	15			insert "developed" after parenthesis. (Government of Ireland)	Will take fix at final editing stage.
G-5-129	A	16	44	16	44	Check the original paper for the correct author name (M.M.Q Mirza) (Government of Canada)	Fixed.
G-5-130	A	16	48			"passed" replaces "past" (Government of Ireland)	Revised text ok. FNT
G-5-131	A	17	1	18	35	Please review these pages for statements repeating information found earlier in the chapter (a suggestion to reduce the length of the chapter) (Government of Canada)	Revised text solves the repetition problem. FNT
G-5-132	A	17	14	17	18	Higher lignification rate and nitrogen depletion of green biomass and at elevated CO2 and simultaneous faster metbolism rate and higher consumption rate of insects leads to stronger insect population to feed more to meet their nutrition requirements. To reduce pest feeding damage better nutrition status of trees by fertilization might help to prevent insect feeding damages. (Government of Finland)	This is generic TAR knowledge. We have focused on inserting new findings in this area. FNT
G-5-133	A	17	14		18	In addition to the new findings listed, the authors may also wish to consider studies that show that increasing CO2 increases crop losses due to weedy competition in the field (e.g. Ziska, Global Change Biology 6: 899-905; and that Increasing CO2 may favor the spread of invasive weeds (e.g. Smith et al. Nature 208: 79-82). Consider adding to Executive Summary. (Government of USA)	Ziska references inserted. FNT
G-5-134	A	17	15		15	Edit sentence to make sense and elaborate on possible pathogenic and weed effects. (Government of USA)	Ok. FNT
G-5-135	A	17	32	17	32	check sentence, it seems that parts of the sentence are missing after "same" (Government of Germany)	Ok. FNT
G-5-136	A	17	32		32	Word missing: "…are likely to happen at the same *time*? that mitigation … (Government of USA)	OK.
G-5-137	A	17	36		41	The fact that TAR findings showed that climate impacts tended to be greater "when fine-scale vs. coarse-scale scenarios are used" seems a very significant finding. Can the authors say anything about how this issue affects findings throughout this chapter?	This issue was in part mentioned in the TAR. New revised text did not include the scale issue, since the topical studies carried out to date are pre-2002. In any case, the results of

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						(Government of USA)	those studies remain highly uncertain and the mechanisms unclear. FNT
G-5-138	A	17	43	18	2	Indeed there may be a hidden farm productivity potential in developed countries since for some time farmers have been discouraged for grain production, for example. However it should be told explicitly here how much of the optimism of swift adjustments and increased trade are built on the assumption that farm production can swiftly increase in the north? Is this any crucial assumption? Should there be new farm land, if no, do the precipitation pattern on growing period support increasing productivity in northern parts of Europe, for example?? (Government of Finland)	Good point. Discussion of socio-economic connections is developed in later section 5.6. FNT
G-5-139	A	17	47		47	Delete "in Africa". After this sentence, which would now end with 'malnutrition', a sentence could be inserted that would read: *For instance, the capacity to manage climate risk by smallholder farmers in Mexico decreased as a result of changes in livelihood security brought about by market liberalization*. (Eakin, H. 2005. Institutional change, climate risk, and rural vulnerability: cases from central Mexico. World Development, 33 (11), 1923-1938. (Government of USA)	The sentences here refere to greater trade in the context of greater climate impacts, i.e., it is not a sentence on the positives or negatives of trade per se. revised text makes this more clear. FNT
G-5-140	A	18	11	19	33	Figures 5a – 5f appear to have useful information. However, the text describing the graphs is presently unclear and needs to describe the methodology used to develop the graphs. Specifically: a) describe to what extent precipitation and CO2 changes are imbedded in these results; b) list the studies that provided the aggregate data (perhaps in a table footnote); c) detail what adaptation options are considered; and d) normalize the y-axis scale – at least by crop type. (Government of USA)	Revised section addresses these points. FNT
G-5-141	A	18	20	18	40	This is an incorrect representation of knowledge-base for climate change impacts on cereals. Generally, a good assessment of current position, except the statement 'other than cereals' (line 21). The uncertainties expressed in the paragraph apply equally to cereals. There is still minimal knowledge of the response of cereals to elevated CO2 derived from in-field studies that incorporate other climate change parameters (water, temperature). (Government of Australia)	Good point, which has been conveyed –for cereals--earlier in the section, although perhaps indirectly. It is nonetheless true that we know a lot more about cereals and elevated co2 (pioneering research startet in the 70s, with key australian players), than for other crops of relevance to developing tropical countries (often no research at all). FNT
G-5-142	A	18	31	18	40	economic-trade-technology assumptions require further analysis: for example: can dairy production expand considerably in New zealand and exports increase dramatically if world trade is liberalised? Where do the farmers take the feed for growing dairy herd? What happens to soiil and production costs if dairy production doubles?	Good point. However, it is beyond the scope of this chapter to get into this sort of detail. The socio-economic interactions considered within the studies mentioned do include livestock and feed, and take some of these

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						(Government of Finland)	limits into general consideration at regional level, within the global context. FNT
G-5-143	A	18		19		Should different scales in Fig. 5a-f be more clearly indicated? (Government of Finland)	Revised graphs have all same scale. FNT
G-5-144	A	18		19		figures are not clear. What is the underlying data (which models/studies are we looking at. What is the adaptation, is it something that normally would not be done (i.e.. irrigation is a common practice but using climate specific crop varieties is not). so does it go further than autonomous adaptation strategies. (Government of Netherlands)	Revised graphs and figure legend address these issues. FNT
G-5-145	A	19	26	19	26	Is Fig. 5.2 taken from other studies or a unique result of this publication? (Government of Sweden)	Unique result, but data points taken from existing publications. New text and figure legend clarify this issue. FNT
G-5-146	A	20	34	20	35	Drop "(C3 versus C4)" since elevated CO2 usually favor C3 species that have a better nutritive value than C4. This is especially true for C3 legumes. Thus Polley et al. (2003, New Phytologist 160: 319-327) showed C4 grasses decreased and C3 perennial forbs increased under elevated CO2. Nitrogen concentration of C3 forbs decreased at elevated CO2 but was still greater than that of C4 grasses at low CO2. (Government of France)	Much of the C3/C4 dynamics was addressed in TAR. We focused here on new findings. FNT This sentence has been corrected and the ref to Polley et al., 2003 has been added. JFS
G-5-147	A	20				Section 5.4.3.1: This section has not reviewed the extensive literature on heat stress in livestock production in the United States and other temperate countries, including at least one that estimates current losses in the U.S. at over $ 1 billion. Moreover, the literature extends as well to poultry and sheep, and effects on increase nutrient requirements, reproductive effects and mortality. This literature should be reviewed and included. (Government of USA)	The impacts of heat stress on livestock production is discussed (see 'Thermal stress reduces productivity, conception rates and is potentially life-threatening to livestock'). Current losses are not discussed in 5.4.3.1 as this section is on future impacts. However, we added further references to studies showing large losses e.g. in confined feedlots. JFS
G-5-148	A	21	5	21	9	Can we conclude that price volatility increases as well as economic risks? risk reducing policies? (Government of Finland)	We did not find referencses on this issue. JFS
G-5-149	A	21	25			Table 5.2: Newman reference is missing. Lilley et al should be 2001. More generally, there are very few irrigated grasslands in the tropics. What is the value of this information in the table? (Government of USA)	Agreed, since there are very few tropical irrigated grassland, these references were dropped. JFS
G-5-150	A	22	25	22	25	A definition of "industrial crops" would be helpful. (Government of Australia)	Definition included (Aggarwal)
G-5-151	A	22	25	23	2	The chapter on industrial crops and biofuels seems to be rather short. Renewable primary products such as Biogas and Ethanol will become more and more	Space constraint and limited knowledhe restrict us to expand this section (Aggarwal)

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						important especially in developing countries. (Government of Germany)	
G-5-152	A	22	38	22	42	The authors should review for inconsistency. The work of Reedy et al. (2002) is solid, and the conclusions are important. This recent work demonstrates that the basis upon which large increases in cotton yield were proposed, is indeed flawed. The previously proposed increase in yields appears not to be correct. (Government of Australia)	Yes, Reddy et al (2002) is highlighted (Aggarwal)
G-5-153	A	22	45	22	52	Is sugar beet any competitive energy crop in Europe? What about maize or creed canary grass? (Government of Finland)	Not necessary. Effect of climate change on maize and other crops is discussed earlier in the chapter and hence not repeated here. (Aggarwal)
G-5-154	A	22	49			The predicted yield increase for Europe of 3-5 t/ha by 2080 may for some European regions be true for the 2015-2020 time frame already. (Government of Germany)	Statement qualified; more reference added
G-5-155	A	23	9	23	9	please correct these figures according to http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/004/Y2316E/y2316e0b.htm : there were in 2000 187 Mha of forest plantations, i.e. 4.7% of forest area (not 3%), and they increased by 4.5 Mha per year (not 2.5) (Government of France)	There is some confusion in terminology here. The numbers are correct. For reference see FAO2005, pg. 76 ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf: "Productive forest plantations represented 1.9 percent of global forest area in 1990, 2.4 percent in 2000 and 2.8 percent in 2005. Currently, there are about 109 million hectares of productive forest plantations in the world…" In FRA 2005, 'productive forest plantation' is defined as a "forest of introduced species and in some cases native species, established through planting or seeding mainly for production of wood or non-wood goods". Man-made forests of native species are classified as plantations when they are characterized by few species, straight tree lines and even-aged stands, otherwise they are classified as semi-natural forests". If I understand correctly, it is suggested to add to this area non-industrial forest plantations (e.g., protective forests). However, non-industrial

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							forest plantations are outside the scope of the chapter, as clearly marked at the end of the same paragraph. AK
G-5-156	A	23	17	23	32	This paragraph would benefit if present trends in forest productivity were added to model predictions. In many European countries productivity has increased (Spiecker H., Mielikäinen K., Köhl M., Skovsgaard J., 1996. Growth trends in European forests. Studies from 12 countries. European Forest Institute Report n° 5. Springer, 372 p. , Nabuurs G-J, Schelhaas M-J, Mohren GMJ et al. , 2003. Temporal evolution of the European forest sector carbon sink from 1950 to 1999. Global Change Biology, 9, 152–160. See also Boisvenue and Running, 2006 quoted in chapter 5). As an example, the average productivity of the entire French forest increased from 5.7 to 6.5 m3/ha/yr between 1984 and 1996 (14% increase in 12 years, Dupouey et al., 2006, La séquestration du carbone en forêt. Forêt-Entreprise 168: 15-18). Since the harvesting rate has not followed the increase in biomass, there has been an increased carbon stock in French forests, estimated to 17 MtC per year (Dupouey et al, 2006), about 17% of french fossil C emissions (about 1/3 of this increase is due to increased forest area, and 2/3 to increased productivity. Causes for the productivity increase are CO2 increase, increased duration of growing season due to warming, nitrogen deposition. The relative roles of these factors may only be studied using mechanistic models. (Government of France)	Rejected. 1. This paragraph deals with the **modeling** forecasts. Past changes in productivity have nothing to do with it and are discussed elsewhere. 2. At the same page we do discuss past changes in productivity, citing Boisvenue and Running, 2006, who reviewed ~50 different studies and generally found productivity increase. We are aware that there are many more studies (including those cited by the reviewer), however it is not universally accepted that the current trend should be attributed to CO2, N deposition, and climatic change. Furthermore, increase in dusturbance can reverse this trend (Kurz, Apps, 1999) 3. Carbon sequestration issues are discussed in WG3 Chapter 12. 4. We are not sure why did the reviewer advise us to look into "Boisvenue and Running, 2006 quoted in chapter 5". This is chapter 5 and we refer to this publication at the same page, two paragraphs below. AK
G-5-157	A	23	17		32	The authors state that global timber production will increase as predicted by the TAR. Perhaps this is ignorance on my part, but I've read about large infestations of pine bark beetle occuring in Canada and the Northwestern U.S. with millions of acres of timber destroyed. (Increasing minimal temperatures did not kill the beetle). Is this something worth mentioning? (Government of USA)	This paragraph deals with the **modeling studies**. A lack of adequate representation of wildfires, insects, and extreme events in the models used in those studies (and in the models generally with a few exceptions) is clearly described later in the text. Especially important is interaction between changing pattern of insect damage and forest fires – but again we have no post-TAR modeling studies on the topic that I am aware of. AK
G-5-	A	23	24	23	24	On the other hand there is an increasing risk of frost damage in the north as springs	Frost damage is mentioned in 5.4.5.2; space

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158						move earlier but the possibility of bursts of arctic air masses remain high that may influence the predictions. (Government of Finland)	limitations preclude more thorough discussion. AK
G-5-159	A	23	39		41	Sentence says a set of impacts may happen but no analysis has been done yet. So what is the "new knowledge" here? Consider an alternative placement in text. (Government of USA)	The sentence is corrected; there are a number of publications suggesting the impacts, which will be diverse and regionalized. AK
G-5-160	A	23	43		52	The tree studies mentioned here, where no response of tree growth was observed in response to CO2 are interesting, but previous studies by Norby at Oak Ridge and DeLucia at Duke also show a significant increase in tree growth with CO2. Wouldn't it be safer to say that the response might be species specific? (Government of USA)	Agree-correction incorporated. However the main messaage that 35% increase in forest production is likely to be unjustified given the FACE data stays unchanged. AK
G-5-161	A	23	44	23	45	This has to be corrected. There are many studies (Norby et al., 2005, PNAS 102, 18052-18056) showing NPP increases around 20% or more in FACE studies where CO2 is multiplied by 1.5 or so. The study by Körner quoted line 46 (no increase in NPP) should thus not be overstated. (Government of France)	Reference to Norby et al. is added, however the studies showing little NPP increase in mature stands or under elevated O3 should not be ignored. Note that we are required to present both sides of the argument. AK
G-5-162	A	23	44	23	44	May delete the word "towards" after "revised to". (Government of Pakistan)	Corrected. AK
G-5-163	A	23	50	24	1	Lack of balance in argument. The work of Boisvenue and Running (2006) is not universally accepted. The majority of findings (as indeed cited elsewhere on p 23) present a much more conservative view, and recognise the vital importance of integrative ecological effects (esp with water). (Government of Australia)	We can't confirm that there is an overwhelming number of findings confirming negative or no impact. Indeed we are criticized for presenting an over-pessimistic view and ignoring a large number of publications confirming increased production (e.g., (Spiecker H., Mielikäinen K., Köhl M., Skovsgaard J., 1996. Growth trends in European forests. Studies from 12 countries. European Forest Institute Report n° 5. Springer, 372 p. , Nabuurs G-J, Schelhaas M-J, Mohren GMJ et al. , 2003. Temporal evolution of the European forest sector carbon sink from 1950 to 1999. Global Change Biology, 9, 152–160.; A. Shvidenko, personal communication on increased trees growth rate in Russia). Note that we are required to present both sides of the argument. AK
G-5-	A	23	52	23	52	Using the Boisvenue and Running 2006 to support this statement is a problem. The	Kurz and Apps 1999 is a modeling study and

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164						paper appears flawed as it does not properly account for changes in forest productivity due to climate change from changes in regional forest C sink strength due to temporal changes in land use, land cover, and disturbance. The paper (and Chap 5) fails to cite several key papers that attempt to account for these effects eg. Caspersen et al. 2000 Science 290:1148 (US East forests) and Kurz and Apps 1999 Eco App 9:526-547 (Canada forests) and thus it is unclear how comprehensive the review and analysis is. (Government of Canada)	obviously does not belong to discussion of observed changes. Boisvenue and Running concentrated on changes in growth rate due to climatic factors, which was possibly the reason the Caspersen et al. analysis was excluded from their study as the latter concentrated on the area under significant land use change. We cite Caspersen et al. elsewhere as a factor of uncertainty. AK
G-5-165	A	24	1	24	1	In the Finnish national Forest Inventory there has been a clear increasing growth trend that is very probably somehow linked to CO2 increase among other factors (N-deposition, management changes). (Government of Finland)	Yes, and we cited Boisvenue and Running 2006 who found an increasing trend in 37 out of 49 studies. However there are also more conservative estimates of the future trends, when other effects such as LULC changes and disturbances are taken into account, which are also presented in the paper; some of the observed growth increase could be due to re-growth and not the climate /co2/N change – Caspersen (1999). Note that there are many comments concerning with the overly optimistic view of the paper and we are required to present both sides of the argument. AK
G-5-166	A	24	8	24	10	An explanation of the inconsistencies between the models used by ecologists and those used by foresters would be helpful. (Government of Australia)	Explanation is included. See also our reply to comment E-5-335, which underlines a very important problem of miscommunication between the ecologists and foresters. AK
G-5-167	A	24	15	25	1	Table 5.3 Solberg 2003b, Global. Clarify what is said in the scenario column (Government of France)	Clarifications added to the table. AK
G-5-168	A	24	15	25	1	Table 5.3 is difficult to understand because it contains a mixture of information on timber production (biophysical part) and on prices (economic part). I suggest a clear separation between predicted trends in both fields, and a clarification of seemingly contradictory statements. Some comment to give the main conclusions would be useful. (Government of France)	The table is reorganized. AK
G-5-	A	24	15	25	1	Sohngen, 2005. Impact column "Reductions in production in North America and	There is a long-term gain in production with

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169						Russia". This is the opposite of what has been said in the same Table under Sohngen et al., 2001. Please comment or correct. (Government of France)	near-term reduction. The table is corrected to clarify the distinction. AK
G-5-170	A	25	11	25	12	The authors have missed an important paper that verified a predicted link between climate warming and the amount of area burned by forest fires. The study increases the level of certainty associated with effects of CC of forest fire: Gillet, N.P., Weaver A.J., Zwiers, F.W. and Flannigan M.D. 2004 Detecting the effect of climate change on Canadian forest fires. Geophysical Research Letters 31 (8) (Government of Canada)	Reference included. AK
G-5-171	A	25	21			Suggested change: For many forest types, forest health questions are of great concern with pest and disease outbreaks as major sources of… (Government of Finland)	Corrected as suggested. AK
G-5-172	A	25	25	25	31	The statement requires some sort of substantiation. Certainly in northern forests, access should be easier not worse if precipitation declines. (Government of Canada)	Rejected. The sentence states "may affect", not "will affect". We never imply universal change in all regions. Lack of space precludes elaboration on regional details, found in the North America chapter. AK
G-5-173	A	25	26			suggested change: insects and pathogens and… (Government of Finland)	Corrected. AK
G-5-174	A	25	27			suggested change: insects and pathogen outbreaks.. (Government of Finland)	Corrected. AK
G-5-175	A	25	29	25	36	Also changes in species composition due to different climate preferences will be major problem for forestry, especially in the northern latitudes as the planning horizon is extremely long and todays regeneration actions should be planned for the climate of later half of this century with predicted more than 5 degree temperature increase (Government of Finland)	New requirements for forest management are discussed later in 5.5.1 (adaptations. The correction is suggested for the Table 5.7: Key AK
G-5-176	A	25	36			Suggested addition to the end of the paragraph: Forest management practices as means to mitigate climate change effects on forest health should be explored. (Government of Finland)	New requirements for forest management are discussed later in 5.5.1 (adaptations. The correction is suggested for the Table 5.7: Key Knowledge Gaps and Research Priorities. AK
G-5-177	A	26	1	26	8	Also, climate change driven species extinction may impose strong new requirements on forest management methods. (Government of Finland)	New requirements for forest management are discussed later in 5.5.1 (adaptations) AK
G-5-178	A	26	7		7	Change "Only few" to "Few". (Government of USA)	Done. AK
G-5-	A	26	12		22	With respect to the use of "will" and "would" – choose one but keep to one tense.	The last sentence is edited. Style will be edited

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179						Also, the last sentence needs some editing. In its present state it makes no sense. (Government of USA)	by a native speaker. AK
G-5-180	A	26	17	26	17	This will also cause big changes in the production preferences eg. sifts for fuel usage of forests from fiber based industries. (Government of Finland)	Fuels and production shifts are already discussed in 5.3.2.2. Accepted with this correction. AK
G-5-181	A	26	18	26	18	The word "would" may be replaced by "world". (Government of Pakistan)	Corrected. AK
G-5-182	A	26	18			A word missing: developing regions (Government of Finland)	Corrected. AK
G-5-183	A	26	37		39	What are the units in table 5.4? (Government of USA)	Meetric tons, as stated.
G-5-184	A	26				Table 5.4 : If you want to use data from 2004, you need to change entire data in table 5.4. -> if you want to use data from 2003. you should correct values in table 5.4 with FIGIS and FAOSTAT (Government of Korea)	Done (Brander)
G-5-185	A	28	3	28	4	Surely sea level rise causes water level contours to shift landward? (Government of Canada)	This is a direct quote, which is being checked with authors of the paper. (Brander)
G-5-186	A	28	26	28	33	Line 26 reports reduction in primary production, line 33 reports global increases in primary production. Please reconcile the two statements. (Government of France)	The first is an observation (based on satellites), the second is clearly identified as a simulation (Brander)
G-5-187	A	28	37		39	These lines have been added since the last draft. Specifically "… and possibly global decline (in fisheries production) *and that has already begun*" (italics added for emphasis). The evidence you reference justifies suggesting that climate change is already reducing global fish production. Your quote from Sarmiento indicates a predicted increase of 0.7 to 8.1%. Further it is not possible to distinguish fisheries induced changes from climate ones. They suggest that increased stratification (decreased vertical mixing) could decrease production in the tropics but *increase* it at high latitudes thus exacerbating the consequences of poleward shifts in species distributions. This would strengthen the conclusions in the para starting P.28, L.50, that low latitude artisanal fisheries would suffer the greatest impacts. As a result, suggest you modify the bullet, P.4, L.22, to"…with potential consequences for low latitude artisanal fisheries" This reinforces earlier concerns that the document is not consistent in its treatment of fisheries. Somewhere the document needs to differentiate between impacts of climate change vs climate variability on fisheries. Suggest looking at works by F.	Suggested modification of p4 line 22 not accepted, because that line is based on observation, whereas the modification relies on simulations, which are very uncertain concerning detail. The final point about consistency and dealing with climate change vs variability is dealt with in section 5.4.6.3, particularly p29 lines 21-23. (Brander)

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						Berkes, N. Peluso, and N. Mantua. (Government of USA)	
G-5-188	A	28	41	28	41	Climate change AND VARIABILITY has been implicated…it's not just climate changes. (Government of Canada)	See section 5.4.6.3 (Brander)
G-5-189	A	29	21	29	21	Before making a sweeping statement such as this, perhaps the authors should discuss briefly how they are used now. (Government of Canada)	Comment not clear – does it refer to how models are used now? (Brander)
G-5-190	A	29	33	29	36	The sentence needs to be reconstructed. (Government of Pakistan)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-191	A	29	33	29	41	Define surplus or use another word - it's a bit challenging for the lay person. (Government of Canada)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-192	A	29	33		39	It is unclear what the term "surplus production" means. It should be explicitly defined. (Government of USA)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-193	A	29	35	29	35	delete "when variability" editorial remark (Government of Germany)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-194	A	29	35		35	Delete one occurrence of "variability when". (Government of USA)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-195	A	29	36	29	37	This is an adaptation not an impact (Government of Canada)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-196	A	29	36		36	Choice of the word "must" is too strong. Suggest replacing with "may need to". (Government of USA)	These comments are accepted and the paragraph has been altered accordingly. (Brander)
G-5-197	A	29				Box 5.4 - this is very brief treatment of this issue, which could meaningfully be expanded in the following ways: (1) discuss the very plausible mechanisms for potential impacts of coral mortality on fisheries (ie loss of corals = loss of habitat = loss of prey species = decline in target species) and (2) discuss some important reasons why impacts on fisheries have not been detected to date, including especially the multitude of non-climate drivers on fisheries systems that are likely to mask indirect climate impacts. (Government of Australia)	The box was written to go into the Cross-cutting theme and it should be read in the context of the other material there, which is more complete. (Brander)

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G-5-198	A	30	3	30	3	The section on Rural livelihoods does not include much results, in comparison with other sections. It gives an impression of speculations, not necessarily based on scientific results. It would have been appreciated that real results would be more clearly sorted out from non investigated relations. (Government of Sweden)	Section has been revised, with adiitional citations form peer-reviewed literature
G-5-199	A	30	3	31	35	This section is too focused on small holder ag systems and could provide more balance by addressing subsistence systems, including those found in the Arctic (e.g. ref Ford, J., Smit, B. and J. Wandel. 2006 Global Environmental Change 16, 145-160.) (Government of Canada)	It was felt that subsistence and smallholder agriculture based on *domestication* was fundamentally different from hunting/gathering systems, though the use of wild resources by S&S farmers is noted. Northern subsistence populations are already extensively covered in the Polar Regions chapter.
G-5-200	A	30	9	31	29	Develop a clearer graphic or delete this one (it is not helpful). (Government of USA)	Graphic now deleted
G-5-201	A	30	9			the conceptual model needs clarification, the circles and text are not clear (e.g. why are markets not part of the picture?). If the message is that the system is complex just mention it and leave it at that. (Government of Netherlands)	Graphic now deleted
G-5-202	A	30	50	30	50	What is the meaning of "low confidence"? The magnitude of the impacts listed in the following 4 lines is not indicated and as written could be minimal. Very high confidence could qualify such a vague statement (Government of France)	The overall line of reasoning from increased frequency of drought to the specific impacts listed, particularly to the effects on human development indicators, seems to justify a conservative level of confidence.
G-5-203	A	31	30	31	30	I do not see that the subsistance fuel requirement is considered here. (Government of Finland)	Space did not permit consideration of this.
G-5-204	A	31	38	31	38	Section on Adaptation is interesting. (Government of Sweden)	Thanks (Aggarwal) or (Howden2)
G-5-205	A	31	50	31	50	The meaning of the qualification low confidence is not clear in this context. (Government of France)	In the line referred to, there is no reference to 'low confidence'. Perhaps wrong page or line number given (Aggarwal) or (Howden2)
G-5-206	A	32	21	32	22	I suggest that instead of only talking about technologies to alleviate drought problems, also problems caused by excess precipitation would be mentioned here. Add e.g. at the end of this sentence 'as well as water management to prevent flooding, erosion and nutrient leaching in areas of increased winter precipitation and extreme rainfall events'	Text amended to include this comment (Aggarwal) (Howden2)

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						(Government of Finland)	
G-5-207	A	32	27			Add: integrated pest and pathogen management (Government of Finland)	Text amended to include this comment (Aggarwal) or (Howden2)
G-5-208	A	32	37		38	The 10% yield benefit is difficult to interpret. Does this mean that autonomous adaptation (such as the practices listed in bullets on lines 17-29) results in a 10% yield benefit with regard to current climate variability? Authors should reword to clarify. (Government of USA)	Text altered to clarify (Aggarwal) or (Howden2)
G-5-209	A	32	41	32	42	It is written: Benefits of adaptations tend to level off. If it is assumed that benefits are in comparison to without adaptation, where can it be seen that it levels off in Figure 5.2. The difference in percentage between with adaptation and without adaptation lines, increases with temperature. Concerning absolute values the interpretation is different may be? (Government of Sweden)	The analysis where the benefits asymptote is referenced. This was a more structured study than the meta-analyses in Figs 5.2. However, even from first principles, one would expect adaptations within a particular farming system to be able to cope with only a limited range of change . Levels of change above this would need major reconfiguring of the system (ie moving from cereal cropping to grazing) (Aggarwal) or (Howden2)
G-5-210	A	32	45			Delete "…from problematic climate change" (Government of Finland)	Text retained as deletion would make this statement ambiguous. (Aggarwal) or (Howden2)
G-5-211	A	33	15	33	32	An important management strategy is to increase variability of management methods, species used, scale of treatments. Again, forest management will also have an important role in trying to preserve species diversity. (Government of Finland)	These points are covered in the text now. (Aggarwal) or (Howden2)
G-5-212	A	33	34	33	52	There are also constraints in fisheries adaptation by the movement of fish stocks beyond the regions safely accessed by currently used boats. It increases safety concerns and creates variable access among the fishing population. (Government of Canada)	This is true but a relatively minor point. Not elaborated due to space constraints. (Aggarwal) Refer to Keith Brander and ask for his suggestion (Howden2)
G-5-213	A	33	51		51	Wording is too strong. Suggest replacing “are seen as” with “can be”. (Government of USA)	Text amended to incorporate this suggestion (Aggarwal) or (Howden2)
G-5-214	A	34	7	35	18	Activities described in that chapter are of general nature with regard to adaptation and not specific for adaptation measures in FFFF. This chapter should therefore be shifted to Chapter 17.a (Government of Germany)	Disagree. The examples are specific to food, fibre, fisheries and forestry. Chapter 17 is at a much higher, conceptual level. Furthermore, the structure approach here is not covered in Chapter 17. Additional focus has however,

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							been given to suitable examples of adaptation practice. (Aggarwal) or (Howden2)
G-5-215	A	34	9			Section 5.5.2: It would be helpful in this section to define the decision points resource managers et al. consider when making management decisions, then direct the information on climate change toward those decision points, i.e., what are the tools mangers use to make decisions and how can information on climate change be integrated into those tools. Consider an illustrative graphic as a replacement for Figure 5.3. (Government of USA)	The six-point structure there is aimed at those decision-points. Some modification of text has been made to address this. (Aggarwal) or (Howden 2)
G-5-216	A	34	24		27	Pre-condition #2 is garbled as written. Removing “by” on line 24 would help, but the meaning of the sentence is still not clear. (Government of USA)	Text amended as suggested (Aggarwal)
G-5-217	A	34	32	34	32	Add in the parentheses ' improved water management technology' (Government of Finland)	Whilst agreeing with this, water management has been previously addressed in 5.5.1 and also in the Chapter on Water Resources. In the interests of saving space, this point was not addressed. (Aggarwal) or (Howden2)
G-5-218	A	34	36	34	36	The problem in forestry is that the options should be good both for the present climate and that in 50 years time (Government of Finland)	Agree. This point is generally dealt with in point 4 and also in 5.5.1. In the interests of saving space, this point was not addressed here. (Aggarwal) or (Howden2)
G-5-219	A	34	47	34	47	The word "including" apearing after the phrase "used arrangements" may be deleted. (Government of Pakistan)	Word deleted (Aggarwal) or (Howden2)
G-5-220	A	34	48	34	48	add 'water management technology' (Government of Finland)	The text already identifies ‘efficient water use technologies’. (Aggarwal) or (Howden2)
G-5-221	A	35	13	35	13	Misprint: Age missing in literature citation. (Government of Sweden)	Section deleted Delete Dietz 2003 reference from text, also Hayami and Ruttan 1985 and also Eakin 200 and Kelly 2000 if not referred to elsewhere (Aggarwal) or (Howden2)
G-5-222	A	35	45			Costs and other socioeconomic aspects are some of the most important elements to policymakers and more detail from the identified studies in this section should be made available. And regional information, where available from these studies, should be provided as well. (Government of USA)	Details are available from the revised section 5.6. Space reasons militate against a repetition of details that are available from the original sources. Schmidhuber
G-5-223	A	35	47	36	7	One aggregate price for food and its possible changes over time or temperature elevation is not only uninformative, but also mis-leading; diets of rich and poor	True, diets are different, but food price for the most important foodstuffs have been moving

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						people are very different (Fig. 5.4) (Government of Finland)	largely in tandem over the past 50 years and are expected to do so in the future. Schmidhuber
G-5-224	A	35	49	35	50	The finding that the impact on global agriculture of climate change, could be positive in terms of GDP is important and the authors should provide an assessment of the Fischer study. More information should also be provided on how the costings were calculated. (Government of Australia)	Details on GDP assumptions are available from the revised section 5.6. The relative importance of GDP effects vis-à-vis CC effects is mentioned there is well as in the ES and SPM. Schmidhuber
G-5-225	A	35	49			It seems odd that the Fischer et al. 2002 global agricultural impacts study is the only one discussed in this section. At a minimum, much more detail (e.g., climate scenarios, baseline assumptions, what crops, CO2 fertilization assumptions, etc.) about Fischer et al. should be provided, but additional details from the other studies (e.g., Reilly et al.) would be useful as well. (Government of USA)	The revised section also includes other references notably to Parry et al, and Tubiello et al. Schmidhuber
G-5-226	A	36	4		4	Has "GMT" been defined yet? If not, it should be spelled out here. (Government of USA)	Clarified.
G-5-227	A	36	20	36	21	Figure 5.4 should be moved above section 5.6.2 for clarity of presentation. (Government of Australia)	Will be done at final editing stage.
G-5-228	A	36	20		22	The Darwin and Reilly studies do not appear in the list of references. (Government of USA)	Fixed.
G-5-229	A	36	26	36	26	Major shifts in the energy requirements and supply are taking place that will impact also forest sector prices. (Government of Finland)	Yes, but no literature on this is available viz climate change at this time.
G-5-230	A	36	29	36	29	The phrase "many these services" may be replaced by "many of these services". (Government of Pakistan)	Will do at final editing stage.
G-5-231	A	37	1	37	8	increase of cereals imports to developing countries by 10-40% until 2080 (p. 37); is this any remarkable change? WTO outcome may have a larger effects in the next 10 years. Is this development dangerous, and if so, why? (Government of Finland)	It's an increase in imports over and above a projected increase that is already remarkable (nearly factor of 3 to 2050: from 100mmt to 265mmt); note that a successful WTO conclusion should raise WM prices for cereals and thus **reduce** imports by developing countries, not increase them!!! Schmidhuber
G-5-232	A	37	13	37	17	What is role of this assumption on European and world wide food markets: potential of increasing agricultural land in Russia by 40-70% ??? Russians have to build new roads and plough a lot of rocky forests to reach this much new farm land. Are slightly increasing food prices a sufficient incentive for this? Has any research project analysed under which conditions significant increase in farm land is	Point well taken. The potential is in terms of agro-ecological suitability (soils and climate); that said, investments are likely to come on stream in the long-term provided that incentives (governance and prices) are in

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						possible in Russia, or elsewhere in north-easter Europe? (Government of Finland)	place; certainly an uncertainty. Schmidhuber
G-5-233	A	37	14	37	14	Formulation correct? particularly refers to globally, but North America is not global (Government of Sweden)	Is a major region worth noting in a global context.
G-5-234	A	37	14			Suggest to change text from "…there will be major gains…" to "…there can be major gains…" (Government of Norway)	Will handle at the final editing stage.
G-5-235	A	37	29	37	36	Where do the Asian consumers shift to if rice becomes scarce? to wheat? what could be implications? (Government of Finland)	They shift already out of rice! Will do even more so as incomes are projected to rise fast in Asia. Shift to livestock and implicitly towards coarse grains to produce meat, milk and eggs. Schmidhuber
G-5-236	A	37	39	38	22	Shouldn't there be a paragraph on "access"? (Government of USA)	Yes, was deleted accidentally but has been included in the revised draft.
G-5-237	A	37	44	38	27	Can you given the statement at page 18 -19 "Finally, coupled agronomy-trade simulations show that …… need to be considered in order to realistically project climate change impacts on food supply." indicate in which areas climate change is a significant factor overruling other drivers (technology, economy, demography) of change. (Government of Netherlands)	This level of detail is not possible with any confidence.
G-5-238	A	37	49		49	Suggest replacing "mask" with "include". The regional effects will be well known when they occur. (Government of USA)	But are not known now.
G-5-239	A	37				5.6.3. and 5.6.4. don't say anything of forests, change subtitle or add something? (Government of Finland)	
G-5-240	A	38	13	38	21	The section on Utilisation is unclear concerning climate impact on human nutritional uptake. (Government of Sweden)	Should be clearer in revised version. Schmidhuber
G-5-241	A	38	46	38	46	Here must be a word missing between 'measures' and 'deforestation'. Add 'to avoid' or 'against' (Government of Finland)	Will handle at final editing stage.
G-5-242	A	38	51	39	51	The examples are confusing to which MDG are you refering and what is the exact relation with climate change? From this section one could get the impression that forestry is important for sustainable development. (Government of Netherlands)	Section has been completely rewritten so as to make this comment irrelevant.
G-5-243	A	38	51	39	2	Clarify, what is meant by "proportional terms"? Proportional to what:country size? Population? GDP? Otherwise the statement is misleading as there is rapid	Section has been completely rewritten so as to make this comment irrelevant.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						deforestation going on in Asia(Malysia) and Latin America(Brazil) as well. (Government of Germany)	
G-5-244	A	39	2	39	40	lines 2 - 4 suggests that "highest reliance on solid fuels…." is demonstrated in figure 5a-c, that is not clear from the figures, which illustrate the status of the world without identuifying areas of undernourishment etc., give more clear explanations to the figure. (Government of Germany)	Section has been completely rewritten so as to make this comment irrelevant.
G-5-245	A	39	5	33	40	Figure 5 is not necessary in the IPCC report. Should delete and report only essential elements. (space consideration) (Government of Canada)	Section has been completely rewritten so as to make this comment irrelevant.
G-5-246	A	39	41	39	52	Food security and forests in danger in developing countries; how does this fit together with increasing wood imports to developed countries? (Government of Finland)	Section has been completely rewritten so as to make this comment irrelevant.
G-5-247	A	40	6	40	7	This, and several other points, are expressed more clearly in Section 5.8 than they are in the Executive Summary (Chapter 5, page 3). (Government of Australia)	We agree, hence the revision of the Exec. Summ.
G-5-248	A	40	8	40	8	The 3 oC increase in temperature is not a moderate increase but a very substantial increase. Accordingly, the word "moderate" may be deleted from line 8. (Government of Pakistan)	Not when the range is 0-5. In this case 3 degrees is in the middle of the range examined.
G-5-249	A	40	16	40	17	Previous studies have shown increased tree biomass productions ranging from 20 to 50% for CO2 going from 350 to 700 ppm (Lee et al., 1998. Biomass, growth and allocation. In: European forests and global change (Jarvis P.G., ed.), Cambridge University Press, pp. 126-191). Face studies report increases in forest NPP of 23% in average (Norby et al., 2005, PNAS 102, 18052-18056), or even of 28% (Ainsworth and Long, 2005, listed in chapter 5), for a CO2 concentration going from 360 or 370 ppm to usually 550 ppm. There is thus a relatively good agreement between both sets of studies for trees. A French team has a detailed forest model (ref. Dufrêne E., Davi H., François C., Le Maire G., Le Dantec V., Granier A., 2005 – Modelling carbon and water cycles in a Beech forest. Part I: Model description and uncertainty analysis on modelled NEE. Ecological Modelling, 185: 407-436.). They have just run this model at 376, 560 and 752 ppm. Averaged over 8 years with different weather, the increase in NPP was 21% at 560 ppm and 33% at 752 ppm, thus quite representative of what has been found in most FACE experiments for trees. Photosynthetic acclimation (decreased photosynthetic capacity of trees grown at high CO2) occurs to a much smaller extent in trees than in herbaceous species. It may not occur at all in real forest ecosystems in which gradual increase in carbon stimulates nitrogen acquisition (Luo et al., 2006,	Thank you for this information. Authors are considering some of this in our revisions.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Ecology 87: 53-63). (Government of France)	
G-5-250	A	40	16	40	19	I would say that the given medium confidence is not necessarily well based. None of the present models are able to adequately consider both the extreme events nor the changes in species distribution that will impact the predictions a great deal. Also the knowledge on soil processes remain too vague. (Government of Finland)	We agree with the general point, but our confidence rating was based strickly on the way the models handle CO2.
G-5-251	A	40	16	40	24	First sentence gives cause for some questions: when experiments suggest smaller CO2 fertilisation effects however crop models not, does this mean that the models dont build up the reality propoerly? Clarify. Furthermore, in what we have now higher confidence; that the models are now close to the upper range of new research? but not to reality? and than it is stated that models may overestimate CO2 effects with medium confidence, that is we dont have lower confidence in the models. Please clarify or delete all text from "however" (line18) to (medium confidence)(line19). (Government of Germany)	Clarified.
G-5-252	A	40	21	40	21	To be fair, you should also quote the value of 28% for trees (given page 14 line 3) (Government of France)	Done.
G-5-253	A	40	26	40	27	This is certainly wrong in Western Europe where forest productivity has much increased (1% per year at least since 1970 or so, Nabuurs G-J, Schelhaas M-J, Mohren GMJ et al. , 2003. Temporal evolution of the European forest sector carbon sink from 1950 to 1999. Global Change Biology, 9, 152–160. Please correct. (Government of France)	Will consider.
G-5-254	A	40	26	40	28	These two sentences should be split into separate sub-points as it is confusing to conflate forestry with possible extinctions in fish species. (Government of Australia)	Has been corrected.
G-5-255	A	40	26	40	35	Surely fisheries and forestry are sufficiently different to warrant separate paragraphs. (Government of Canada)	Yes I agree, they should not have been lumped together to save a bullet (Brander)
G-5-256	A	40	26	40	35	Efforts at brevity are appreciated, but in this case it does not work to co-mingle forestry and fisheries because the audience interests are quite separate. (Government of Australia)	Yes I agree, they should not have been lumped together to save a bullet (Brander)
G-5-257	A	40	26	40	27	Clarify with statement at page 4, line 13 -17, where medium confidence is stated. (Government of Germany)	Has been revised.
G-5-258	A	40	30			Add. (e.g. Pests and pathogen effects) (Government of Finland)	Will consider at final editing stage.
G-5-	A	40	45	40	52	"…to avoid 10-15% reduction in yield". Ewert et. al. predict 50-90% increase in	Not sure of the point here.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
259						crop yields in western Europe in the next 50 years. (Government of Finland)	
G-5-260	A	40	47	40	47	The meaning of the qualification low confidence is not clear in this context. (Government of France)	We believe that the findings are consistent across studies, but the state of the art of economic modeling is not advanced such that even consistent results must be viewed as low confidence.
G-5-261	A	41	14	41	14	Table 5.5 - should add a finding or 2 related to subsistence, particularly in the Arctic. (Government of Canada)	Done.
G-5-262	A	41	14	42	2	The sequence of rows in various columns of Table 5.5 is disturbed. This may be rectified. (Government of Pakistan)	Fixed.
G-5-263	A	41	15	42	5	Table 5.5 is clearly presented and is particularly useful, consideration should be given of including this in the Synthesis Report. (Government of Australia)	
G-5-264	A	42	4			The phrase "Increase export" may be replaced by "Increase in export" in the "Forestry" row under "Finding" column in Table 5.6. (Government of Pakistan)	Will handle in final editing.
G-5-265	A	43	1	43	24	please clarify, what does increased or decreased impact means in terms of direction? Is a decreased impact positive for crop yields? Or negative? Or does it depend on the region? Add clarifying sentences to the figure. (Government of Germany)	Seems fairly clear to us that increased/decreased relates to the quantity in the rows.
G-5-266	A	43	3	43	3	Table 5.7. First line in "Research priorities" "FACE experiments...." Change "Long-term FACE experiments ..". Recent experience of 3 to 4 year experiment tell us that significat effect in forest trees can be found not earlier thatn on third year. Short-term expeiments miss the accumulating effects of climatic trends. (Government of Finland)	Will handle at final editing stage.
G-5-267	A	43	33	44	1	the last three research priorities could perhaps be refined or worked out per sector. Special attention is needed for the decision making level (farm level in agriculture) and how adapation strategies can be implemented. (Government of Netherlands)	Will consider.
G-5-268	A	43	33			Insufficient recognition of knowledge gap 1. As correctly described in the document, there is a lack of knowledge of elevated CO2 response in many crops, however it is stated that this knowledge gap has been filled for cereals. The knowledge base for cereals is equally very narrow, and it is absent for areas where there are high water potential deficits - as in the majority of Australian growing	The statement is intended to state that there is more knowledge for cereals than other crops, not that everything is known about cereals.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						conditions. Given the importance of cereals to food security, suggest that the research priority is to build much greater understanding of the integrative effects of elevated CO2 in cereals with a range of factors especially water and temperature, under conditions of semi-arid (non luxurious) farming systems. (Government of Australia)	
G-5-269	A	43	33			Extra knowledge gap. There is a lack of recognition in document (5.4.1, 5.4.2) of the timing of climate change events, especially in annual production systems. For instance, cereals are particularly vulnerable to a very short window of elevated temperature in the first two weeks after anthesis, and to increased water stress during booting. Climate change is likely to influence the timing of heat and water stresses, and the effect of elevated CO2 to accentuate or ameliorate responses at these 'sensitive points' is simply not known. (Government of Australia)	Was stated in the TAR—this focuses on new gaps.
G-5-270	A	43				Table 5.7: please add: Knowledge Gap: missing advisory procedures to support farmers for growing renewable primary products, to identify possible areas and/or identify agrometeorological risks. Research Priority: improve and/or adapt existing tools and procedures. (Government of Germany)	It seems that this priority is important but a bit too specific and out of balance with the tenor of the current gaps.
G-5-271	A	43				Given the millions of dollars it takes to run a FACE project, and the fact that money to run such projects is declining, other methodologies should not be excluded. In fact, FACE systems do not differ significantly from many open-top chamber systems in predicting the response of plants to CO2 (e.g. Amthor, 2001, Field Crops Research, 73:1-34 for a wheat comparison) (Government of USA)	The broader community thinks that FACE type experiments provide a much greater confidence of applicability of results to real farming/forestry situations.
G-5-272	A	44				The phrase "the critique re the overall" may be replaced by "the critique regarding the overall" in line 7 paragraph 2 under the "Research Priority" column of Table 5.7. (Government of Pakistan)	OK.
G-5-273	A	45	0	59		"References" is not yet in good shape, e.g. could not find Kaakinen et al. (Box 5.2) etc (Government of Finland)	Fixed.
G-5-274	A	45	0			Suggested references for chapter 5: Riikonen, J., Lindsberg, M.-M., Holopainen, T., Oksanen, E., Lappi, J., Peltonen, P. and Vapaavuori, E. 2004. Silver birch and climate change: variable growth and carbon allocation under elevated concentrations of carbon dioxide and ozone. Tree Physiology 24, 1227-1237. Kostiainen, K., Kaakinen, S., Warsta, E., Kubiske, M.E., Nelson, N.D., Sober, J.,	Will consider.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Kornosky, D.F., Saranpää, P. and Vapaavuori, E. Wood properties of trembling aspen and paper birch after five years of exposure to elevated CO2 and O3. Manuscript submitted to Global Change Biology. (Government of Finland)	
G-5-275	A	45	1	59	26	Many references are incomplete. (Government of Pakistan)	Fixed.

This part contains LATE GOVT comments for chapter 5

CHAPTER 5

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
5-1	LATE	0				With only few exceptions, issues related with Latin American countries are missing. Authors must know that countries like Brazil and Argentina are, and will be, among the most important contributors to food supply. [see -Magrin, G.O., and M. I. Travasso. 2002. An integrated climate change assessment from Argentina (Chapter 10) In: Effects of climate change and variability on agricultural production systems, edited by Otto Doering III, J. C.Randolph, J. Southworth, and R. A. Pfeifer. Boston, MA: Kluwer Academic Publishers,. 296 pp., Travasso, M.I., G.O. Magrin, W.E.Baethgen, J. P. Castao,G. R. Rodriguez, J.L. Pires, A.Gimenez, G.Cunha, and M. Fernandes. 2006. Adaptation Measures for Maize and Soybean in Southeastern South America. Working Paper N 28, AIACC. Available at: http://www.aiaccproject.org/working_papers/working_papers.html (Government of Argentina)	Travasso et al. Study now referenced
5-2	LATE	0				This chapter is well developed, but marginally extensive. It still commits the same shortcoming than in FOD, i.e. to orient too much all the information to report on developed countries studies and research. Such a focalization brings the authors to mention the effect of increasing environmental temperatures on livestock productivity only in the Mediterranean region when, as it said in regional chapters (case of Latin America) such relationship, including that of increasing absolute humidity was well known in many cattle rising and dairy production in LA countries, and the Agricultural Regional Training Centre, in Chapingo, México, already trained agronomists and veterinarian in this field, as far as in the 1980s. (Government of Argentina)	Tried to insert more literature from developing countries, especially in the section on small-holder agriculture.
5-3	LATE	0				The same tendency to think mainly in the Northern Hemisphere, is reflected in a very simple and innocent error when referring to the precipitation in JJA (in the first bullet of the item on Assumptions about future trends (page 3, line 10), when the material, founding this bullet, see page 11, lines 1 to 3, mentions the precipitation trend in the summer of the Southern Hemisphere, corresponding to DJF. (Government of Argentina)	Corrected.
5-4	LATE	0				The quality of the sectoral chapters (3 to 8) looks quite diverse. However,	We do not see 1 as a resonsibility for Chapter

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						practically all of them show the same two shortcomings. 1.- the lack of strong appeal to decision makers regarding the assumption of their country s responsibility to implement fully their commitments in respect to the performance of geophysical and biological observations and compile the necessary social, economic and related human health information to understand better the implications of climate change in their different trades. 2.- The necessity to improve cross referencing among them and with the regional chapters (Government of Argentina)	5 per se. We tried to improve cross-referencing in the final version.
5-5	LATE	0				Regarding the issue on sustainable development, last bullet (page 5, line 11), it is clear that the adaptation measures need to be integrated with other international / regional decisions; however, in a chapter dealing with environmental as well as with social and economic factors, the mere reference to the MDGs looks quite insufficient, particularly because other international undertakings, like MEA, WEHAB , etc cover more than the social issues on which the MDGs are aiming at. (Government of Argentina)	In 5.5.2 we cross refer to Chapter 17 where this component of effective adaptation is being dealth with more comprehensively. The link to environmental measures is dealt with in 5.5.2 but there have been few studies on this so far – hence the relatively low profile in the ES.
5-6	LATE	0				Regarding the importance water (quantity and quality) has in agricultural, forestry, fisheries, in general, in food production, it would be necessary to bring to the attention of decision makers, farmers, fishers, etc, the value of freshwater. First, the inception of the concept of food productivity, decades ago, needs now to be followed by that of “water productivity”, as stems out from various FAO and other author's publications. Although Chapter 3 SOD does not include this and theconcept of irrigation efficiency, this suggestion has been made to its authors. Then, assuming that they will develop these concepts, appropriate cross-reference would be sufficient, as it is necessary to cover these factors. This becomes more transcendent due to the important limitations arising from water shortage to extend the agricultural frontier, a fact which is important in the treatment of the CCT on water and for the development of the IPCC Technical Paper on Water. (Government of Argentina)	We do try to cross-reference the water resources chapter, but much of what is recommended here is not out in the literature to be included here.
5-7	LATE	0				Finally, Chapter 5 should mention the effect of warming and water acidification (both in sea and freshwater ecosystems) on the trophic chain (i.e. fisheries depending from the Antarctic krill), destruction of chorals reefs and mangroves, and disappearance of freshwater fish and other species due to acidification and other forms of pollution. This last one is a very critical issue due account taken of increasing industrial activity in some developing regions. The reduction of tilapia stocks in Lake Victoria is a clear case of the adverse effect of the Earth's warming on food production. Decision making needs to be informed on these facts. Cross	This would seem to be more appropriate for Chapter 4.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						reference with the regional chapters would easy the task of Chapter 5' authors. (Government of Argentina)	
5-8	LATE	0				Concernig agriculture, in some items there is some bias towards citations involving the own authors of the chapter. There is little about regional studies around the world. Why is not included a table like 5.2 or 5.3 including both, global and regional studies? (Government of Argentina)	The regional studies are covered in far more detail in the regional chapters.
5-9	LATE	3	42	3	44	This item could be deleted because of the general concepts/knowledges,i.e. without specific or new findings. (Government of China)	Has been eliminated.
5-10	LATE	3	45	3	48	It should be added some words to explain a limited conditions revise this sentence"increased evaporation arising from icreased temperatures ", because the actual evaporation observation in the last 50 years didn't increase along with the increase of temperature in lot of regions. (Government of China)	Has been eliminated.
5-11	LATE	4	37	4	37	The last word"point" should be changed into "scope",because the point would change in ceratin scales under some conditions,like technology development. (Government of China)	Text to be amended.
5-12	LATE	4	38	4	43	In this paragraph, joint adaptation and sustainable development need to be mentioned. This is a concern of developing countries. (Government of China)	See response to comment 5-5
5-13	LATE	7	30	7	30	Which is understood for 'political regions'? Are they made up by many countries; e.g. the European Community? (Government of Argentina)	Varies. Could be counties or provinces, or groups of nations.
5-14	LATE	7	37	8	3	Hurricanes should be included During the last few years they affected some regions in an unprecedented way. See for example: Webster, P. J. , G. J. Holland, J. A. Curry, H.-R. Chang. 2005. Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment Science 16 September 2005: Vol. 309. no. 5742, pp. 1844 – 1846. DOI: 10.1126/science.1116448 (Government of Argentina)	But we are unable to find literature on climate change, hurricanes, and agriculture or forestry.
5-15	LATE	9	4	9	14	Besides the incorrect citation (In references FAO 2003 is on fisheries?) a lot of bibliography on these important issues is available and should be taken into account. (Government of Argentina)	Citation corrected.
5-16	LATE	9	44	9	44	Add 2005 in Brooks et al. (Government of Argentina)	Will consider.
5-17	LATE	9	49	9	49	Add 2003 in Vazquez Leon et al.	Will consider.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Government of Argentina)	
5-18	LATE	10	2	10	12	Maybe you could add some example for NE Brazil (Lemos, M. C., T.J. Finan, R.W. Fox, D.R. Nelson, and J. Tucker. 2002. "The Use of Seasonal Climate Forecasting in Policymaking: Lessons from Northeast Brazil." Climatic Change 55: 479-501). (Government of Argentina)	Seems like the point is adequately supported with the existing references.
5-19	LATE	10	9	10	9	To add a chinese reference related (in English):" Wang et al. 2004", after "…current vulnerability", i.e." Wang Futang and Liu Wenquan, 2004: Global Warming & Climatic Vulnerability of Agriculture :case assessment for the Loess Plateau in China, World Resource Review, 16(2), 231-242". (Government of China)	Will consider.
5-20	LATE	11	6	11	8	The present chapter's authors recommend examining Figures 5.1a and 5.1b side by side in order to get an idea of how the current areas suitable for rainfed crops could be modified by projected changes in rainfall. However, it seems that WG I has not yet authorised the use of the figure which will be 5.1a; therefore, the recommended comparison cannot be made and, by implication, it is not possible to assess whether the aforesaid recommendation should be sensible or not. (Government of Argentina)	Has been revised to include a figure on climate change-altered runoff.
5-21	LATE	11	33	11	49	FAO 2006 is unavailable in the web. (Government of Argentina)	Fixed.
5-22	LATE	12	7	12	28	References since 1990 already cited in TAR (Sedjo and Lyon, 1990, 1996; FAO, 1998; Sohngen et al., 1999;etc) (Government of Argentina)	But were needed as point of departure for the current assessment.
5-23	LATE	13	48	14	24	Soybeans should be included. Recent papers consider that CO2 effects are overestimated. Also, should be included acclimation to CO2. These issues should be discussed. [Morgan, P.B., Bollero, G.A., Nelson, R.L., Dohleman, F.G. & Long, S.P. 2005 Smaller than predicted increase in above-ground net primary production and yield of field-grown soybean was found when [CO2] is elevated in fully open-air. Global Change Biol.11, 1856–1865 Long S.P., Ainsworth E.A., Leakey A.D.B. & Morgan P.B. 2005. Global food insecurity. Treatment of major food crops with elevated carbon dioxide or ozone under large-scale fully open-air conditions suggests recent models may have overestimated future yields. Philosophical Transactions of the Royal Society 360, 2011–2020.] (Government of Argentina)	A carefully chosen selection of Long's papers was included that covers the main points needing attention.
5-24	LATE	14	26	14	50	This is a recent reference for maize: Leakey, A.D.B. , M. Uribelarrea, E. A. Ainsworth, S. L. Naidu, A. Rogers, D.R. Ort, and S. P. Long. 2006. Photosynthesis, Productivity, and Yield of Maize Are Not Affected by Open-Air Elevation of CO2	Will consider.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Concentration in the Absence of Drought. Plant Physiology, February 2006, Vol. 140, pp. 779–790, (Government of Argentina)	
5-25	LATE	14	38	14	40	Incomplete references: Demer,2003 and Shukla, 2003. There is another reference that could be useful: Sage, R. F. & D. S. Kubien, 2003. Quo vadisC4? An ecophysiological perspective on global change and the future of C4 plants, Photosynthesis Research, Volume 77, Issue 2 - 3, Sep 2003, Pages 209 - 225 (Government of Argentina)	Thank you—will consider if we cannot locate the original Shukla reference.
5-26	LATE	14	38	14	40	Contradictions between the two paragraphs. In the first one "our assessment is that main crop simulation models, such as CERES, Cropsys, EPIC,SoyGrow, and main pasture models CENTURY and EPIC, are in line with recent findings" while in the second one "Importantly, plant physiologists and modelers alike now recognize that effects of elevated CO2 measured in experimental settings and implemented in models may overestimate actual field and farm-level responses, due to many limiting factors such as pests, weeds, competition for resources, soil water and air quality, etc., which are neither well understood at large scales, nor well implemented in leading models" (Government of Argentina)	The language has been modified to clarify that the models are not inconsistent with the FACE results with respect specifically to CO2 sensitivity, but that a whole host of other limitations to the models cause them to underestimate damage from climate change.
5-27	LATE	15	51	16	7	This point could be moved to 5.8. (Government of Argentina)	We debated this, but the specificity of the recommendations made them more appropriate for here.
5-28	LATE	16	35	16	50	This paragraph is in contradiction with the affirmation in page 15 (..... most assessment studies continue to only include effects on changes in mean variables). (Government of Argentina)	We don't understand this comment. It is true that few studies have examined effects of climate variability independent of change in mean climate, but that is not to say that nothing has been done in this regard.
5-29	LATE	16	37	16	40	In line 39, what kind of field applications are being considered? (Government of Argentina)	Tillage, for example.
5-30	LATE	17	22	17	25	Suggest quote the statement carefully, did scientific results present that? Is there some works in linking with CO2 concentration and temperatue? (Government of China)	Yes, there is work relating CO2 and temperature dating back to the TAR.
5-31	LATE	18	41	19	25	figure 5.2 a-f ,please indicate the literature source? Use same method or various? (Government of China)	Done.
5-32	LATE	22	49	22	51	we still can get some benefits by industrial crops from climate change,but this part is not involved in the table5.6 (Government of China)	Not sure how to respond to this statement.
5-33	LATE	29	33	29	34	There is reference to the adverse effects on fish stocks of a 'positive trend' in the	That fish stocks are increasing.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						NAO. What does precisely 'positive trend' mean? (Government of Argentina)	
5-34	LATE	30	50			The four bullets following line 50 are low confidence statements. Therefore, should 'may' (or 'can') be used instead of 'will' in 'These will lead to...'? (Government of Argentina)	Will be changed.
5-35	LATE	32	15	32	15	Add reference: Travasso, M.I., G.O. Magrin, W.E.Baethgen, J. P. Castaño,G. R. Rodriguez, J.L. Pires, A.Gimenez, G.Cunha, and M. Fernandes. 2006. Adaptation Measures for Maize and Soybean in Southeastern South America. Working Paper Nº28, AIACC. Available at: http://www.aiaccproject.org/working_papers/working_papers.html (Government of Argentina)	Reference added
5-36	LATE	33	8	33	8	Balgis? (Government of Argentina)	Reference amended
5-37	LATE	34	46	35	1	Editorial. A few semi-colons, if properly placed, would help much the reading of such a long sentence. (Government of Argentina)	Text amended
5-38	LATE	34	47			The text: '...including through addressing climate change...' is obscure. (Government of Argentina)	Text amended
5-39	LATE	40	8	40	8	Cancel "local", because there are literatures for both local and global, A1,A2,B1,B2, scenarios (Government of China)	Has been rewritten.
5-40	LATE	46	1	59	26	Many incomplete references (Government of Argentina)	Fixed.