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

Government and Expert Review of Second Order Draft

Specific Comments

EXPERT REVIEW COMMENTS

Chapter 5

August 2006

Organization of the review comments file

Comments are organized as follows:

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

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

Discussion of expert review comments and record keeping

IT IS RECOMMENDED THAT:

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

Substantive comments

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

Non-substantive comments

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

General

- The record should be kept in this document, ideally electronically.
- The document becomes part of the traceable account of the Working Group II Fourth Assessment. When completed to the satisfaction of the Review Editors, a copy should be returned to the TSU by the **8th December 2006**.

Chapter 5:

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

	Chapter 5 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
5.Z1	**GENERAL COMMENTS** The chapter appears to represent a lot of early work by the authors, which has led to a draft that is in fair shape, if very long.	Yes	
5.Z2	The current draft is 24 pages too long - see Blue Book Doc 3 for this calculation. Thus, it will there need careful condensing to retain the key conclusions, and also the additional material suggested by reviewers.	Draft is now 42 pages compared to 40 page target, which is within error margins	
5.Z3	You will need to a short executive summary.	ES now present	
5.Z4	It is erudite on the whole and most sections use numerous examples and make numerous key points. The proportion of recent research reviewed is relatively high. In particular you seem to have found a persuasive balance between the sections, (we think correctly) giving over half the pages to section 5.4 and covering the topics though crop /forestry /fisheries etc. in an easy-to-follow manner.	The impacts section is now 17 pages out of 42, so if anything now rather short	
5.Z5	However, the chapter would benefit from shortening and tightening and several summary tables would be useful, each highlighting key points. For example, you could update TAR tables [such as TAR table 5.4] but make them much shorter than in the TAR. Adding tables and figures will help to break-up 'unrelenting' text.	Now 7 tables and 6 figures, compared to 4 figures and 2 tables in the much longer ZOD. Summary tables, e.g., Table 5.5, are now included.	
5.Z6	We make the following further suggestions for shortening the chapter: 1. update summary figures [such as TAR figure 5.20] 2. concentrate on the emerging new knowledge, post-TAR (for example where AR4 reinforces or revises TAR and do not repeat the rest 3. illustrate the main points by example but do not list every finding that leads to the conclusion 4. use collected sources to cover the references (for example the AIACC summary report might be used as 'meta' reference source).	Done Done Done more successfully in some sections than others – direct effects strong (5.4.1); fisheries weaker (5.4.6) SOD is very comprehensively referenced; not much use of meta-references.	
5.Z7	Section numbering is non-compliant, starting from zero.	Now starts at 1	

5.Z8	Your draft is heavily biased towards commercial agriculture, at the expensive of, for example, fisheries and subsistence systems. With respect to fisheries, the text is too general with few references and examples and is of surprisingly little relevance to climate change issues. Subsistence systems (a key sector in many developing countries) are hardly mentioned. Sections on rangeland are useful. Forestry coverage is patchy. Discussion of vulnerability is all but absent and sustainability discussion is limited to food crops and forestry.	Fisheries is still one of the weaker sections, with work still to do to pull it together, but much better than was. Subsistence systems section now strong. Forestry sections now strong. Vulnerability is covered. Sustainability section is present but weak – see later remarks – needs work if to be useful.	Substantive comment—will need KB's attention. It is not clear what this comment means. If it means making stronger statements, then it will remain a weak section. I have made the changes which Jean P. suggests.Brander
5.Z9	There is nothing at all on costs.	Now present	
5.Z10	You do not specify what case studies you plan to use.	Boxes on European heat wave, Mekong etc now present.	
5.Z11	There is a lack of information about the Southern Hemisphere in the draft (especially on developing countries).	Much better in SOD, although still open to complaint that too oriented towards Northern Hemisphere – there is a statement in ES about JJA rainfall, which clearly means summer rainfall, which is indicative of attitude.	
5.Z12	Your first task probably needs to consider what are the emerging key conclusions (global, regional and local), and then to consider how best to address these, for example, by giving them more attention than other findings.	Sections of Emerging Conclusions now strong, and if anything too much repetition of these.	Marginally substantive comment. Brander
5.Z13	**SPECIFIC CONTENT** There is no assessment of 'key' impacts (in the sense of thresholds) in Section 4 that could lead Chs19 and 20 to draw together. Is this planned?	Now improved, with key impacts in ES and Fig. 5.2	
5.Z14	You might emphasise new material of various types, including grey material that assists decision making with respect to development paths, sustainability, vulnerability, and adaptation strategies.		
5.Z15	You will need to increase your liaison with other WGII Chapter teams – especially Ch 4 and Chs 17 to 20.	Many references to Chapter 4 now, and some to 17.	
5.Z16	Please spend some time considering knowledge, data and research gaps.	Done	
5.Z17	It is suggested that you highlight your conclusions regarding how this assessment: confirms conclusions of TAR, or revises them.	In Section 5.4, most sub-sections open with a backwards reference to the TAR, which is well-handled. The only section which doesn't is Rural livelihoods (5.4.7) but it could usefully open with 4-5 lines on this.	Substantive comment—JM needs to handle. Brander Sentence now inserted at beginning of 5.4.7 to the effect that TAR discussion of smallholder and subsistence systems was implicit not explicit

5.Z18	It is not always clear what the timescales are of your assessed effects under mean climate change: i.e., are they for the 2030s, or 2050s or 2080s?	Usually clear now.	
5.Z19	Is it possible to say anything about effects under: 1. scenarios of stabilisation and 2. different development pathways (e.g. SRES scenarios)?	SRES is barely mentioned; there is one reference to mitigation impacts (page 17 lines 25-28)	Substantive comment—needs to be handled in regards to crop yield figure—what else? Brander Actually, our review of mitigation scenarios is longer: pg. 17, lines 25-36 I believe it is quite exhaustive. We also already mentioned the effects of socio-economic scenarios at the end of section 5.4.1., yet without explicit reference to SRES, as requested. This can be easily fixed, as ssuggested (suggested==see FNT edits in master copy). FNT
	Chapter 5 FOD comments by Co-Chairs and TSU	**Has this been addressed in the SOD?**	**Author response**
5.F1	**Comment 5.F1: Osvaldo Canziani** Chapter 5 FOD is well written; however, being still incomplete, it is too long. The estimated FOD printed pages are around 60 while the allocated number is 30. It looks like an excellent scientific assessment, including some valuable advice, particularly on what concerns adaptation actions in countries having a complete or quasi complete knowledge of their current resources, including climate and water resources (hydrographic systems). However, as mentioned in the specific comments, a more focused advice for developing country´s decision makers is necessary.This includes actions to be taken before any effort is developed to deal with the climate change effects (both adverse and beneficial). In this regard some basic components in the multifarious complexity of FFF, should be considered as very basic elements. Suggestions will be included in the specific comments. Further, FOD does not contain conclusions valid for decision making. For instance, many decision makers request information to act in closer time-horizons (i.e. 2020 or nearer), It is suggested to add some comments in this respect. FOD includes a large number of references on developed countries FFF activities and research and few on developing countries. However, since a good amount of research work developed by developing country scientists is available, these should be mentioned. Maybe the	Length is now on target (42 pages, compared to 40 page target – within the margins of error). Authors have removed their table on adaptation strategies (FOD Table 5.3). They have good sections on autonomous and planned adaptation, and these contain examples relevant to developing countries, but there is no attempt to offer advice. SOD has tables on impacts by warming increment and by date. Some five examples of possible impacts in the 2020s are provided. Cross-referencing to other chapters is	We see that it is inappropriate to 'offer advice' as this may be interpreted as being policy prescriptive. What we offer is a structured approach to planned adaptation with this fleshed out with examples of options. Aggarwal Not sure what kind of advice we can offer to developing countires, but perhaps JM can think about this. Brander To be considered at LA4—we should discuss with co-chairs. Much of the "advice" will be generic to good development practice—improve agricultural knowledge management, increase security of property rights etc. (JM) LAS believes that provision of advice is polic-prescriptive. Each of us should look at relevant regional chapters for possible cross-referencing/elimination of repetition and conflicting statements: FT for crops and

	recommendation for improved cross-referencing with regional and, even, with other sectoral chapters, will improve the chapter scope and permit to reduce its length. Regarding adaptation, major emphasis is put on climate variability effects, although some are missing, like the changes in oceanic circulation in the case of climate variability (i.e. the important economic effect on fisheries due to the deflection of the Humdbolt current, in the eastern Pacific Ocean). Regarding adaptation to climate change, the relocation of crops, already applied in South America, is not offered as an adaptation strategy. Further, some simple suggestions, like the value of redesigning frost tables (intensity and duration, in autumn, winter and spring) is a suggested feasible adaptation action.	strong for other sectoral chapters and Chapter 17, but cross-referencing to regional chapters is not done. Humboldt current is not mentioned. Relocation is mentioned (Section 5.5.1), but no present-day examples are offered	process knowledge; JFS for livestock and range; AK for forestry; PA for industrial crops; KB for capture fisheries; JM for small-holder agriculturalists. To be done in Capetown. (FNT) Can be done but NB very patchy coverage of South Asian agriculture in regional chapter. (JM) I corresponded with Osvaldo Canziani about the Humboldt Current, but the material which he susggested is old and covered in TAR. P29 lines 17-19 deals with his point. I've looked at most other chapters for overlaps. Brander
5.F2	**Comments 5.2 – 5.F10: Martin Parry** From being in quite good shape last December in the ZOD, I think that this has not tightened up as a chapter to the extent we had hoped: a) the messages new since TAR are not clearly spelled out; b) length, which was 50% in excess in ZOD, is now 100% in excess; c) the structure is sometimes confusing; d) there are no outstanding summary figures or tables that shout out to be used in a Summary for Policymakers. I recommend the authors consider following the example of ch 4 in creating an effective summary of findings, thus: a) a table summarising impacts by increments of T change (table 4.5) b) a summary map of projected impacts, worldwide (fig 4.9) c) a burning embers diagram for each FFF type to show key vulnerabilities (fig 4.10)	The SOD is now tightly written in most sections. It reads well – competent and focussed. a) TAR messages clearly spelled out b) Length good c) Structure now clear, but authors put forestry and fish together in the same section often – not a good idea and they need separating out. d) Summary tables are now included – 5.5 and 5.6 a) Done b) Done c) Not done	Substantive comment: KB and AK need to look over this and decide how to separate. We are not able to find cases of forestry and fisheries being combined except in the current climate stresses section, which combines all sectors. We discussed this in Clermont. You put them together in 5.8 because we were only allowed 5 key conclusions. My opinion is still that the one on FACE should be shortened and incorporated with some of the others. Substantive comment: All: c) do we want to attempt a burning embers diagram for vulnerabilities? I am in favour of it. (FNT) Las will attempt a burning embers diagram.

5.F3	Length is an increasing problem. In ZOD Word text was 58pp (in excess by 24); in FOD it is 70 (in excess by 35). Asssuming refs will be 7 printed pages (i.e. half the Word number), then text needs to maximum 23 printed pages,that is 35 Word pages. Tables and figures could summarise much of current text and make the latter redundant. For example, Boxes 5.2 and 5.3 and Table 5.3 summarise the new knowledge . IF CONCLUSIONS WERE ATTACHED TO THESE (and I suggest that each para in the boxes and each part of the table have a clear conclusion/summary/message of the state of current knowledge), then these are the essential core of the chapter. The rest could be cut to half the current amount. It is imperative the chapter meets its target length in FOD.	Chapter is on target for length Now done. However, Table 5.3 has been removed. Material from Boxes 5.2 and 5.3 has been moved to main text where treatment much improved – clearly related back to TAR, key conclusions highlighted. Box on Kajiado pastoralists has sadly been removed.	JM: any way to re-insert a short mention of Kajiado pastoralists? Box (in fact on Kenya-Ethiopia border) has been reinstated FGD p.33
5.F4	Key conclusions are not clear, viz a) is global agric production projection potential expected to increase? How different is this conclusion from TAR? B) is this consistent with more recent findings that CO2 effects may previously have been over-estimated (NB the global assessments prior to 2005 generally assume CO2 effects that have NOT YET BEEN REVISED DOWN in tune with 2005 findings). What is the new message and its confidence level?	Now very clear. a) Yes, but at a slower rate. Doesn't say whether is different from TAR. b) Current ES does <u>not</u> say that direct effects are less than previously thought in agriculture. Does not reference the 2006 Science paper by Long et all and presumably has not yet assessed this (see our closing recommendations on this). Says that effect is likely to be less for forestry (high confidence). Main text says that, for agriculture, results may not translate from plot/model studies to the field (5.4.1.1)	FT: Could clarify. I need to look into this more. If the increase referred to is due to socio-economic trends, I am not sure that there is any difference with respect to TAR findings. (FNT) There is clearly a need to assess Long et al. paper. Other models than EPIC and DSSAT are used…Trace CO2 effects there? JFS I am changing the text slightly in view of our recent submissions. Yet, in light of what we wrote (naturally hoping that it will be accepted), this all thing seems to have been blown out of proportion and I wonder whether it needs to be discussed to the extent it now is. (FNT)
5.F5	I do not think it works to separate Exec Sumary statement by confidence levels, if this means separating out topics: eg there are some aspects of food production that come under different sections: better to bring topics together, e.g. with one para on food production, but different parts of this (maybe) having different confidences attached to them.	ES now better organized.	
5.F6	The structure adopted has not helped the authors: a) why not bring all adaptation (except acclimation eg of trees and	Now done	

	fish) into section 6, thus enabling considerable condensing of current text b) bring all socio-economic components into section 5 (eg production, security, livelihood; and c) cover only effects on primary potential in section 4.		
5.F7	There seems to be a lot to do; and, as before, I think you need to start with deciding what your key conclusions must be and be clear how these differ or confirm TAR); then you can decide what space to devote to the key areas. You simply cannot cover all the ground, and no one expects you to.		
5.F8	Please use the reduced-form section headings that have been recommended, as other chapters have.	The chapter is doing better in this regard – see comment below.	
5.F9	The conclusions do not include a matrix, which was requested, which summarises effects under different amounts of climate change, and under SRES futures and stabilisation (where this information allows)	Now done for temperature and time increments (Tables 5.5 and 5.6). But these tables do not mention SRES scenarios or mitigation.	Substantive comment: again, we are dinged for not enough on SRES. We need to discuss. Brander Will revise text to insert a paragraph in both the food crops section and socioeconomic sections that discusses SRES results—Francesco and Josef to coordinate to consider the range of biosphysical and socioeconomic impacts across SRES scenarios..
5.F10	These, below, are a copy of comments on ZERO-ORDER DRAFT IN JAN 2005 made by Martin Parry, [with responses in FOD indicated in square brackets] This chapter appears to represent a lot of early work by the authors, which has led to a draft that is in fair shape. In particular you seem to have found a persuasive balance between the sections, giving over (we think correctly) half the pages to section 5.4 and covering topics crop/forestry/fisheries etc in an easy-to-follow manner. [I now think that, as the chapter has grown, it has lost shape and message] But one problem is length. The current is xxx times the target length (which would be xx pages in this format; this draft is 73). [You have not addressed this is and it is now much more of a problem]. Some solutions would be: 1) judicious use of tables to summarise text eg could there not be updates of tables in TAR [such as TAR table 5.4, but much shorter than in TAR] and updates of summary figures [such as TAR figure 5.20]. 2) Concentrate on the emerging new knowledge eg where AR4 reinforces or revises TAR, and do not repeat the rest. 3)	Generally these comments appeared in the ZOD comments, and are addressed there. They are included here for completeness.	

	illustrate the main points by example, but no need to list every finding that leads to the conclusion (and use collected sources to cover the references eg AIACC summary report might be used as 'meta' reference source? [the core boxes and table I refer to above have helped, but the text has not been cut accordingly; you do not need both] What case studies do you plan to use? [boxes are helpful] Unrelenting text needs to be broken up by friendly figures and tables. [Summary tables and figures, as suggested above, would be really helpful] But first task probably needs to be for writing team to consider what are the emerging key conclusions (global, regional and local), and then to consider how best to address these, eg give them more attention than non-key findings. [these not clear] No assessment of 'key' impacts (in the sense of thresholds) in section 4 that could lead ch19 and 20 to draw together. Is this planned? [A table illustrating the effects estimated for increment of T and P change would be helpful, as I have suggest in my FOD comments] Also missing is assessment of 1)effects under different development pathways: eg under SRES futures; 2) effects under stabilisation scenarios (where such information exists). [These are still missing]		
	Chapter 5 SOD comments by Co-Chairs and TSU		**Author response**
5.S1	**LENGTH:**	On target :with 42 pages within range of estimate error (5%)	
5.S2	**ARE PAO HEADINGS PRESENT?**	Broadly, with some changes in precise wording that should be OK. They have swapped Sections 5.5. and 5.6, so that Adaptation comes before Costs.	As discussed at Merida, this fits better with a more logical flow. Aggarwal
5.S3	**HAVE MOST GENERAL COMMENTS OF ERs FROM ZOD AND FOD BEEN COVERED?**	ZOD comments: • Many comments relate to adaptation, which is now much better dealt with. • ERs thought treatment of vulnerability poor – not clear that this has been addressed, but seems OK in SOD if short and to point. • ERs thought too much on impacts, not enough on adaptation etc. Balance has shifted in their indicated direction	

		(but may not suit TSU/CC) Further comments from FOD: • Too little on developing countries – much has been done but maybe not enough • More emphasis required on extremes and technology - much has been done but maybe not enough • More mention of impacts under SRES – not addressed. <u>This is important and needs priority attention by the authors</u>	Substantive comment: One way to address this is to add an interpretive section on our crop yield figures that makes SRES more explicit. Brander See above
5.S4	**ARE REFERENCES BROADLY COMPLETE?**	No	
5.S5	**IS THERE LINE-OF-SIGHT TEXT ➔ ES AND TEXT+ES ➔ TS+SPM?**	Yes	
5.S6	This chapter has improved greatly. It is tightly-focussed, well-directed, confident and authoritative. There are still some weaker sections, but (once it has included info on impacts under stabilisation, under SRES, etc, etc see our closing comments below) this will be ready to go for Government and Expert Review. The section on non-climate futures makes a fascinating read.		
5.S7	The decision to sometimes consider Fisheries and Forests together under the same sub-heading is an odd one, and makes for some uneven reading. Separate sub-sections for these two topics are advisable.		Addressed above. Brander
5.S8	Weaker sections are principally: • Section 5.4.6: Refers too much to present-day and observed trends, which should come earlier; does not follow structure of earlier sub-sections of 5.4 with division into **Confirmation of TAR** and **New Knowledge**. • Section 5.6, which has too many sub-headings and so comes across as 'bitty'.		Substantive comment: KB—this may only require some explanation concerning lack of predictive studies, (already there at p27 line 14) plus some window dressing with headings? OK I have done this. Brander JS: combine 5.6.1, 5.6.2, and 5.6.3 into one section?
5.S9	The English needs some polishing in parts, plus a read through for missing conjunctions and prepositions.		Will do at end. Brander
5.S10	Authors have added 'Fisheries' to title but this doesn't seem justified since fisheries come under 'Food', the first word of the title (Plenary discussed this explicitly and carefully chose the PAO title, <u>so please use this</u>).		I asked the TSU for clarification about the title and they are confused about what was decided. Brander
5.S11	Authors repeat their key conclusions – they appear in the ES AND in Section 5.8.1. In so doing, they are following instructions and the Reduced Form Headings, but may be too repetitious given length constraints – maybe they could use that space more effectively.		
5.S12	**<u>In summary re recommend that the authors need to:</u>** • Change title back to Plenary-Agreed Outline title. • Use the exact PAO subheadings for sections, which enable the reader easily to cross over between chapter (NB the other chapter use these exactly) • Do some English editing to get a more even feel to the chapter. • There really should be considerably more on food supply [and less on yield, if necessary] (NB		**Titles are a balance between the outline and material as presented.** **Will do once major pieces gel.**

	that's why 'food' was requested in the title by Plenary, rather than 'agriculture'). Specifically, what are the implications for access to food and risk of hunger at lower latitudes, near-term and longer term? Do the risk of hunger figures tabulated in Ch 20 'stand up' (there is a curious difference on this between the chapters. See the set of papers on climate change and food in (UK) Phil Trans Royal Soc B, 2005. • More on the above point from Martin Parry: I have questions about Figure 2: Has it been reviewed and published? What are the direct CO2 effects assumed? What levels of adaptation are assumed? These need to be absolutely clear because the implications of the graphs are v. important. Eg the figs imply that yields with adaptation increase with climate change even in Tropics. This seems to be a major change in conclusions from TAR. It implies that food security is not aggravated by climate change. Without further evidence (published and with the assumptions made clear), I do not think your conclusions are justified. I would like to discuss this with you and Cynthia Rosenzweig. • Work to try to include more developing country/Southern Hemisphere information. • Need to improve o section on Planned Adaptation (5.5.2) by condensing it and focussing clearly on FFF issues. o Methods section (5.1.4) by considering and wider range of methods including modelling.. What progress has been made in methods since TAR? o Section 5.6.5 which is currently weak. o Section on fisheries (5.4.6) o Bring up to date the assessment of CO2 fertilisation. There should be reference to the Science paper 2006 on FACE experiments by S. Long et al, and its implications for food security. Why was this not cited, reviewed and assessed? We in the TSU even went to the trouble of alerting you of its forthcoming publication and sending you a copy!? You may not agree with its conclusions, but your task is to assess the published literature. • Can a burning embers diagram be developed (i.e. effects under different amounts of T change, for different FFF categories?) See original comment 5.F2 c) comment. • Assess the literature which describes impacts under SRES scenarios (and if this is sparse, say so) • Assess literature which describes impacts under stabilization/mitigation scenarios (and if this is sparse, so so) • Give more emphasis to extremes – this chapter is very much oriented towards changes in mean climate. • Work on figures: o Sort out the permissions for Fig 5.1 and satisfy yourselves selves that this figure is really going to work. o Try to make Fig. 5.3 look less messy. o Improve quality of Fig. 5.4 o Explain Fig 5.5 better in caption and make clear populations are all global.	**We need to discuss this.** **Josef will add back access to food, while shortening sustainable devel.** **Substantive point: FT and MH need to think about Martin's point—obviously the graphs are not reviewed, but we can make the assumptions more explicit. May need Chhetri's help on this.** Addressed by including more developing county literature, from peer-reviewed articles and AIACC final reports **Francesco to lead a revision.** **Achknowledge lack of literature in lead-in to 5.4 Will re-classify planned vs. autonomous adaptation.** **Will not add more on methods—was criticized in FOD for too much on methods. Cross-refer to regional chapters JFS** **With respect to 5.6.3, will link to Fischer study** **Will try to construct a burning embers of vulnerability.** **Yet I have included short new paragraphs that at least cite the newest work. (FNT)** **FT, JFS, PA, AK, JM, and MH need to think about this and incorporate more SH and DC info.** **MH—condense planned adaptation.** **Will try to construct a burning embers of vulnerability.** **Yet I have included short new paragraphs that at least cite the newest work. (FNT)** **(FNT)**

		We disagree—the literature is thin on extremes. Will point this out in lead in to 5.4. Cross reference to WG1 statements on extremes. **Discuss figures at Cape Town.** **--will redraft 5.3** **--5.4 will be modified** **--5.5 will be dropped.** **Section on Planned adaptation has been reduced by over 20% with additional examples there now on FFF issues and options. Aggarwal Disagree—too much space needed.** **JS: maybe condense 5.6.5 to a few major points.** **KB needs to address for fisheries.** **I have adopted most suggestions. Brander** **FT: attend to CO2 issues.** **Burning embers diagram produced. Aggarwal** **Again, do we want to expend the space to do a burning embers?** **Maybe a box summarizing key impacts in FFFF under SRES and stabilization would be the way to handle?** **Again, a box on extremes may be the way to handle.**

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-1	A	0		0		The SOD inquestionably has a superior quality than FOD, but yet it is very big (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-2	A	0				Throughout the chapter, you need to indicate whether the impacts at various temperature changes are for temperature changes with respect to current conditions (1990-2000), recent conditions (1960-1990), pre-industrial conditions, or some other time period. This information is needed in the caption to Fig. 5.2, Table 5.2, Fig. 5.4, and Table 5.5. There is potentially great confusion, because in chapter 4, impacts are given for temperature changes with respect to pre-industrial conditions, while in Chapter 19 (which summarizes several chapters), impacts are given for temperature changes that are supposed to be with respect to 1990. (Danny Harvey, Dept of Geography, University of Toronto)	Substantive point that requres clarification in presentation of numbers in figures Will follow the guidelines established by the TSU. FNT
E-5-3	A	0				This chapter has improved considerably since the FOD, and the messages of the chapter are generally clear and backed up by references. However, many of the tables and figures do not appear to have a clear message or are too comprehensive with too much information, so that the message is lost. Also some parts of the text does not give a clear message, but do for example just list a whole range of factors that will influence the ecosystem or yields. This is not very helpfull, and I suggest that the text is concentrated on those issues of primary importance, with particular reference to new knowledge since the TAR. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	See below for how this will be handled. FNT
E-5-4	A	0				There are a lot of cases in the whole chapter where it is said that X will change in response to Y, but it is not said in what direction the change will be. It would be helpful to be specific where possible. Overall there is very little on fibre, despite it being in the title of the chapter. Should not this be increased, or else dropped from the chapter title? (Robin Matthews, Macaulay Institute)	Not sure what this means. Not much literature on fibre.
E-5-5	A	0				The issue of spatial-temporal resolution of crop models / impact studies is very important. It is listed in section 5.4.2.3 as an ongoing uncertainty, which it is. But, some progress has been made since the TAR in addressing the disparity in temporal and spatial scale between GCM output and crop model input. A range of methods have been investigated (Hansen JW, Jones JW (2000) Scaling-up crop models for climate variability applications. Agricultural Systems 65, 43-72; Hansen J., Challinor A., Ines A., Wheeler T., Moron V. Translating climate forecasts into agricultural terms: advances and challenges. Climate Research 2006, in press). Some studies have successfully used GCM output directly as input to crop models designed to work at large scales (Examples: Hansen JW, Potgieter A, Tippett M	Should be taken onboard and linked to discussion of relevance of CO2 for models. JFS Francesco to consider these suggested references.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(2004) Using a general circulation model to forecast regional wheat yields in Northeast Australia. Agricultural and Forest Meteorology 127,77-92; Challinor AJ, Wheeler TR, Slingo JM, Craufurd PQ, Grimes DIF (2004) Design and optimisation of a large-area process-based model for annual crops. Agriculture, Forest Meteorology 124, 99-120) (Tim Wheeler, University of Reading)	
E-5-6	A	0				New Knowledge bits often seem repetitive of earlier information. Suggest omitting "New Knowledge" sections but flagging points with a bold asterisk in main text when they do constitute new knowledge. That way - reader still gets idea of new knowledge & authors can shorten chapter. (Richard Fleming, Great Lakes Forest Research Centre)	We disagree
E-5-7	A	0				In general, this chapter is much improved from earlier drafts and contains interesting information. However, the chapter still lacks a clear storyline. The authors need to provide an overview of what the assessed literature means, on both global and regional scales. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	Substantive point—we need to identify what the main messages are from 5.4, 5.5, and 5.6 and place in the lead-in paragraph of each of those sections. This needs to start now. These messages are covered in the final section.
E-5-8	A	0				I have appreciated the opportunity to take another look at this chapter. As before, my comments below concentrate on the agricultural (crops-livestock) aspects rather than forestry and fish. Compared with the first-order draft, the flow of the chapter is much better. What struck me most about reading the chapter now is that there are still considerable areas of uncertainty that are likely to severely hamper the provision of statements that are made with high or even medium confidence concerning the impacts of CC on FFFF products. In a signficant sense, this fourth assessment shows that many of the issues raised in the third assessment have not been addressed and/or resolved. I think a significant weakness of the chapter is that the pieces on socio-economic aspects do not encompass the ranges of responses possible. I realise that this is not the Millennium Assessment, but a statement such as "agricultural trade flows are foreseen to rise significantly" (page 4, line 46) really ought to be related to various key assumptions (e.g., that globalisation continues). I also realise that it will not be possible here to consider a range of scenarios, but more could usefully be added on different outlooks. (Philip Thornton, ILRI)	Substantive point: we need to make assumptions explicit. Some previous points on how to insert a table on SRES impacts may be useful. (FNT)
E-5-9	A	0				Good. Conclude comprehensive results since TAR, and write style change much,show results with exactly temperature increase (Hui JU, Chinese Academy of Agricultural Science)	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-10	A	0				Generally, it is suggested that the writing style/form should be consistent in the whole text of Chapter. For example, the words of items in p.32-33 are likely too longer, and may be modified as in p.27-29 with the next section headings, i.e. " 5.5.1.x" or "1.","2." ...,(as in p.34-35) or emphasized dark point (as in p.30-32). (Futang Wang, Chinese Academy of Meteorological Sciences)	
E-5-11	A	0				Generally this is a great improvement on the previous drafts but there are still some inconsistencies that I have tried to point out. For instance, it is not clear what role biofuels play in the report and industrial crops - they are mentioned (p.6) but not in the executive summary (p. 3-5). I think the references used are good and relevant and represent progress since the TAR. I have kept my comments to those areas in which I feel I have the most expertise. Terminology - in places you use the term 'corn' which can mean both ´maize´ and ´other cereals such as wheat, barley etc'. I suggest you stick to using the common names of crops and delete corn from the chapter. An important general point since the TAR has been the work that has been done on the incidence and effects of changing climate variability. In the TAR this was mentioned but without the research to back up the initial hypotheses. Work since the TAR has allowed the FAR to really put flesh on the bones. Ewert at al, 2005 have shown that the CO2 signal for crop yields in Europe is very weak when compared with the ca. 2% increase in yields that have resulted from technology - breeding and management. At some point you need to make this point - but also that the predictions are that the 'weather' signal is going to get stronger with climate change. (John Porter, The Royal Veterinary and Agricultural University)	Discussion of biofuels to be added by Josef Substantive point (also made by Cassman): we need to say something about biofuels even if only in the future trends section. JS will need to take the lead. I looked for onconstistencies in relation to the corn-maize context throughout the document. Now fixed. FNT As for the technology vs. co2 effect point, I think we already have statements (now strengthened) at the end of 5.4.2.1 that make the influence of socio-economics compared to climate/co2 clearer (including citing the mentioned ewert et al reference). I do not feel there's a need to add more, except that in out main points and conclusions we need to have a statement to this end, merging this and previous observations on treatermnt of SRES scenarios effects. (FNT) Need to standardize terminology trhoughout. The role of biofuels and the likely impacts of an increased use of agricultural produce for bioenergy has been included in the revised draft. Schmidhuber
E-5-12	A	0				General comments on the chapter. The chapter was substantially improved following the comments made on the FOD. However, there still entire sections, paragraphs or sentences describing general concepts or personal opinions. This is a	We disagree.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						report, so I guess that only referenced arguments should be reported. Moreover, since the space available is very limited, reducing the length of no referenced parts, more space would be available for reporting the results of research activities. (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-13	A	0				General Comment: I am very pleased to see that many of the comments and suggestions I made in the first round of review have been addressed in this new draft of Chapter 5. In fact, the Chapter is now in very good shape and I commend the authors. At this point, I only have two comments/suggestions as given below. The most important concern is that there is so little said about the newly emerging MEGA-trend of using large amounts of grain, sugar and oilseed crops for biofuel production, and the impact this trend will have on food security. The acronym used in the text is FFFF (food, fiber, forestry, fisheries), but the fact is that current trajectories for expansion of crops for biofuel production will have a tremendous influence on the prognosis for meeting food future demand for both food and livestock feed. Hence, the acronym should be FFFFFF (food, feed, fiber, fuel, forestry, fisheries). For example, in the USA, current plans for expansion of ethanol production from corn grain will reach 30-40 billion liters/yr within five years, and this will require from 25-30% of all USA maize production (even assuming continued increases in yield at trendline rates of increase). Because the USA produces 40% of global maize supply, this diversion of maize to ethanol production in the USA will consume 10-12% of total global maize production. Note also that other countries are planning to expand their bioufuel production from wheat (France), sugarcane (Brazil, South Africa), maize (China), soybean (USA, Brazil), and oil palm (Indonesia). At issue is whether this scale of diverting food crops to biofuel production is incorporated into the current Chapter 5 andalysis and conclusions. If it is not, then this chapter runs the risk of being obselete before it is published. I BELIEVE THAT THERE SHOULD BE A BULLET ITEM IN THE EXECUTIVE SUMMARY and SOME TEXT IN THE BODY OF THIS CHAPTER ABOUT THIS ISSUE, AND HOW IT WILL ADD INCREASING UNCERTAINTY TO PREDICTIONS OF FUTURE FOOD SECURITY BECAUSE THE AMOUNT OF FOOD DIVERSION TO PRODUCE BIOFUELS WILL DEPEND ON THE FUTURE PRICE OF GASOLINE AND DIESEL OIL. High energy prices will also stimulate use of greater amounts of forestry products for biofuels and bio-based industrial processes. (Kenneth Cassman, University of Nebraska)	JS: another strong recommendation that we include some analysis of emerging role of biofuels. See above.
E-5-14	A	0				Chapter should include a more thorough discussion of the potential climatic risks of fire, pests, and diseases to agriculture and forestry.	The comment was addressed RE forestry. Kirilenko

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Lara Hansen, WWF)	
E-5-15	A	0				Big improvement on previous draft. Agric gets more discussion than either Fisheries or Forestry. If there's a good reason for this, it should be stated. Otherwise greater balance might be achieved by removing some of the agricultural examples (see below). Discussion of pests & disturbances inconsistent (see below). (Richard Fleming, Great Lakes Forest Research Centre)	JFS and FNT to consider UK Foresight Programme report on emerging pathogens.
E-5-16	A	0				Authors have removed the FOD case study on Pastoralism in Kajiado. This is a shame and I would urge them to replace it. It can be done within existing page constraints. (Jean Palutikof, Met Office)	JM: please give this consideration. To be restored.
E-5-17	A	0				A major weakness of this chapter is that there is no meaningful global synthesis of the implications of climatic change for global agricultural production. What minimal synthesis that is provided does not seem to be consistent with the detailed information given at the regional level and for major food crops. In particular, in the Executive Summary (page 3, lines 35-37) it is stated that 1-3 C warming will have small beneficial impacts on the major food crops in temperate regions, while for tropical regions (lines 39-41) we are told that even 1-2 C warming willl have negative impacts for some major crops, and that more than 3 C warming will have negative impacts on all tropical crops. It follows then that 3 C warming (which could occur by mid century) is likely a threshold for the beginning of net negative effects, but the threshold could be much less (depending on the relative sizes of the impacts in temperature and tropical regions). On page 4 (lines 46-49) we are told that global food production should increase until 2020-2050 (which seems reasonable, except that I would replace "should" with "could"), followed by a decline to 2080, with Section 5.6.1 given in support of the statement. Yet in Section 5.6.1, there is no information this specific. Rather, there is just the vague statement that global production falls within a 2% boundary of the no-climate change reference production, but we aren't told anything about the assumptions accompanying this result (regional temperature changes, CO2 fertilization, extent of adaptation), and no information on temporal trends is given. Most of the section deals with impacts on food prices, which does not tell us what the changes in food availablility or incidence of malnutrition and starvation are. The only other reference to a synthesis is in Section 5.6.5, which is even more vague than Section 5.6.1. Thus, there needs to be a significant new section discussing the likely net impact of the separate analyses in temperate and tropical regions, with all the key assumptions clearly laid out along with the associated uncertainties. (Danny Harvey, Dept of Geography, University of Toronto)	JS: perhaps this issue could be handled by inserting more detail in 5.6? To be handled in the FNT and JS revision of 5.4.2 and 5.6 The revised and expanded version of section 5.6 brings together the likely impacts of CC and other factors on food security and all of its dimensions, ei.e. food availability, access utilization, and stability. Schmidhuber

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-18	A	0				Authors have added 'Fisheries' to title but this doesn't seem justified since fisheries come under 'Food', the first word of the title. (Jean Palutikof, Met Office)	We disagree.
E-5-19	A	3	1	5	14	My first impression of the executive summary was that it provides a reasonably balanced presentation of the results, highlighting new findings. In investigating the support for some of these statements in the text, and following that back to original citations I have found that these conclusions are often not directly supported either in the chapter (or in some cases there is a statement in the chapter that seems to support the statement but that statement seems to be a misrepresentation or considerably extrapolation of what was actually concluded in the original research article.) I have not been able to check every citation, but these few instances lead me to be concerned and, in general, suspicious of these conclusions.Some detailed cases below. (John Reilly, Massachusetts Institute of Technology)	Substantive comment to all authors: need to make sure that each Exec. Summ. Statement is well-grounded in the text. We will need to consider this in Cape Town. We will check.
E-5-20	A	3	4	3	7	This summary statement should be further qualified and reordered. The high confidence statements certainly seem justified with regard to the yield and livestock effects in Europe and Africa--these are well-documented in the chapter. These statements should go first. The opening sentence that infers what these events mean more broadly is not well-documented and at minimum needs some modifications, and should follow the other 2 sentences so as to avoid the implication that there is high confidence in this statement. The chapter provides documentation of the result of these events, but as far as I could see it did not provide any method or study on how one could use these individual events to infer something for "the vulnerability of food, fibre, forestry, and fisheries." I examined various regional indices for wheat prices for the 1990-2006 period and saw only a small positive price response in Europe in 2003 relative to 2002 (while prices at other major points--US, Australia) actually declined that year. I take that as evidence that the overall food system was relatively robust to this severe regional climate event. The evidence on farm losses for Europe has thus little or nothing to do with food, fibre, forestry, and fisheries systems. What I think can legitimately be deduced is that These events demonstrate the vulnerability of regional farming systems to regional climate events...and the robustness of the food systems to climate events that are only regional and local in nature. (John Reilly, Massachusetts Institute of Technology)	The lead-in statement seems fairly intuitive and common sensical. No need to change.
E-5-21	A	3	4	44		Following are citations not provided within individual comments. Most of these can be obtained at http://members.cox.net/igoklany/ Goklany, IM. 1995. Strategies to Enhance Adaptability: Technological Change,	Some of these are old references and none seem directly relevant to this chapter.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Economic Growth and Free Trade. Climatic Change 30: 427-449. Goklany, IM. 2001b. The Precautionary Principle: A Critical Appraisal of Environmental Risk Assessment (Cato Institute, Washington, DC). Goklany, IM. 2003a. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. Goklany, IM. 2003b. "Agricultural Technology and the Precautionary Principle." In R. Meiners and B. Yandle, eds., Agricultural Policy and the Environment (Lanham, MD: Rowman and Littlefield, 2003), pp. 107-133. Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. Goklany, IM. 2005c. Is a Richer-but-warmer World Better than Poorer-but-cooler Worlds? 25th Annual North American Conference of the US Association for Energy Economics/International Association of Energy Economics, September 21-23, 2005. Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. (Indur Goklany, US Department of the Interior)	
E-5-22	A	3	6			Can't draw the conclusion of European maize yields reduced by 20% accurately from Box 5.1 the maize yields reduction by 36% and 30% respectively in Italy and France (Fang Sun, Institute Environment and Sustainable Development in Agriculture)	JFS: please check this out. Will revise to eliminate inconsistency. FNT
E-5-23	A	3	7	3	8	I suggest to add in the end: ¨In the case of hurricanes, tsunamis, the losses are bigger, reaching in many cases a high % of crops, forests, coral reef, and others (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	We disagree.
E-5-24	A	3	8			Because of the significance of Amazonia, based on comment 9 (above), there should be a bullet on p. 3 under "Current sensitivity/vulnerability" that would read as follows: "Based on data from 1976-2001, long-acting and widespread environmental changes are stimulating the growth and productivity of Amazon forests." (Indur Goklany, US Department of the Interior)	More appropriate for Chapter 4.
E-5-25	A	3	10	3	12	To cultivate non cultiavable land and to utilize the un used treasure of nutrients for cultivation of specific crop and plants under changed climatic conditions needs to be seriously concidered. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-26	A	3	10	3	12	I question the inclusion of this statement at all and the statement of medium confidence. The current draft does not contain the figure that is the basis for this conclusion pending permissions from WG-I. The text referred to in this conclusion acknowledges that analysis of these climate projections using crop/agriculture models has not been done and so "the best we can do at present is to examine Figure 5.1a and b side by side." Conclusions drawn on visual examination of a map seem "highly speculative" not "medium confidence." In particular, it has long been recognized that GCM maps of soil moisture are in poor agreement with soil moisture derived from more detailed crop models driven by the GCM climate. GCM models of soil moisture, while improving, are highly simplified compared to the crop model representation of soil moisture. Moreover, one effect of CO2 fertilization is to increase water use efficiency. All of these factors lead me to question whether visual inspection of a map can lead to "medium confidence" in this conclusion. If nothing else the statement is so vague that it is unclear whether this is a statement about current conditions relative to some historical period before observed climate change, or is forecasts for a particular year/decade (e.g. 2090's, 2030's, 2010's?--it makes a quite a lot of difference!. (John Reilly, Massachusetts Institute of Technology)	JFS: please respond—seems that we may want to adjust the confidence on this point? JFS and FNT will rephrase. FNT
E-5-27	A	3	10	3	11	Append to the end of this sentence, the following: "although increased water use efficiency due to higher atmospheric CO2 concentrations would alleviate some of the resulting problems." (Indur Goklany, US Department of the Interior)	JFS: please respond. I tend to agree. JFS – will respond with above
E-5-28	A	3	10			JJA precipitation? Do you mean 'summer (which would be DJF in the southern hemisphere)? (Jean Palutikof, Met Office)	Just trying to remain politically correct with respect to hemisphere/season. Will rephrase to make hemisphere neutral. FNT
E-5-29	A	3	12	3	12	I suggest to add: .....[see 5.3.1], and floods in others as Europe, Asia, North America, with great losses (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-30	A	3	13	3	14	It is dificult to generalise the shifts of food, fibre, forest and fisheries systems to higher latitudes and elevations, because fisheries and forestry parameters respond differently (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Yes, but all seem to share this general characteristic.
E-5-31	A	3	14	3	14	Do favourable conditions for each of food, fibre, forestry and fisheries all shift north? Do fish, for example? (Robin Matthews, Macaulay Institute)	Yes.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-32	A	3	15	3	17	This is an important finding which needs to be retained in the chapter and should be highlighted in higher level summaries. (Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	
E-5-33	A	3	15	3	17	The impect of climate change on FFFF sectors should be seen against the expected long-term development in the global economy, including increasing world population and declining global agricultural production, especially in developing country,(medium to high confidence)[see 5.3.2.1] (Yingjie LIU, Institute of Environment and Sustainable Development in Agriculture,CAAS)	We agree
E-5-34	A	3	15	3	17	Is there a 'declining relative economic importance of these sectors' in developing countries? It may be worth asserting here the importance of agriculture for livelihoods across the tropics. (Andrew Challinor, University of Reading)	Possibly not, but the statement is valid at the global scale as it was intended.
E-5-35	A	3	18	3	20	This statement as is is not supported by the text in Section 5.3.2.1. The principal text in this section that would lead to this conclusion appears to be related to statements citing a study by Cassman et al (2003). I went to this article. It is an excellent article but as far as I could see it does not "emphasize that climate change will add to the dual challenge of meeting food (cereal) demand while at the same time protecting natural resources and improving environmental quality in these regions." The study did not consider climate change impacts on yields at all as far as I could find. Perhaps I missed a statement in the text somewhere but I saw nothing to this effect in the conclusion and abstract, and so at a minimum this is an overstatement. At best (if I missed something) the impact of climate change was described in an aside in the paper and was not the principal focus of it. The IPCC statement " Pressure to cultivate marginal land or to adopt unsustainable cultivation practices as yields drop may increase land degradation and endanger biodiversity of both wild and domestic species (low confidence)" is odd in any case. IF yields drop then there will be pressure to cultivate marginal land and that may increase land degradation and endanger biodiversity. This is a statement on which I would place "high confidence" certainly worded mildly to say that "this may increase land..."--however you would need to find some decent quantiative support for it, although that should be possible. So, I can only imagine that the "low confidence" in this statement reflects judgment about the clause "as yields drop" perhaps, appropriately expressing low confidence that yields will drop. But, the statement is not necessarily saying yields will drop, only that there is a relationship--falling yields--more degradation. Moreover, there is no indication of why yields are dropping or from what reference point. (The Cassman et al paper is mostly talking	JS: please respond to this comment. We may need to adjust references to get the foundation needed in 5.3.2.1. JS and FNT to handle.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						about yield increases and whether increases will not continue or be as large as people thought--nothing about yield decreases.) (John Reilly, Massachusetts Institute of Technology)	
E-5-36	A	3	19	3	19	I suggest to add: ..... may increase land degradation, erosion, and endanger biodiversity..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Need to restore comment on biodiversity – JM to handle
E-5-37	A	3	21			There should be a new bullet addressing assumptions that are generally made with respect to technological change and adaptation when developing future trends and impacts. Apropos of these, we note that global impacts studies such as Parry et al. (1999, 2004) include some -- but not the full range of -- adaptations that would be available in the future. For example, Parry et al. (2004) itself acknowledges, these adaptive responses are based on currently available technologies, not on technologies that would be available in the future or any technologies developed to specifically cope with the negative impacts of climate change (Parry et al., 2004, p. 57). The potential for future technologies to cope with climate change is large, especially if one considers bioengineered crops (Goklany, 2001b, 2003b). Accordingly, if the approach used by Parry et al (2004) is standard practice in this field, that suggests that negative impacts are overstated while positive impacts are understated. This should be noted. (Indur Goklany, US Department of the Interior)	Seems like a fine-grained point that we simply do not have space to include.
E-5-38	A	3	23	3	26	Realistic biological data confirms the TAR conclusions of positive responses of crop yields to 550 ppm CO2 from FACE studies, contrary to the earlier crop model estimates. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	FT : please resopnd. Crop model estimates for crop response at 550 ppm are consistent with recent evidence from FACE data as well as with previous experimental reviews. We already state this well in the (revised) text. (FNT)
E-5-39	A	3	23	3	26	From the TAR, the crop yields at 550ppm CO2 concentration increase by an average of 15%. Is it necessary for provide explain here as 17% was cited? In addition, it mentioned that crop model estimates of CO2 fertilisation are in the range of FACE results at 550ppm, but how about over 550ppm? For example, what is about 600ppm, 700ppm? As to long-term climate change, it is possible that atmospheric CO2 concentration will be up to 700ppm in some regions. Also, the same issue exist in line21-22 page40 this chapter. (Liyong Xie, Chinese Academy of Agricultural Sciences)	FT: please respond. There was confusion in the text. The TAR did not actually come out with an overall number, but provided examples from FACE experiments ranging 10-20% for a number of crops. The actual 17% figure is from a recent review of FACE results, encompassing C3 and C4 crops (Ainsworth and Long, 2004). The point on concentrations above 550 ppm is

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
							well taken. FACE experiments do not and will not provide this info; other experimental settings confirm overall the earlier findings of Kimball, i.e, about 30% increase from 330 to 660 ppm for all crops; or 31% from 350 to 700 ppm for wheat (Amthor, 2001). FACE data are consistent with these figures, though at the lower end of possible extrapolations from higher concentrations. WE MAY NEED TO INSERT some clarifying statements about this in the text. (FNT)
E-5-40	A	3	23	3	23	According to literatures, FACE experiment was usually described as “Free Air CO2 Enrichment” rather than “Free Air Carbon enrichment”. Which one is best in the report? Also, the same issue exist in line 20 page40 this chapter. (Liyong Xie, Chinese Academy of Agricultural Sciences)	Ditto. Obviously it is Free air CO2 enrichment. JFS It should be “Free Air Carbon Dioxide Enrichment”. FIXED (FNT)
E-5-41	A	3	23	5	9	The key future impacts are all interesting, but the authors need to find a more compelling way to present this information. There doesn't seem to be a logical progression from one impact to the next, and I am not sure why they are in this order. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	All: let’s discuss a way to introduce future impacts with a few general observations/interpretive statements.
E-5-42	A	3	23	5	23	I'm pretty sure that this figure of +17% is an average for C3 crop species only, and does not include C4 species. It is important to make this distinction, even at this high level of summary, in order to avoid misinterpretation by readers for crops such as maize, millet, sorghum. (Tim Wheeler, University of Reading)	Good point—FT to handle? No, this figure is an average for all available FACE crops, including highly-responsive C3 (potato, cotton) and low-responding maize and sorghum. The actual figure for major C3 only (rice, soybean, wheat is about 15%) and 0-5% for maize and sorghum. (FNT)
E-5-43	A	3	25	3	25	The range is important here and should be cited. Also the interaction of CO2 with water and nutrients should be stated. The statement as it is is misleading. (Andrew Challinor, University of Reading)	FIXED. Also, these are responses with no stress, and it is now mentioned. GOOD POINT though, we had statements about water and N interactions in the ZOD, but we took them away because they had already been dealt with in TAR and to make up space. I NEED TO RE-insert a claryfying statement

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
							to this end! (FNT)
E-5-44	A	3	27	3	29	"some" is vague. If the true answer is 'almost all' or 'all' please say so. Name exceptions if not too many? (Richard Fleming, Great Lakes Forest Research Centre)	FT: fix? Need to discuss with andrei. “almost all” is not the same as “some.” It remains to be seen if this is a minority or majority of avalable models. I would imagine the latter. (FNT)
E-5-45	A	3	30	3	32	The temperature changes were never consistent and some time leads to precepitation. This needs to be included. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	FT: consider? YES, the point on increased precipitatino needs thought. In general, what matters is changes in ET though. (FNT)
E-5-46	A	3	30	3	32	the increased risks of fires in forests with feedback to radiative forcing caused an increased vulnerability of terrestrial carbon pools doesn’t be mentioned in the part of 5.4.1, so suggest delete “and by the increased risks of fires in forests with feedback to radiative forcing ”. (Fang Sun, Institute Environment and Sustainable Development in Agriculture)	AK and FT: we need to adjust text to validate this finding. AK, please take lead. Suggest removing this point: carbon pools are beyond the scope of the chapter (covered by WG3). Kililenko
E-5-47	A	3	33	3	34	We note that currently substantial work is underway in researching and developing crops that are tolerant to abiotic stresses such as drought, high and low temperatures, salinity, and water logging, which might reduce yields due to climatic variability. There is also ongoing R&D into controlling the advent of flowering. In the long term such work is likely to bear some fruit, even if it turns out to be less than what its proponent would hope for. The impacts studies should take note of these and factor them into the analysis. For further details, see Goklany (2001b, 2003b), and the following comment. (Indur Goklany, US Department of the Interior)	Space precludes this much detail.
E-5-48	A	3	33	3	34	Surely this depends on where the crops are growing? Extremes will only have an effect if they result in part of the time the crop is growing being in a sub-optimal condition (e.g. more than optimal temperature). (Robin Matthews, Macaulay Institute)	Not sure what the point of this comment is.
E-5-49	A	3	33	3	33	Should be ´Crop modelling and experimental studies' (John Porter, The Royal Veterinary and Agricultural University)	FT: please consider. YES, the point on increased precipitation needs thought. In general, what matters is changes in ET though. (FNT)
E-5-50	A	3	33	3	34	Crop modelling sudies that increased variability of extreme events may damage crop yields in the future.[see 5.4.1.3] (Yingjie LIU, Institute of Environment and Sustainable Development in Agriculture,CAAS)	Acknolwedged.
E-5-51	A	3	33	5	34	This impact is not very clearly worded -- does it mean variability rather than	Yes, uncertainties remain but we ask “what if”

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						extremes (i.e. downside risk)? And in any case, aren't there still consideable uncertainties about the changing probabilities of extreme events? (Philip Thornton, ILRI)	
E-5-52	A	3	35	3	41	We have a number of questions regarding Figure 5.2. First, it's not clear what benchmark is used to measure temperature departures from. Is it pre-industrial or is it from a more recent benchmark? Second, a full set of references should be provided so that the data behind the curves can be traced and, if necessary, verified. Third, it's not clear what assumptions were made regarding secular technological change, or future adaptations in each of the studies. This should be elaborated on . [See comment no. 2.] Fourth, there is no time dimension in Figure 5.2. But the time dimension matters because the negative impact of a 3 degree rise in 30 years (for instance) should be much larger than a 3 degree rise over 100 years. This leads to me to suspect that secular technological changes were either ignored or deemed not to be important, and suggests a methodological flaw in developing these figures (and perhaps in the underlying studies). All this should also be addressed on page 18, lines 6-16, and the results appropriately qualified. (Indur Goklany, US Department of the Interior)	Need to clarify benchmark temperature as current. Netra needs to provide the full list of references for the studies included in the graphs. He also needs to clarify all assumptions in the graph, including statistical details of the polynomial fits, climate characteristics, regions within the temperate and tropical zones, types of adaptation assumptions, and anything else of relevance.
E-5-53	A	3	35	3	38	I have great problems with Figure 5.2 on which this conclusion is based. The figure indicates that "polynomials have been derived." I can only imagine this is a statistical regression fit. This "meta analysis" of the data has apparently not been published anywhere and we see no R2 values to show goodness of fit, nor do we see estimates of the standard errors of estimated coefficient(s). Clearly, from the data presented the errors are large, and I suspect that a polynomial does not fit much better than a simple linear function. Finally, I wonder what data are included as observations and how. In the US study for the National Assessment (Reilly (ed.) 2002. Agriculture, Potential Consequences of Climate Variability and Changes, Cambridge U. Press,) crop models were run at 45 different sites in the US for 2 climate scenarios, for the decade of the 2030's and 2090's for maize, rice, and wheat under irrigated and dryland conditions. We also had another crop model exercise that was replicated in every 2-digit US hydrological basin (order of several hundred sites) for one climate scenario for 2030's and 2090's. That means there were 45*2*2*2 crop model results-or 360 data points plus 600 or so additional crop model results from the alternative model) for each crop from this study alone. It's important to weight these by areas where the crop is actually grown or might be grown, thus we reported a national average yield change weighted by current production (which realistically would underestimate yield gain/overestimate yield loss) because in the future production will be weighted more heavily by places with	See previous comment. Netra, Francesco, and Mark need to carefully think about John R.'s comments here and decide how to handle—please begin a discussion by email immediately. Some additional work on Figure 5.2 and subsequent analysis may be necessary before it is ready for publication. After extensive weighing of these comments, LAs are convinced that the figures are simply a vehicle for synthesis, not new research. More qualifying information provided on the graphs in 5.4.2. The US National Assessment results were indeed included.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						yield gains/smaller yield losses. Under the Had CM2 simulation dryland yield for maize was up 34%, for spring wheat it was up 30% and for winter wheat up 55% w/o adatation. Global temperature change was 3.3 degrees C but we did not report local temp. change but it was higher. In any case, I don't see any yield change plots in temperate regions that suggest corn yield increases as much as 34% --or as high as 55% for wheat-the scale on the figures don't even include these levels. So what is going on here? Have you missed one of the most comprehensive studies of agriculture in a major temperate region of the world? Was there just too much data, or was it too complex? Was it averaged together in some ad hoc way thus giving it a weight = 1.0 among these 50 or so data points when it should have had a weight of 350 out of 400? I can understand the desire to try to derive some general insight from all the crop studies that have been completed. However, this very ad hoc "meta analysis" undermines some of the careful work that is referred to in the opening of the chapter regarding CO2 effects. As that work indicates, statistical analysis of existing studies can be useful but is a serious research effortin itself that requires careful attention--and publication, and peer review to make sure that the effort is up to scientific standards. If one of the chapter authors have tried to put this together just for the chapter, I give them credit for a good idea but, particularly if a major conclusion of the chapter is going to hang on this analysis it needs to be done in a way that carefully documents exactly what studies were included and how, and then be subject to review and publication that can then be cited by the IPCC. Thus, I see no real scientific support (i.e. statistically significant in a careful study that weights obervations appropriately) there is no basis to state this as a finding, even if only "medium to low confidence" (John Reilly, Massachusetts Institute of Technology)	
E-5-54	A	3	35			In view of the fact that you highlight both temperature variability and changes in mean temperatures in the chapter I suggest that you need to be clear which you are referring to - eg. p3. ln.35 you are talking about mean temperatures but in other places (eg. p.4 ln. 4) are discussing changes in var. - need to be clearer to the reader. (John Porter, The Royal Veterinary and Agricultural University)	Will clarify.
E-5-55	A	3	39	3	41	I know have less knowledge of recent crop model studies of tropical regions, but the general problems cited for Fig. 5.2 for temperate regions, holds for tropical regions. I also find it unlikely that one could support a conclusion that all crops are stressed by plus 3 degrees C without any caveat--one might guess this, but I doubt that crop modeling studies for "all crops" under all conditions of tropical agriculture have actually been carried out--and that in fact very few studies of a few crops in a	Will remove precision and stress general tendencies.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						few regions have actually been studied. (John Reilly, Massachusetts Institute of Technology)	
E-5-56	A	3	41	3	41	For literatures limited, it is maybe more suitable for substituting “all crops” by “most crops” here. (Liyong Xie, Chinese Academy of Agricultural Sciences)	OK—will do.
E-5-57	A	3	42	3	44	This item could be deleted because of the general concepton/knowledges,i.e. without specific or new findings. (Futang Wang, Chinese Academy of Meteorological Sciences)	We stand by this conclusion, but will need to clarify in the text.
E-5-58	A	3	42	3	44	Section 5.4.2.1 does not offer much material that directly supports this statement--the wording suggests that it is possible to point out some of these regions. There is stuff on irrigation but that is covered in a later executive summary point. At best we have contrast of developing/developed countries under the trade lessens impacts section? If this is to be a major point and section 5.4.2.1 is called out in support of it, then something like this should be a italicized heading in that section, where the studies that supposedly support this statement are organized together. If indeed you can identify some regions--North Africa, Southern India... etc with some confidence then you should point them out in the executive summary. Otherwise you need to be more clear about what you are concluding--"On the whole developing countries appear more at risk of negative effects on yields given existing climate model forecasts." Since the climate model forecasts remain, and yield depend on complex interaction of temperature, precip...other changes that it seems very hard to have even "medium confidence" in particular regions. Or do you really mean only that because at least some areas will get worse (and some better) it is almost certain that some of the worse areas will happen to be in areas where current agricultural conditions are poor--which is a much weaker statement than what is said here currently--implying that you know which regions those are. (John Reilly, Massachusetts Institute of Technology)	FT, could you respond? I agree that 5.4.2.1 is not really the source fo rthis statement. Yet this is pretty straightforward stuff form even the TAR and we should include it in our review. I think however that the better place to back it up is 5.6.4. Perhaps we need to really think about how do we make clearer statemetns there and how we link them back to sections 5.4 and 5.5. See proposed modificaitons (FNT)
E-5-59	A	3	42	3	44	Programme to make non vulnerable land for cultivation may open new opportunities to developing countries, where natural resource base is poor. This may be recommended. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Thank you, will consider.
E-5-60	A	3	42	3	44	Potential negative yield impacts would be particularly pronounced ….. (Yingjie LIU, Institute of Environment and Sustainable Development in Agriculture,CAAS)	
E-5-61	A	3	47			better wording is: "This, combined with increased water stress (see Chapter 3), provides …" (Danny Harvey, Dept of Geography, University of Toronto)	FT, please consider in revision. Done. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-62	A	3	49	3	49	The role of pests has become clearer, but later on in the same bullet point the magnittude of the effects are unknown? Needs to be restated (Philip Thornton, ILRI)	FT, please consider. Slightly modified the sentence. I do noth think that "progress" form the TAR excludes that the overall magnitudes of the phenomena are still unknown. (FNT)
E-5-63	A	3	50	3	50	"Is" should replaced with "are" (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	OK
E-5-64	A	3	51	3	52	This sentence is true but misleading. Although the magnitude is unknown, we are pretty sure the direction (sign) of the effect will be negative on renewable resource industries - say so. (Richard Fleming, Great Lakes Forest Research Centre)	FT: please consider. Done (FNT)
E-5-65	A	3		5		Need to say something about interactions of global averfishing and climate change in the executive summary. (Stephen John Hawkins, The Marine Biological Association of the United Kingdom)	KB: please consider.
E-5-66	A	4	1	4	8	I find these two points--one nearly sure things will get bad in a region and other nearly sure that things will get better in another region to mainly be an expression of how little whoever wrote these understands the predictability of climate a regional scales of this level. Maybe what is meant is IF there is "increased frequency of heat waves and droughts..." At least the second, rosy point, acknowledge that lack of moisture could upset the their strong conclusion in a few regions. Aren't many of these temperate grasslands in mid-continental regions on which there is some agreement that there will be less rainfall? Certainly, more precipitation in some of the Mediterranean climate areas--a la California and southwestern US was predicted by HadCM 2 could change the first conclusion. (John Reilly, Massachusetts Institute of Technology)	JFS: this point may only require some wording changes to respond? Wording to be revised. JFS
E-5-67	A	4	9	4	9	An example of above comment. Incr. CO2 and warming will modify the dominance of palatable plant species … But how will it modify the dominance? (Robin Matthews, Macaulay Institute)	JFS: need to suggest how dominance will change. Changes are well established, not their direction. Revise working or even delete. JFS.
E-5-68	A	4	9	4	12	Ameleorating effect of CO2 over high temp. stress may send positive signals and needs to be included. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	JFS: please consider.
E-5-69	A	4	9	4	12	"Modify" ???? Do we know whether palatable plant species will be more or less dominant? If all you can say is something as weak as this why bother? I suppose you would go out on a limb and express "high confidence" that it will rain on at least some days during the summer in most US cities.	JFS: please consider. Same as above. JFS

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(John Reilly, Massachusetts Institute of Technology)	
E-5-70	A	4	13	4	13	global forest products output' is horrible English. (John Porter, The Royal Veterinary and Agricultural University)	Will fix.
E-5-71	A	4	22	4	24	The wording is unnecessarily tentative -- why not make the statement stronger, and together with the "low confidence" tag, this is perfectly acceptable (Philip Thornton, ILRI)	KB: please consider. Agree-delete “concern” Brander
E-5-72	A	4	22			Delete the word 'concern'. (Stephen John Hawkins, The Marine Biological Association of the United Kingdom)	KB: please consider. Agree, done Brander
E-5-73	A	4	23	4	23	changes in the Gulf stream will also be very serious for crop and food production (John Porter, The Royal Veterinary and Agricultural University)	KB: please consider. Yes, but I’m not responsible for making statements about crop and food production Brander
E-5-74	A	4	27	4	27	Add to "Vulnerability increases….often due to multiple non-climatic stresses (see section xx)". (Emma Archer, University of the Witwatersrand)	Box (in fact on Kenya-Ethiopia border) has been reinstated FGD p.33
E-5-75	A	4	28	4	28	I suggest to add a new bullet: If the frequency of extreme events increases, the losses in the FFFF will be very high and GDP will be decreasing at very low levels, increasing the poverty, the health problems and hungry (high confidence) (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	JS: please consider. Not enough literature to make this assertion stick.
E-5-76	A	4	33	4	38	Stack holders: farmers and growers need to be given alternate cultivation technology to meet the stress of warming. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	MH: please consider. Agree with the point, but not enough space to make these fine grain points.
E-5-77	A	4	33	4	37	Maybe the last word "point" change to "scope", because the point would change in some area.[see Fig 5.2] (Yingjie LIU, Institute of Environment and Sustainable Development in Agriculture,CAAS)	MH: please consider. Will consider.
E-5-78	A	4	36	4	37	Reword or state what point. (Paula Harrison, University of Oxford)	MH: please consider. Ditto.
E-5-79	A	4	38	4	38	property rights' - do you mean 'land rights' or IP? Or both? (John Porter, The Royal Veterinary and Agricultural University)	MH: please consider Quite apart from the issues of IP, “property rights” is to be preferred because it better covers rights to grazing, extraction of wild resources etc., than “land rights” which tendsto imply cultivation rights. (JM)
E-5-80	A	4	39	4	39	how does 'participatory research' result in adapatation to climate change? What is	MH: please consider.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						'mainstreaming' as a verb? Whole para. (ln. 38-43) sounds very woolly. (John Porter, The Royal Veterinary and Agricultural University)	We should probably address the first question in 5.5.2 "Mainstreaming" may look inelegant to those looking for inelegance but it is very widely used (re gender, environment, HIV, as well as CC. (JM)
E-5-81	A	4	44	4	44	I suggest to add two bullets: First - Research and production of crops and trees more resistant to stress. Second -Need of help in financial resources and technologies to developing countries, from multilateral organizations and developed countries in FFFF matters. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	MH: please consider. Agree with the point, but no literature to support.
E-5-82	A	4	46	4	47	It seems more consistent with the information given on page 3, lines 35-41, to rephrase this sentence as: "Globally, agricultural production potential may increase over the short term (2020-2050), and this should translate into an increase in overall food availability, followed by a decline thereafter". However, Section 5.6.1 as it is written now does not provide support for this statement or the original statement. There seems to be no justification in saying "a decline to 2080" - why should the decline stop in 2080? (Danny Harvey, Dept of Geography, University of Toronto)	JS: please reconcile this discrepancy. It does now.
E-5-83	A	4	46	5	2	These conclusions are at best weakly supported in the text. There have been no real transient studies of global climate change impact on agriculture published (although I have completed such study and it is now under review in a journal) and so this conclusion is highly speculative. At best, you can state this as an observation of the result of some studies, translating results from equilbrium studies to say something about transient effects of climate change, which is what I assume has been done in Figure 5.4. Here as in the attempt to simply represent crop studies, the effort to fit a curve that goes from zero at zero temperature change through results from different studies using multiple GCMs with doubled equilibrium climate--or maybe a few years of a transient climate run--is artful but hardly scientific. These studies that are supposedly represented are not fully cited--no year, nor are they all cited in the reference list. So I cannot even comment on whether the curve labeled Reilly et al (I suspect a study I led) is accurate as I do not know which study that is. Rather than fit these curves when there are only 3 or 4 data points in each study, it would make more sense to simply plot the data points on a graph. (This again seems like "meta analysis" on the cheap.) Moreover, since the temperature change by 2100 could range from 1.5 degrees increase from present up to 5 or more (at least last IPCC), even if you believe these relationships between Temp and impact, there is	Josef and Netra: you will need to address these comments and decide how to handle with respect to Fig. 5.4. Please begin an email discussion—would be best if a strategy is already in place by the time we meet in Cape Town. Text has been modified.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						almost a 50/50 chance that global increase by 2050 will be less than 3 degrees, in which case benefits through 2100. You need to do a better job of connecting probabilities of different temperatures in a transient climate run with your damage function--although I'm not recommending that because I think your damage function has little confidence--i.e I would not fit a function that implies that you can interpolate-extrapolate in temperature space and translate that to a transient climate impact. Anyone who has looked at this problem with any care would run shreiking from the room at the many assumptions that must hold to draw the inferences you draw from these few studies. (John Reilly, Massachusetts Institute of Technology)	
E-5-84	A	4	47	4	47	Delete "followed by a decline to 2080." Fisher, et al (2002), the one study cited in section 5.6.1 show a range of impacts in 2080 from -1.5% to +2.6%. They also indicate that global cereal production is within <2% of the no climate change basecase. The changes documented in the underlying chapter are too small to justify a claim of reduced food production in 2080. (Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	
E-5-85	A	5	3	5	4	Authors put more stress on determining that there will be flow of exports of temperate zone products to tropical countries. They need to suggest how poor developing countries meet this challenge by alternate croping systems, growing less susceptable plants and developing industries suits to that region where the energy requirement could be regulated through the high temperature experienced by these countries. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	We do not have the space to get into this level of detail.
E-5-86	A	5	4	5	4	Q. But will tropical countries be able to afford these increased exports from temperate countries? (Robin Matthews, Macaulay Institute)	I agree that this is a pertinent question and needs to be at least posed in the ES? (JM)
E-5-87	A	5	6	5	9	Pests have some potentially important roles to play here. (a) Plantations require more investment to set up & maintain. This makes pest control cost effective in some situations where it was not before plantations were introduced. (b) Increasing exports includes exports of exotic pests leading to potential trade barriers. Under climate change, transport of exotics from the sub-tropics to temperate regions becomes more dangerous because it becomes easier for such exotics to establish in temperate regions which are not as cold during winter as they used to be. (Richard Fleming, Great Lakes Forest Research Centre)	AK: please consider. Suggestion to include here as well. Discussed in 5.4.5. Kililenko.
E-5-88	A	5	12	5	14	Why waste space with this satement of support for "motherhood and apple pie?" (John Reilly, Massachusetts Institute of Technology)	JS: need to add detail tojustify having this statement in the Exec. Summ.
E-5-89	A	5	13	5	13	I suggest to add: .... Millenium Development Goals project	OK.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-90	A	6	3	6	3	Importance for whom/what? (Robin Matthews, Macaulay Institute)	We think this to be self-evident.
E-5-91	A	6	3			section 5.1.1: needs to point out that agriculture is the basis of the food industry that is the largest global employer. More people are farmers than any other profession on the planet. (John Porter, The Royal Veterinary and Agricultural University)	True, but we have such limited space that we just couldn't wedge this in.
E-5-92	A	6	5	6	5	what is the earth's total land surface area - needs to be inserted. (John Porter, The Royal Veterinary and Agricultural University)	Don't really see this advancing our points.
E-5-93	A	6	5	6	13	In line 8 "incomes"should be replaced by "income" . Importance of agriculture /crop productivity required to be emphasised. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-94	A	6	5	6	5	"… Earth's LAND? Surface …" (Richard Fleming, Great Lakes Forest Research Centre)	OK—done.
E-5-95	A	6	5			Do you mean 40% of Earth's TERRESTRIAL surface ? (Cynthia Rosenzweig, Goddard Institute for Space Studies)	See last point.
E-5-96	A	6	7	6	7	I suggest to add: .....In many developing countries.....(In GEO -3 with data of 2002 in the Chapter of Urban Zones is written that near of half of population in the World live in urban zones - 47% page 240 and in page 241 exist a table of United Nations Population Division 2001 that express : Developing Regions 73,2 % in 1975 live in rural zones, but in 2000 only reach 60,1% - GEO - 3 Perspectives of World Environment 2002, UNEP, 2002, Earthscan Publications Ltd, United Kingdom - Remember the increasing of tourism and services sector in many developing countries too, changes the percents, forexample, in Cuba the 75% of population live in urban zones) (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	This is all highly relevant, but we cannot accommodate due to severe space limitations.
E-5-97	A	6	7	6	7	After "(about 200 M ha)", add a reference if it is possible. (Marco Bindi, Dept. of Agronomy and Land Management)	Revision makes not relevant.
E-5-98	A	6	9	6	9	After " to human development", add a reference if it is possible. (Marco Bindi, Dept. of Agronomy and Land Management)	This is conventional wisdom that needs no reference.
E-5-99	A	6	16	6	16	Scope' and 'uncertainty' seem to be strange topics to be lumped together into the same section. (Robin Matthews, Macaulay Institute)	Was probably the lesser of evils to put these together.
E-5-100	A	6	16			The format of the sub-section 5.1.2 should be redefined. In particular, I suggest to remove lines 20 and 21, since it is implicit that this chapter is dealing with these	We disagree.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						sectors or ecosystems (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-101	A	6	20			section 5.1.2: the scope of the chapter refers to industrial and biofuels - but are they really included? (John Porter, The Royal Veterinary and Agricultural University)	Yes, in revision.
E-5-102	A	6	45	6	45	the point about photosynthesis is misplaced. Optimum C3 temperatures for psn are flat between about 20-30 deg.C; for C4 it peaks at about 35 deg. C. The main impact of temperature is not on photosynthesis but on water use, development, quality etc - so you need to say that CO2 effects fall with T as the optimal T for a range of processes are exceeded. (John Porter, The Royal Veterinary and Agricultural University)	Accepted.
E-5-103	A	6	45	6	45	replace 'warmth' with 'temperature'. (John Porter, The Royal Veterinary and Agricultural University)	Done
E-5-104	A	6	45	6	52	Emphasis needs to be given to identify crops of variable nutrient requirements (low nutrients) to recommend for poor resource countries (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	This is just a summary of major findings—reader can access TAR for more details.
E-5-105	A	6	45	6	46	CO2 effects' is quite vague. What effects exactly? (Robin Matthews, Macaulay Institute)	Are implicit in the statement.
E-5-106	A	6	45			CO2 effects increase… - Understandable in two ways, better to specify: effects on… ; or increase of…. (Jüri Kadaja, Estonian Research Institute of Agriculture)	Ditto.
E-5-107	A	6	48	6	49	please check again for (~+2°C), TAR not indicate the exactly change range as varied with regions and crops. (Hui JU, Chinese Academy of Agricultural Science)	This was an average over several studies.
E-5-108	A	6	48	6	48	Insert 'will occur' between 'losses' and 'with'. (Robin Matthews, Macaulay Institute)	Done.
E-5-109	A	7	5	7	5	Should read "Contrary to the findings of the SAR …" (Robin Matthews, Macaulay Institute)	Done.
E-5-110	A	7	9	7	10	I do not understand what is meant by global warming confounding the impact of natural variation and fishing activity. Can you be more specific or rephrase this. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Clarified.
E-5-111	A	7	16	7	16	I suggest to add a bullet: If water shortages occur as it is foreseen, aquaculture id dams, lakes, rivers, lagoons will be very impacted. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Not sure that the TAR said that.
E-5-112	A	7	18			Section 5.1.4: With the exception of meta-analysis, there is not much in this section on methods as the title indicates. It is not clear whether this methods refers to the	Will clarify.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						methods of the IPCC review, or the methods whereby new information since the TAR was obtained. Need to clarify. (Robin Matthews, Macaulay Institute)	
E-5-113	A	7	20	7	32	Section on Methods is inadequate. It only highlights regional studies and meta-analyses. What about modelling techniques - what progress ahs been made since TAR? (Jean Palutikof, Met Office)	Have added a few other approaches, but space limits preclude an exhaustive inventory.
E-5-114	A	7	28	7	28	Remove word "best" (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Disagree.
E-5-115	A	7	29		31	Sentence 'This heightens…' is heavy to read. (Jüri Kadaja, Estonian Research Institute of Agriculture)	Is revised.
E-5-116	A	7	37	8	3	change the sub-title of this section (sensitivity to climate variable ?), the content introduce the mechnisime of crops physiological response to change condition,basic general understanding, not suitable to mark with "current" (Hui JU, Chinese Academy of Agricultural Science)	Need to adhere to IPCC-prescriptions on section headings.
E-5-117	A	7	48	7	49	Coupled crop-climate models have not been introduced. Either introduce them in section 5.1.4, or change the reference to just 'crop models'. (Andrew Challinor, University of Reading)	Now they are.
E-5-118	A	7	52	7	52	see the work of Peter Kettlewell (J Crop Science) on the North Atlantic Oscillation and its effect on wheat quality. (John Porter, The Royal Veterinary and Agricultural University)	Will do.
E-5-119	A	8	1	8	1	The citation Nelson and Kkic is incomplete (the year is missing) (Marco Bindi, Dept. of Agronomy and Land Management)	Fixed.
E-5-120	A	8	1	8	3	Real or predicted data? (Robin Matthews, Macaulay Institute)	Probably derived from observed data.
E-5-121	A	8	1	8	3	I find that citation for this Australian result peculiar--why is O'Meagher, 2005 the authority on a result attributed to Nelson and Kokic? Shouldn't there a be a citation to the Nelson and Kokic study itself? Or was it never properly published? Is this a historical statistical analysis or is it a simulation study. If it is an historical study relating actual income to these conditions, that is fine. If it is a simulation study of these conditions then I am concerned that this may not include a model of trade and therefore not accurately assess impact on world prices which can have a more important effect than the direct yield effect--because these types of details matter it is important to cite the original work, not just a report of the work by someone else. (John Reilly, Massachusetts Institute of Technology)	Fixed.
E-5-	A	8	2	8	2	Remove "s" from incomes	OK

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
122						(Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-123	A	8	5	8	6	Allusion to many instances leaves reader wanting a more complete compendium. Suggest rewording: "Examinations of the effects of the recent heat wave in Europe and drought in Africa illustrate the potentially large effects of local/regional climate variability on crops and livestock and regional farming systems affected by them." and then eliminating following sentences--this gives about the same info. but does not leave the reader believing that you have a complete list that you are just not sharing with us. Also, I think it is important to focus on the local/regional aspects of these events and their impacts, because at the same time, the evidence is that these had little or no effect on global food markets--obviously in the case of Africa the consequences likely extended to hunger/famine whereas in Europe I doubt that anyone went hungry because of these events--or likely did not even face a higher food bill by more than a 1% or so which is the size of impact a drought tends to have on food prices in the US. (John Reilly, Massachusetts Institute of Technology)	Will consider in revision.
E-5-124	A	8	11	8	30	Note the meteorological link between the European heat wave and the large break in the Indian summer monsoon. Box 5.1 could be extended to include this, thus showing the broad-ranging impacts of events such as these. (Andrew Challinor, University of Reading)	We don't have the space to go this far in depth.
E-5-125	A	8	12			The content of Box 5.1 should be coordinated with the section 12.6.1 (Europe Chapter), since in both cases the authors are speaking about hot summer in 2003 (Marco Bindi, Dept. of Agronomy and Land Management)	Will do.
E-5-126	A	8	12			Box 5.1: Estimations cannot be accurate to the final ha - thus the 647069 ha is not an estimate. (John Porter, The Royal Veterinary and Agricultural University)	Point taken.
E-5-127	A	8	15			Uses odd unit of 300mm/yr. Since it is lookong at a single season, it would be better to have a seasonal total. (Jean Palutikof, Met Office)	Ditto.
E-5-128	A	8	27	8	28	Is this the agicultural area for the whole of Europe, or just Portugal? Unclear. (Jean Palutikof, Met Office)	Will clarify.
E-5-129	A	8	27	8	28	"The agricultural area …". Where? Spain, Portugal, or both? (Robin Matthews, Macaulay Institute)	Will clarify.
E-5-130	A	8	33	8	34	This table is shown to illustrate effects of extreme events on livestock production in Africa. But, this table may just be showing the effects of severe droughts on livestock production. Many of the countries mentioned are notoriously dry with recurring droughts that will have these effects. It you want to keep the information in the table on drought effects on livestock, then a clear distinction should be made	The distinction between extreme and severe effects does not seem to be relevant here. The table has been clarified, and a clear reference added in the text. ERs other than Olesen do not talk about reducing content.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						between extreme (statistically rare) and severe events. I suggest also to make the layout of the table clearer and reducing its content. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	
E-5-131	A	8	33	8	34	In Table 5.1, specify what the numbers in column 3 represent. For example, does "37% of cattle" mean "37% of cattle lost"? (Danny Harvey, Dept of Geography, University of Toronto)	See E-5-130
E-5-132	A	8	33			You talk about reduction and loss in the first two rows, but then stop qualifiying your percentages. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	
E-5-133	A	8	33			Table 5.1: This is not discussed in the text. (John Porter, The Royal Veterinary and Agricultural University)	See E-5-130
E-5-134	A	8				Table 5.1: For rows 3-10, need to be specific whether a loss or gain is being referred to. E.g. 37% of cattle doesn't mean much. Table columns should also have headers. (Robin Matthews, Macaulay Institute)	See E-5-130
E-5-135	A	9	2			Multiple stresses -- I would have thought that the interactions with human health would have to be mentioned here -- impacts on agriculture and food production may be highly significant (Philip Thornton, ILRI)	This is mentioned under impacts, not included under current trends due to extreme space contraints
E-5-136	A	9	2			I assume "sensitivity" & "vulnerability" are defined somewhere in the report. Is there a glossary? (Richard Fleming, Great Lakes Forest Research Centre)	For the whole report.
E-5-137	A	9	4	9	4	I suggest to add: .....limited availability of water resources and water pollution (see Chapter 3), loss of biodiversity..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Addressed. Kirilenko
E-5-138	A	9	12			Add the following new material after the period (full stop) on line 12: "Recent data from Amazonia spanning 25 years indicate that: (i) trees 10 cm or more in diameter recruit and die twice as fast on the richer soils of southern and western Amazonia than on the poorer soils of eastern and central Amazonia; (ii) turnover rates have increased throughout Amazonia over the past two decades; (iii) mortality and recruitment rates have both increased significantly in every region and environmental zone, with the exception of mortality in eastern Amazonia; (iv) recruitment rates have consistently exceeded mortality rates; (v) absolute increases in recruitment and mortality rates are greatest in western Amazonian sites; and (vi) mortality appears to be lagging recruitment at regional scales. Analysis indicates that these spatial patterns and temporal trends are neither caused by obvious	Beyond the scope. Kirilenko

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						artefacts in the data or the analyses, nor can trends be directly driven by a mortality driver (such as increased drought or fragmentation-related death) because the biomass in these forests has simultaneously increased. In summary, these findings therefore indicate that long-acting and widespread environmental changes are stimulating the growth and productivity of Amazon forests [O. L. Phillips, T. R. Baker, L. Arroyo, et al., Pattern and process in Amazon tree turnover, 1976-2001, Philosophical Transactions of the Royal Society of London Series B - Biological Sciences 359: 381 – 407 (2004); see also: Y. Malhi and O.L. Phillips, Tropical forests and global atmospheric change: a synthesis, Philosophical Transactions of the Royal Society of London Series B - Biological Sciences 359: 549-556 (2004).]" (Indur Goklany, US Department of the Interior)	
E-5-139	A	9	13	9	13	Box 5.3 is on p. 29 - a long way from p. 9. (John Porter, The Royal Veterinary and Agricultural University)	Will be handled in the final editing.
E-5-140	A	9	16	9	38	I suggest to add in Box 5.2 the negative effects of tropospheric ozone over agriculture in general and crops in particular. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Already there. We have added the word "tropospheric" in order to minimize confusion
E-5-141	A	9	17	9	38	Morgan et al. (2006) (New Phytologist) present a FACE study of ozone impacts on soybean, which shows yield reductions of up to 20%. It is probably worth putting this, and some other reported numbers, into Box 5.2. Note also that the Volk reference is not in the reference list. (Andrew Challinor, University of Reading)	Included long et al (2006) rather thatn morgan et al., 2006 reference. Volk reference included FNT
E-5-142	A	9	17			Remove Box 5.2. Takes up a lot of spce here & in refs only to conclude with possibilities & uncertainties (Richard Fleming, Great Lakes Forest Research Centre)	Do not agree (FNT)
E-5-143	A	9	18			Box 5.2: 2 points - 1. you have to make clear that this is tropospheric O3 you are discussing and the CO2 x O3 interaction in crops has been looked at in detail - see the work of Ewert F et al. in Global change biology. Box 5.2 is very vague - what are you trying to say with these boxes? present uncertainties?, give a snapshot, give an example? (John Porter, The Royal Veterinary and Agricultural University)	"tropospheric" added. Ewert and Porter is important, but pre-TAR. The aim of the box is to add new knowledge from post-TAR studies, underlying current uncertainties and research needs. FNT
E-5-144	A	9	25	9	25	It is not clear what references the Booker and Fiscus citations refer to. Here are some possibilities: Booker FL, Fiscus EL. 2005. The role of ozone flux and antioxidants in the suppression of ozone injury by elevated carbon dioxide in soybean. Journal of Experimental Botany 56, 2139-2151. Booker FL, Miller JE, Fiscus EL, Pursley WA, Stefanski LA. 2005a. Comparative responses of	Fixed. It was the booker e t al., fiscus et al 2005 articles. FNT

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						container- versus ground-grown soybean to elevated CO2 and O3. Crop Science 45, 883-895. Booker FL, Prior SA, Torbert HA, Fiscus EL, Pursley WA, Hu S. 2005b. Decomposition of soybean grown under elevated concentrations of CO2 and O3. Global Change Biology 11, 685-698. Fiscus EL, Booker FL, Burkey KO. 2005. Crop responses to ozone: uptake, modes of action, carbon assimilation and partitioning. Plant, Cell and Environment 28, 997-1011. Booker FL, Prior SA, Torbert HA, Fiscus EL, Pursley WA, Hu S. 2005b. Decomposition of soybean grown under elevated concentrations of CO2 and O3. Global Change Biology 11, 685-698. (Fitzgerald Booker, U.S. Department of Agriculture - Agricultural Research Service)	
E-5-145	A	9	30	9	30	I suggest you add the following reference to this sentence as it pertains to CO2 x O3 effects on crops: Fuhrer J, Booker FL. 2003. Ecological issues related to ozone: agricultural issues. Environment International 29, 141-154. (Fitzgerald Booker, U.S. Department of Agriculture - Agricultural Research Service)	OK (FNT)
E-5-146	A	9	33	8	33	I suspect you mean Felzer et al (2004) rather than just Felzer (2004). Follow-on work that may be of interest to you is Felzer et al (2005) [Felzer, B., J. Reilly, J. Melillo, D. Kicklighter, M. Sarofim, C. Wang, R. Prinn, & Q. Zhuang. "Future Effects of Ozone on Carbon Sequestration and Climate Change PolicyUsing a Global Biogeochemical Model," Climatic Change 73 (3): 345-373, 2005] and Reilly et al. 2004 [Reilly, J., B. Felzer, S. Paltsev, J. Melillo, R. Prinn, C. Wang, A. Sokolov, and X. Wang, The Economic Impact of Climate, CO2, and Tropospheric Ozone on Crop Yields in China, the US, and Europe, Abstract 7314; B33A-0239: EOS, 2004]. The latter is a rather brief abstract but is now (as of late April 2006) a submitted paper [Global Economic Effects of Changes in Crops, Pasture, and Forests due to Changing Climate, Carbon Dioxide, and Ozone, J. Reilly, S. Paltsev, B. Felzer, X. Wang, D. Kicklighter, J. Melillo, R. Prinn, M. Sarofim, A. Sokolov, C. Wang, Energy Policy). I attach a copy of this paper FYI if, given IPCC rules, it is citable. (John Reilly, Massachusetts Institute of Technology)	OK (FNT)
E-5-147	A	9	34	9	35	contrasting experimental results'. What is meant here? Does it mean that the literature contains contradictory findings? Unclear. (Jean Palutikof, Met Office)	Clarified (FNT)
E-5-	A	9	43	9	52	There seems to be potentially interesting results from at least the Mexico-US	The sentence has been revised: "A comparison

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
148						contrast study, but why do you refuse to tell us what they are. Instead you use vague terms "drastically different vulnerabilities" depend on class, access to resources… I think I can guess that the result would be that poor, lower class, suffer severe consequences such as...hunger, inability to afford basic necessities such as health care, disruption of education....compared with those with greater income/access to resources who may suffer some loss of income but have sufficient resources.... Of more an issue--the next citation lists globalization as something that is "changing capacity.." Is it increasing or decreasing capacity--a good or bad thing? Is this an attempt to be purposely obtuse? (John Reilly, Massachusetts Institute of Technology)	of conditions on both sides of the United States-Mexico border reveal how social, political, economic, and historical factors contribute to differential vulnerability among farmers and ranchers living within the same biophysical context (Vasquez-Leon *et al.*, 2003)." Readers are referred to the article for detailed results, as they cannot be explained in one or two sentences. The discussion of globalization has been revised to 1) be more specific and 2) acknowledge that globalization may have positive and negative consequences for adaptation. More details are provided in the references that are cited. O'Brien
E-5-149	A	9	43		44	First sentence seems to be needless in the context (Jüri Kadaja, Estonian Research Institute of Agriculture)	The point of this sentence (that vulnerability is context-dependent as well as hazard-dependent) is to emphasize that it is not one or the other, and that context is important (as described in the remainder of the paragraph) (O'Brien
E-5-150	A	9	44	9	44	The citation Brooks et al. is incomplete (the year is missing) (Marco Bindi, Dept. of Agronomy and Land Management)	Corrected in the text. O'Brien
E-5-151	A	9	49	9	49	The citation Vasquez-Leon et al. is incomplete (the year is missing) (Marco Bindi, Dept. of Agronomy and Land Management)	Corrected in the text. O'Brien
E-5-152	A	9	49	9	52	More detail could be provided here (Emma Archer, University of the Witwatersrand)	The sentence has been revised. O'Brien
E-5-153	A	9	50	10	8	The term "variability" is still used ambiguously. It is not clear whether it refers to spatial differences in climate, whether it relates to different weather conditions between years or a combination of both (Nicholas Holden, University College Dublin)	The common understanding of climate variability as differences in weather conditions over time is used. Spatial variability is not included in this, and would be otherwise specified. O'Brien
E-5-154	A	10	2	10	20	Again, this hints at having something useful to say but sticks safely to vague platitudes, at best letting the reader guess the direction of a relationship. Re Adapative capacity "influenced" by wealth, technology…Do I need to guess that adaptive capacity is positively related to these things? Is it a hypothesis that has been tested does it need to be tested--if you suspect there is a relationship but no one has empirically investigated it, at least say as much--that more work to	These are not intended to be platitudes, they simply say that there are relationships between adaptive capacity and general indicators. Specifying the relationship (greater wealth = higher adaptive capacity; more technology = higher adaptive capacity) disregards the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						investigate the relationship is needed. Finally, at least the last sentence has Reid and Vogel actually concluding that these things "aggravate" current response options and overall development initiatives, although that language is not very precise--do these things aggravate the initiatives or the success of iniatives--I guess either could be important--initiatives never get put forward, but I guessing what is meant is that initiatives are less successful than they might have been. (John Reilly, Massachusetts Institute of Technology)	importance of contextual factors that determine the conditions under which these statements are true or not true. "Aggravate" has been changed to constrain. O'Brien
E-5-155	A	10	4	10	7	Add "with, however, some limitations" (Emma Archer, University of the Witwatersrand)	This has been added. O'Brien
E-5-156	A	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". (Futang Wang, Chinese Academy of Meteorological Sciences)	This has not been added. O'Brien
E-5-157	A	10	10			To add a chinese reference related (in English):" Wang et al. 2004", after or before the present reference "Salinger et al.," 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". (Futang Wang, Chinese Academy of Meteorological Sciences)	This has not been added. O'Brien
E-5-158	A	10	14	10	20	The line 20 should be better to be removed to before the line 14, i.e. before this section. And the later mey be shortened or to delete some unnecessary words in draft. (Futang Wang, Chinese Academy of Meteorological Sciences)	The last sentence has been incorporated into line 14. Sentences have been revised. O'Brien
E-5-159	A	10	14	10	20	Cross reference here to chapter 9 (Emma Archer, University of the Witwatersrand)	This has been added. O'Brien
E-5-160	A	10	25	10	32	What about the role of conflict? (Emma Archer, University of the Witwatersrand)	Difficult to handle this in a paragraph on global trends—should be handled I a regional assessment.
E-5-161	A	10	25	10	25	insert 'rate' after 'growth' (John Porter, The Royal Veterinary and Agricultural University)	Declining growth rate is already occurring. Declining absolute growth is expected.
E-5-162	A	10	26	10	26	Remove "s" from incomes (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-163	A	10	29	10	31	Something of a non-sequitor. Yes re: rural populations--but if anything wholesale movement of people to cities would put less stress on agro-ecological areas as these smaller regional populations try to feed themselves. It would seem to be more the clash of traditional agriculture and people who depend on it with a commercial agriculture that must develop to feed the increasing number of people in urban	We are'nt so sure about the direction of agro-ecological change with urbanization, thus are less comfortable staking a strong position as advocated in this comment.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						areas--and so the transformation from fairly rural societies to more urban. Small point at some level, but this paragraph doesn't quite hang together as is. (John Reilly, Massachusetts Institute of Technology)	
E-5-164	A	10	37	10	46	This whole paragraph seems a bit out of place - it is supposed to be talking about trends in climate, not vague generalities about the impact of weather variables on various crops etc. (Robin Matthews, Macaulay Institute)	Right. Consider starting with the para. on climate change (from WP1) and then introduce current suitability for rainfed crops. JFS
E-5-165	A	10	37	10	46	This paragraph seems to describe current sensitivity, i.e. be more relevant to Section 5.2.1, than future trends. (Paula Harrison, University of Oxford)	Same
E-5-166	A	10	37	10	38	" …are too dry for rain-fed agriculture". What is this based on? Does it also include areas that are too cold or too hot or too steep? (Robin Matthews, Macaulay Institute)	Clarify from Fischer et al. JFS
E-5-167	A	10	42	10	42	should read 'temperatures and solar radiation level' (John Porter, The Royal Veterinary and Agricultural University)	Agreed
E-5-168	A	10	46	10	46	It is normal to refer to figures in numerical order in the text so 5.1a and 5.1b should be reversed (Nicholas Holden, University College Dublin)	Agreed
E-5-169	A	10	48	11	9	See comment on this wrt to summary and danger of drawing conclusions based on visual inspection of a chart. Also, if WG I is indeed concluding it has solid evidence on regional precipitation, I guess you need to bow to them, however, given the importance of aerosols in cloud formation and in determining what happens to precipitation, and how they are also related to global and regional climate change, I wonder just what that confidence is based on since not the GCMS have real atmospheric chemistry that treats aerosols and their climate and cloud-precipitation impacts. (John Reilly, Massachusetts Institute of Technology)	Consider commenting the maps if we do have the WG1 map at hand. JFS
E-5-170	A	10	49	10	49	What does "robustly" mean here? It is redundant if it means that "90% of simulations …" because you already state that. The implication is that it means something else? (Richard Fleming, Great Lakes Forest Research Centre)	No simply redundant
E-5-171	A	11	3	11	3	I think this sentence should read: "Increase in precipitation extremes are also very likely in the …" (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	We disagree.
E-5-172	A	11	5	11	6	The sentence refers to frequency of droughts, but the figure appears to be showing change in rainfall. These factors are not necessarily the same, since droughts do not only depend on the change in rainfall, but also on the timing of that change in	OK

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						rainfall. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	
E-5-173	A	11	6	11	7	This is perhaps ambiguous. Are the models refered to "global" models? Local applications of crop and system models surely include these effects? (Nicholas Holden, University College Dublin)	Will clarify.
E-5-174	A	11	6	11	8	The sentence between line 6 and 8 should be removed. It is clear from the two figures that Fig. 5b is used only as a reference to explain which and where current rainfed crops will be affected by changes in rainfall pattern. (Marco Bindi, Dept. of Agronomy and Land Management)	Not sure the reason this.
E-5-175	A	11	8	11	8	you need to compare Figs 5.1a and 5.1b for the reader rather than leave them without comment. This happens in many cases in the chapter where material is simply left for the reader to intepret and there needs to be better discussion of the graphs and tables. (John Porter, The Royal Veterinary and Agricultural University)	Same
E-5-176	A	11	11			Figure 5.1: Will this be in colour? It is almost impossible to interpret if it won't be. It is also rather small - would it be possible to have it on a whole page (landscape format)? (Robin Matthews, Macaulay Institute)	Yes.
E-5-177	A	11	22			Figure 5.1: Define "SI" in legend - Suitability Index? (Paula Harrison, University of Oxford)	Will do.
E-5-178	A	11	29			Section 5.3.2: A graph in this section of projected population increase, and on the same graph total food demand would be useful. I think there also needs to be discussion of trends in consumption patterns - e.g. tendency to eat meat as incomes rise, etc. (Robin Matthews, Macaulay Institute)	Agree, but don't know of one that is exactly comparable.
E-5-179	A	11	31			Land expansion and technical change in SSA, and projected decreases in the number of undernourished people -- again, dependence on the assumptions is critical, and most of this section depends on one source (FAO 2006). (Philip Thornton, ILRI)	Agree.
E-5-180	A	11	31			I 've always heard that it was ineffective distribution of food, not production, that was critical to feeding the hungry. You don't address distribution. Fuel costs & CO2 reduction efforts would both seem to be possible factors to consider? (Richard Fleming, Great Lakes Forest Research Centre)	Distribution is less affected by climate change than production, hence the emphasis.
E-5-181	A	11	33	11	34	This statistic does not show an 'increasing share' as it only cites a current value. Add the equivalent number for a previous time. Has this increasing share of better-fed people been consistent? Over what time period? (Andrew Challinor, University of Reading)	All good points, but the general nature of the comment is valid as a lead in to the details sought in this comment.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-182	A	11	33	11	45	Its not only the growing area but highly productive and responsive cultivars identified for such area contribute significantly and needs to be mentioned here with examples. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Agree.
E-5-183	A	11	33	12	3	This section is good in providing some actual numbers, however,in speaking of additional land needs and where these will come from, also later on number of malnourished, it uses these "will".. as if the forecast is absolutely certain. Use terms like FAO projects X land needed and this will come from..." FAO makes careful projections but no one has a crystal ball on these matters. Also, I question that final statement about Cassman study--Where does it really conclude this? I didn't see it. The Cassman study is a good one and raises many important issues that could be discussed in this section, but climate impacts is not one of them. (John Reilly, Massachusetts Institute of Technology)	Good points. Will incorporate in the final edit.
E-5-184	A	11	33		45	I think you're saying that the rate of increase in area being used for agricultural production is decreasing. Nevertheless, a large area is still going to be converted in the coming decades. But I you need to be more clear. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	OK
E-5-185	A	11	37			Does this include or exclude climate change effects? (Jean Palutikof, Met Office)	No climate effects—need to clarifyin final edit.
E-5-186	A	11	38	11	38	should be 'This infers' rather than 'This implies'. (John Porter, The Royal Veterinary and Agricultural University)	OK.
E-5-187	A	11	39	11	41	This sentence needs a reference. (Robin Matthews, Macaulay Institute)	This is all FAO material referenced in the previous sentences.
E-5-188	A	11	41	11	41	Is there enough land in developing countries for this expansion to take place? (Robin Matthews, Macaulay Institute)	Not without ecological tradeoffs.
E-5-189	A	11	44	11	44	How are these yields expected to increase? Greater inputs? Less pests/diseases? Need to clarify. (Robin Matthews, Macaulay Institute)	Not enough room to clarify.
E-5-190	A	11	47	11	52	Authors might want to state as early as this point that food security is also a function of access. (Emma Archer, University of the Witwatersrand)	Agree, but access is less directly affected by climate change than production.
E-5-191	A	11	47	12	3	I think it needs to be said somewhere (and here could be a good place) that the food insecurity and undernutrition is not currently or even in the future likely to be a function of global food production. Rather it is an effect of poverty, which limits the access of the poor people to foods and reduces the local incentives of improving food supply. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Ditto.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-192	A	11	47	12	3	Alternate systems of protection of natural resources and environmental qualities needs to be emphasised here. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Not sure what is meant here.
E-5-193	A	11				Figure 5.1b is illegible as currently presented. It needs to be bigger for the detail of the legend to be decernable on the map (Nicholas Holden, University College Dublin)	Fixed.
E-5-194	A	12	0			It is not clear to me why you placed "Fisheries" between forestry and subsistence agriculture. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	Follows the prescribed outline for discussion of these sectors in the impacsts section that follows.
E-5-195	A	12	5			Reduce this section. Why so much detail, & much of it from 'gray literature', when, as you state at the start of the 2nd paragraph, most of these analyses have been wrong anyway. (Richard Fleming, Great Lakes Forest Research Centre)	I tend to disagree on both over-reliance on the gray literature and on too much details reported in the section. The point on smaller increases in demand for timber as compacred to the earlier projections is important for the modelling.
E-5-196	A	12	7	12	36	Writing in this section is odd in places - it needs a good edit. (Emma Archer, University of the Witwatersrand)	Should be corrected during the final editing
E-5-197	A	12	13	12	16	Need to specify the direction of this change. (Robin Matthews, Macaulay Institute)	The details from this section were transferred to the table 5.4 during one of the previous review iterations.
E-5-198	A	12	14			"between" in both cases is vague. Specify whether from temperature to tropical, or vice versa, and whether from NH to SH,or vice versa (Danny Harvey, Dept of Geography, University of Toronto)	The details from this section were transferred to the table 5.4 during one of the previous review iterations.
E-5-199	A	12	27			It would be nice to have some examples of what these services are (Nicholas Holden, University College Dublin)	I consider many of these products and services to be self – evident and not worth to be specifically mentioed here unless an estimate of future supply/demand is known.
E-5-200	A	12	30	12	30	"Impact" should be replaced by "effect" (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Senternce should be corrected during the final editing
E-5-201	A	12	40	12	40	production has been forcasted (correct the sentence) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Senternce should be corrected during the final editing
E-5-202	A	12	40			insert "potential" before "world" [supply and demand will balance, through an increase in price] (Danny Harvey, Dept of Geography, University of Toronto)	Agree. Senternce should be corrected during the final editing
E-5-203	A	12	50			Section 5.3.2.4: This whole section doesn't really fit here. The main section (5.3.2) is dealing with balance between supply and demand. Could it possibly go into Section 5.4.7?	Title of 5.2.3 was given. This sub-section needed to be here to describe current non-climate-related trends in smallholder and

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Robin Matthews, Macaulay Institute)	subsistence agriculture
E-5-204	A	12	50			Place this section as a sub-section of 5.3.2.1 (Richard Fleming, Great Lakes Forest Research Centre)	Suggestion not accepted. Smallholder and subsistence farmers also fish and use wild resources
E-5-205	A	13	3	13	3	Move the reference at the end of the sentence. (Marco Bindi, Dept. of Agronomy and Land Management)	Reference has been clarified
E-5-206	A	13	3			Allison and Ellis - Is it a name of enterprise or is it part of reference? (Jüri Kadaja, Estonian Research Institute of Agriculture)	Reference has been clarified
E-5-207	A	13	5	13	35	The information reported in these two paragraphs is not always supported by reference. Thus, these two may be reduced in length for giving more space to other sections. (Marco Bindi, Dept. of Agronomy and Land Management)	More references have been added. Section had already been greatly reduced
E-5-208	A	13	31	13	33	Smallholder/subsistence households declining in SSA? How is this going to happen, precisely? And again, there are competing views depending on the assumptions and scenarios of the future (Philip Thornton, ILRI)	The evidence is clear that “de-agrarianisation” is taking place in rural areas of developing countries, including SSA. Space does not permit full consideration of the debates around this
E-5-209	A	13	38			This whole section is heavily weighted towards Agric. Needs more Forestry & Fisheries for balance. (Richard Fleming, Great Lakes Forest Research Centre)	We tried to be judicious on this but the relative reporting lengths are determined by availablilty of new literature.
E-5-210	A	13	38			Section 5.4: The structure and content is much improved over the FOD. However, the entire chapter still needs a very thorough editing to improve the English, punctuation and add in missing words and years or authors from references cited. (Paula Harrison, University of Oxford)	Will do.
E-5-211	A	13	42	13	44	Should be clear what variability refers to here as well (Nicholas Holden, University College Dublin)	We are keeping “variability” here. The headings of the following sections clarify case by case what we mean by this. FNT
E-5-212	A	13	44	13	44	"modified" is too neutral a word here. Most pests are pioneer species & thrive on the opportunities provided by rapidly changing environmental conditions. It's true that all pests won't thrive, but it only takes 1 or 2 species to outbreak to cause major impacts on the resource. The overall impact of pests in agric & forestry will almost certainly increase for a variety of reasons (Harrington et al. 2001 Agric & Forest Entomol. 3:233). Also, section 5.4.1.4 speaks almost entirely of increased risks. Where are the decreased risks to justify a neutral word like "modified"? (Richard Fleming, Great Lakes Forest Research Centre)	“modified” is OK in this introductory paragraph; all other variables are discussed in these terms. Specifics (yes, negative for pests as for many other factors) are in sections. FNT
E-5-213	A	13	48	13	48	The title of this sub-section should be modified removing the part after "effects ……."	Do not agree. Primary effects and interactions play important, separate roles in these

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Marco Bindi, Dept. of Agronomy and Land Management)	descriptions. (FNT)
E-5-214	A	13	48	14	14	This is a very clearly written and important section. I guess I'm surprised--I've been seeing claims that FACE showed much lower results than previous, studies with CERES type models showed such strong positive effects from combined climate and CO2 (e.g. US National Assessment results mentioned earlier) I assumed these models were based on old results 550 ppm equal +30% yield for e.g. wheat. I guess I was misinformed--however, because of the importance of this result I hope the authors will confirm this is correct. If somewhere along the line the CO2 response of these (e.g. CERES) models were dialed down then that needs to be made clear because this conclusion strongly affects how we interpret some of the many studies done over the past 15 years using the CERES models--I was under the impression they were possibly biased high based on new FACE work but this asserts they are right on or biased low. (John Reilly, Massachusetts Institute of Technology)	FNT. We have a clarifying set of publications in press now, with this reviewer as co-author. I am reviewing the text to make sure our latest points are coming through well. (FNT)
E-5-215	A	13	50	14	24	Needs to be rewritten, South Asian and Indian studies on crops like Brassica, rice and wheat are not included in the text (Ref:Uprety et al 2002-2006) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Cannot be inserted in this genereal opener. FNT
E-5-216	A	14	1	14	2	Citing 17% is misleading. C3 and C4 crops show different responses, and both show a range. The cited Long et al paper gives these ranges as about 15-35% (C3) and -5 to +20 (C4). (Andrew Challinor, University of Reading)	Agreed, ranges included. FNT
E-5-217	A	14	8	14	14	Weigel et al. (2005) give experimental data for several crops in a 3-year rotation for crops under elevated [CO2] in the field entailed significant positive effects ($P < 0.05$) on aboveground (6%-14% stimulation) and belowground biomass production (up to 90% stimulation), while canopy evapotranspiration was reduced. Reference: Weigel, H.J. Pacholski, A., Burkart, S., Helal, M., Heinemeyer, O., Kleikamp, B., Manderscheid, R., Fruhauf, C., Hendrey, G. F., Lewin, K., Nagy, J.l., 2005. Carbon turnover in a crop rotation under free air CO2 enrichment (FACE). Pedosphere, 15(6): 728-738. (Goetz Michael Richter, Rothamsted Research)	This is an important work. However all references here are for review studies (FNT)
E-5-218	A	14	8	14	14	Long et al have expanded their comparison of the benefits of CO2 in FACE experiments to crop model responses (Science 2006, 312, 1918-1921) to show that the modelled response is greater than observations. This adds some uncertainty to the conclusion that the two are similar, as stated here. (Tim Wheeler, University of Reading)	New work shows that these conclusions on crop models were not correct. We have modified the text to include both findings by long et al (2006) and Tubiello et al., (2006a,b). (FNT)
E-5-219	A	14	8	14	8	In which way are model simulations of CO2 effects questioned? (Robin Matthews, Macaulay Institute)	Specified (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-220	A	14	8	14	14	All the listed models are from the USA - whereas many other models have been used for climate change studies - ie APSIM (Oz), Sirius (NZ), Sucros (NL), AFRC2 (UK) etc. Remove this bias. (John Porter, The Royal Veterinary and Agricultural University)	Additional models included. (FNT)
E-5-221	A	14	9	14	9	I suggest to replace "our assessment is" with "it seems" (Marco Bindi, Dept. of Agronomy and Land Management)	Not necessary in modified text. (FNT)
E-5-222	A	14	16	14	24	What about acclimatisation to increased CO2 concentrations? (Robin Matthews, Macaulay Institute)	All relevant current knowledge already discussed in TAR. FNT
E-5-223	A	14	18	14	19	An important omission from this list is the effects of elevated CO2 at different levels of nitrogen. A summary of the CO2 x N interaction in FACE experiments is given in Long et al (Science 2006, 312, 1918-1921) that shows a much reduced benefit to the yield of C3 crops of elevated CO2 when N is decreased to levels that are more representative to low-input cropping systems (Tim Wheeler, University of Reading)	Dependence on N of CO2 response is well known and discussed in TAR. We simply mentioned in the opener that response depends on management and refereced it to a number of review studies. (FNT)
E-5-224	A	14	21	14	24	Suggest: The report might emphasize the significance of increasing field experiment distribution all the world, as well as extending experiment time period. Based on this, taking multi-factors into consideration, the experiment data is to be applied into models, the results would be improved. (Liyong Xie, Chinese Academy of Agricultural Sciences)	We already discussed this at the end of sections 5.4.1 and 5.4.2 . FNT
E-5-225	A	14	22	14	24	Cite studies which have done this. One such study is: Challinor, A., T. Wheeler, J. Slingo, and D. Hemming (2005). Quantifcation of physical and biological uncertainty in the simulation of the yield of a tropical crop using present day and doubled CO2 climates. Philosophical Transactions of the Royal Society B 360 (1463) 1983-1989. (Andrew Challinor, University of Reading)	Many studies are doing this. Not appropriate to cite one or a few. FNT.
E-5-226	A	14	26	14	27	The title of this sub-section should be modified removing the part after "precipitation ……." (Marco Bindi, Dept. of Agronomy and Land Management)	Do not agree. (FNT)
E-5-227	A	14	29	14	50	This is an important section but the statements could be clearer. Opening sentence that they will modify and often "limit" seems stating a lot more than you can here. What these results really seem to be saying is that the partial effect of CO2 on yield can be small/negligible if other important conditions are limiting (nutrients, water, extreme climate event that affects crop during flowering)-which is hardly surprising. If you kill the crop or rob it of key nutrients then pumping CO2 at it is not going to help. It requires a global analysis with real climate scenarios to conclude the extent to which other conditions will indeed by limiting--so I think the "often limit" goes beyond what this work can conclude as there is no indication	We are indeed making specific and limited statements here, based on the available literature. This reviewer is correct, but we are not (and cannot, given lack in the literature) making statements on the global overall effects of these limitations. FNT

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						here that these studies have investigated the degree to which these other factors are limiting in key crop growing regions. (John Reilly, Massachusetts Institute of Technology)	
E-5-228	A	14	29	14	40	Reduce. Why so much detail here & so little explanation of the more complex effects of pests? (Richard Fleming, Great Lakes Forest Research Centre)	This section is 21 lines long, whereas the one on pest is 16 lines long. The reason for the disparity (not so large after all) is due to the fact that there's a lot less published about pests compared to temperature and precipitation interactions with elevated CO2. FNT
E-5-229	A	14	29	14	40	Adverse temperature effect has been partially counteracted by the rising atmospheric CO2 as reported for rice cultivars(Uprety 2005) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Agreed. This is what the examples discussed show. FNT
E-5-230	A	14	30	14	31	Studies also showed that the temperature sensitivity was different between crops or varieties, and different regions. (Liyong Xie, Chinese Academy of Agricultural Sciences)	Same as above. (FNT)
E-5-231	A	14	43			By transporting exotics, trade will almost certainly increase ecological/biodiversity impacts (see earlier comments). (Richard Fleming, Great Lakes Forest Research Centre)	This is important but not as a "primary", i.e., physiological plant process. FNT.
E-5-232	A	14	50	14	50	Suggest adding: on precipitation, the extreme events (e.g., heavy floods and droughts) will play more roles in crop production for it's uncertain. As mentioned in 5.4.1.3 this chapter. (Liyong Xie, Chinese Academy of Agricultural Sciences)	Discussed in section 5.4.2 (FNT)
E-5-233	A	15	1	15	10	It must be emphasised that when models were not based on realistic biological data, predictions are misleading. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	This is a generally true and discussed at the end of sections 5.4.1 and 5.4.2. FNT.
E-5-234	A	15	2	15	10	Ambiguity here as to what variability refers to (Nicholas Holden, University College Dublin)	Agreed. "frequency" used instead. (FNT)
E-5-235	A	15	7	15	7	I suggest to replace "We note here that" with "Moreover," (Marco Bindi, Dept. of Agronomy and Land Management)	OK. Modified without "moreover". (pg 15 line 16) FNT
E-5-236	A	15	7	15	7	"… Volney AND FLEMING 2000 …" (Richard Fleming, Great Lakes Forest Research Centre)	OK. (FNT)
E-5-237	A	15	8	15	10	Cite these 'few models'. One such model is described by: Challinor, A. J., T. R. Wheeler, and J. M. Slingo (2005). Simulation of the impact of high temperature stress on the yield of an annual crop. Agricultural and Forest Meteorology 135 (180-189). I think that the DSSAT model now also includes the impact of temperature extremes.	Do not agree. Several studies are doing this and are discussed in sections 5.4.2. This particular study does not deal with the issue of increased climate variability in the future, but with effects of extremes in general, under

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Andrew Challinor, University of Reading)	current climate. Again, many pre-TAR and post-TAR studies are doing this and one example is not appropriate. Challinor et al. (2006) is more appropriate and now cited within 5.4.2. FNT
E-5-238	A	15	8			Please give examples of these studies (Jean Palutikof, Met Office)	Examples given in 5.4.2 (FNT)
E-5-239	A	15	12			There are some cites in the Africa chapter of work on livestock diseases (the UK government foresight project, or example) (Philip Thornton, ILRI)	NEEDS TO BE CHECKED (FNT)
E-5-240	A	15	32	16	7	Jones et al. (2005) report on the positive feedback mechanism of elevated temperatures and accelerated soil carbon turnover under climate change, which varies between 54 and 80 Gt carbon loss to the atmosphere by 2100, which is dependent on the structure of the soil carbon model. Reference: Jones, C. McConnell, C., Coleman, K., Cox, P., Falloon, P., Jenkinson, D., Powlson, D.., 2005. Global climate change and soil carbon stocks; predictions from two contrasting models for the turnover of organic carbon in soil. Global Change Biology, 11(1): 154-166. (Goetz Michael Richter, Rothamsted Research)	This is a paper on the global carbon cycle that is only marginally relevant to issues in this subsection. FNT
E-5-241	A	15	34	15	49	If you are referring to agriculture then soil C is not as important as other GHG emissions such as N20 and CH4 - and thus mitigation in agriculture is much more than soil C changes - see Paustians figures for US farming and Robertson et al at MSU (Kellogg BS). This needs to be mentioned and also given priority for future research - ie the role of non-CO2 GHGs in climate change and agriculture and how to avoid them and mitigate them. (John Porter, The Royal Veterinary and Agricultural University)	This is not about mitigation (to be discussed in WGIII) but about carbon in agricultural soils, as they relate to stability of production etc. FNT
E-5-242	A	15	34	15	49	A very weak section. Not sure what to make of it. Given the high variability of carbon in soils not sure what we are suppose to make of the impact of European drought. For a quantitative result over long term see Felzer et al (2005) previously cited in my comments on this chapter. Opening comment about confirming results--and uncertainties. could be expanded a bit. What I get from this section is that very few studies have been done, and saying that directly would be helpful. E.g. The impact of climate on carbon storage in managed soils was identified as a potentially important issue in the TAR. Some studies since then have examined this relationship. The amount of net carbon uptake in any one year for sites, regions, and even the world as whole appears to vary strongly because of weather(e.g. Europe, ... WG I, Felzer 2004). It will depend on multiple environmental factors.	Included suggestions within text. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Felzer et al (2005) found climate and increasing CO2 to increase carbon storage on croplands but ozone damage to crops could significantly offset climate and CO2 effects. The effect will depend on other management practices fertilization, irrigation, and tillage practices. (John Reilly, Massachusetts Institute of Technology)	
E-5-243	A	15	42			Does variability here refer to inter-annual variation in weather conditions? If so, I do not think the phrase "climate variability" is appropriate as it remains ambiguous (Nicholas Holden, University College Dublin)	OK modified text for clarity. (FNT)
E-5-244	A	15	43	15	45	It would be informative to indicate that inhibitory effects of ozone on C sequestration at elevated CO2 is primarily related to decreased biomass input and possibly changes in leaf chemistry due to ozone damage (Booker FL, Prior SA, Torbert HA, Fiscus EL, Pursley WA, Hu S. 2005b. Decomposition of soybean grown under elevated concentrations of CO2 and O3. Global Change Biology 11, 685-698. Liu L, King JS, Giardina CP. 2005. Effects of elevated concentrations of atmospheric CO2 and tropospheric O3 on leaf litter production and chemistry in trembling aspen and paper birch communities. Tree Physiology 25, 1511-1522.) (Fitzgerald Booker, U.S. Department of Agriculture - Agricultural Research Service)	Inserted text and reference to this end. (FNT)
E-5-245	A	15	44	15	45	true, but higher CO2 also reduces the deleterious effect of O3 (Danny Harvey, Dept of Geography, University of Toronto)	This is discussed in box 5.2 (FNT)
E-5-246	A	16	1	16	7	More specific comments, or cut completely. More specific comments would be greatly aided by: Slingo, J. M., A. J. Challinor, B. J. Hoskins and T. R. Wheeler (2005). Food crops in a changing climate. Phil. Trans. R. Soc. B 360 (1463) 1983-1989. (Andrew Challinor, University of Reading)	Do not agree. These are generic comments and do not need refereces here. References are offered in specific sections below. FNT
E-5-247	A	16	7	16	7	Perhaps should mention the effects of ozone on plant growth and possible interaction of ozone with CH4 in rice paddies? (Robin Matthews, Macaulay Institute)	Space limits preclude.
E-5-248	A	16	11	16	18	I remain concerned that the TAR and this report, by continually repeating that studies find benefits through 2050 and losses after that, conveys a sense of confidence that we know what these results will be in the absence of serious transient studies of climate change. I can easily see the possibility for significant damages over the next 20 years--on the other hand I can see benefits from warming extending beyond 2100 given the current range of studies , their limits, and what we know about the accuracy of climate forecasts. As indicated elsewhere you have been able to do nothing more than visually examine the most recent climate	This point is well taken. Relevant comments have been inserted in the text. Yet we note that several of the studies cited are transient studies, i.e., the porject climate impacts as the develop in coming decades, rahter than simply being snapshots at given points in time. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						simulations--and then probably just a snapshot of a supposed 2100 climate. I suggest that you take issue with the TAR and suggest that it was far too confident. The US National Assessment found negative effects in the US in 2030 for one climate scenario but beneficial results for 2090 for the same climate model run. I'm really afraid that you are misleading people by suggesting we have little to worry about until 2050. (John Reilly, Massachusetts Institute of Technology)	
E-5-249	A	16	13		14	..increase regionally and globally above (?) 2.5 C. Maybe …. more than 2.5 C (Jüri Kadaja, Estonian Research Institute of Agriculture)	This is what TAR said. We discuss slightly revised results at the end of this section. (FNT)
E-5-250	A	16	20	16	27	This paragraph is poorly written. (Paula Harrison, University of Oxford)	Was edited for clarity. (FNT)
E-5-251	A	16	20	16	34	Reilly et al (2006-in review) finds just the opposite--that stabilization of CO2 concentrations at 550 ppm reduces benefits of warming through 2050 from a reference where concentrations increase to 800 or so. Whether this new work is actually citable or not, I'd suggest you temper this result rather than have a study that contradicts this appear just as this chapter is published. Again, all the more reason not to convey over confidence based on one or 2 studies. (John Reilly, Massachusetts Institute of Technology)	This is not counter to what we say, as we also specified that results are the opposite prior to 2050. Text was changed for more clarity. (FNT)
E-5-252	A	16	29			This section omits the new work on the representation of the effects of high temperature events in crop models. A recent example of modeling the effects of heat stress on crops, and the implications in some climate change runs is that of Challinor et al (Simulation of the impact of high temperature stress on the yield of an annual crop. Agricultural and Forest Meteorology 2006, 135, 180-189). (Tim Wheeler, University of Reading)	Not so. The paper mentioned here deals with climate extreemes under current climate, and many other crop models are able to simulate such extremes, as many pre- and post-TAR studies testify. This section describes specific studies that have dealt with increased frequency of extreme events under climate change scenarios. (FNT)
E-5-253	A	16	32	16	32	"Reduced uncertainty"--I don't think so. Climate scenarios have changed, but you've not analyzed them. I'm more worried about interaction of climate-ozone but we need more studies. FACE experiments suggest lower CO2 results but we only have a few years of data from FACE. Things like European heat wave has to suggest possibility of strong effects soon at least in some regions and so does this confirm "rosy" TAR report of global benefits through 2050--it makes me more uncertain. Recent more rapid warming issues--could we see things sooner. Most of your new knowledge items are things that are not fully incorporated (or incorporated at all) in some of the national global studies and so those things make me more uncertain not less, and certainly more uncertain that the silly TAR led us	Agreed, changed text accordingly. However, most of these new findings are accompanied by modeling examples, so tghere are models out there that incorporate—albit primitively—these effects. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						to believe. (John Reilly, Massachusetts Institute of Technology)	
E-5-254	A	16	35	16	50	Currently substantial work is underway in researching and developing crops that are tolerant to abiotic stresses such as drought, high and low temperatures, salinity, and water logging, which might reduce yields due to climatic variability [see, e.g., Basia Vinocur and Arie Altman, Recent advances in engineering plant tolerance to abiotic stress: achievements and limitations, Current Opinion in Biotechnology 2005, 16:123–132, and refernces therin.] There is also ongoing R&D into controlling the timing of flowering and cessation of growth [see H. Böhlenius, T. Huang, L. Charbonnel-Campaa, A. M. Brunner, S. Jansson, S. H. Strauss, O. Nilsson, CO/FT regulatory module controls timing of flowering and seasonal growth cessation in trees. Science 312, 1040-1043 (2006), and refernces therein]. In the long term such work is likely to bear some fruit, even if it turns out to be less than what its proponents would hope for. Such work should be noted in the text, and the heading on lines 35-36 modified to read as follows: "If climate variability increases, that may lower crop yields beyond the impacts of mean climate change, although future adaptations may alleviate some of these losses." (Indur Goklany, US Department of the Interior)	Adaptation is discussed later in this chapter. What is discussed here are the potential impacts. (FNT)
E-5-255	A	16	35	16	50	Again, the meaning of variability in this context needs to be clearly stated. Here it seems to be refering to inter-annual differences in weather that go to make up the climate. This concept should be clearly defined early in the chapter (Nicholas Holden, University College Dublin)	Edited for clarity. (FNT)
E-5-256	A	16	36	16	41	Good point, but has this new result been incorporated in studies mentioned previously? So doesn't that lead to some uncertainty? (John Reilly, Massachusetts Institute of Technology)	New text doesn’t have this problem. (FNT)
E-5-257	A	16	37	16	39	The issue of temperature thresholds is an important one. However, it is mentioned in a number of places (see refs to Porter and Semenov, 2005). There is the potential for shortening/consolidation. (Andrew Challinor, University of Reading)	5.4.1 and 5.4.2 deal with this issue from two different angles: plant process and impact. (FNT)
E-5-258	A	16	52	17	12	Of the references provided in this section, we were able to access Doll (2002) and Arnell (2004), but our reading of both lead us to believe that they did not consider the effect of higher CO2 in boosting higher water use efficiency. We were unable to access Fischer et al. (2006), while no citiation was provided for Abou-Hadid et al. (2003) and Tao et al. (2003) apparently estimated a decline in irrigation requirements. Therefore, the text should be more explicit about what each of the studies considered (or didn't) in its analysis, and ethe haeding to this subsection (on line 52, page 16) should be modified as follows: "Although the impacts of climate	Good point. Included reference to effects of CO2. However, the studies here show only increases in water use, not decreases. It is debatable whether leaf-level effects of co2 on water use can translate all the way to crop fields. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						change on irrigation requirements could be large, whether these requirements will go up or down by the last quarter of this century is uncertain.". (Indur Goklany, US Department of the Interior)	
E-5-259	A	17	4	17	6	please clarify closey temperature change range with year 2070 and 2080,consist with writing style of the whole chapter (Hui JU, Chinese Academy of Agricultural Science)	OK. Note new revised version (FNT)
E-5-260	A	17	4	17	7	It is not clear how we can have "longer growing seasons under future warmer climates". This is possible for crops with indeterminate growth cycle (e.g. forage and some vegetable crops). However, the majority of agric. crops have determinate growth cycle, so increasing temperatures reduce the length of the growth cycle". Thus, I guess that this point should be clarified. (Marco Bindi, Dept. of Agronomy and Land Management)	Growing season refers to the window of time when crops can grow. Thus climate change will extend growing seasons. Growing period is a crop life cycle, and that will be shortened by higher temperatures. Yet one can grow more than one crop over a longer growing season, or a crop that tales longer to mature, thus the higher water use. (FNT)
E-5-261	A	17	14	17	18	Should indicate CO2 elevated could indirectly flourish pest and disease,or it is diffcult to link Co2 elevated with pest and disease straightly. (Hui JU, Chinese Academy of Agricultural Science)	Slightly edited for clarity. (FNT)
E-5-262	A	17	14	17	18	Redundant: repeats 2nd sentence in 5.4.1.4. (Richard Fleming, Great Lakes Forest Research Centre)	Agreed, eliminated (FNT)
E-5-263	A	17	15	17	15	Add a comma after weeds (Marco Bindi, Dept. of Agronomy and Land Management)	OK (FNT)
E-5-264	A	17	20	17	34	It is not clear if this is with temperature effects included or not. (Robin Matthews, Macaulay Institute)	Subsection removed. (FNT)
E-5-265	A	17	20	17	25	Add the following new material after the period (full stop) on line 25: "Much of analysis of the the impacts of various stabilization scenarios in Parry et al. (2005) is based on Arnell et al. (2002) and Parry et al. (1999). These studies show that in the 2080s unmitigated climate change would decrease global food production by ~2% (see Goklany 2003a, 2005a). This suggests that while while climate change would add to global hunger, it's impact on global food production (at least through the 2080s) is small compared to other-non-climate-change related factors. It also indicates that in the short-to-medium term, an adaptation approach that would specifically reduce current vulnerabilities to hunger (due to climate and climate variability) has a greater potential for reducing hunger than any stabilization scheme. It is also likely to be more cost-effective for the foreseeable future (i.e., through the 2080s). This, of course, does not mean that in the long term, mitigation would not be helpful, but only that its benefits (with respect to reducing hunger) will be slow in coming (Goklany 2003a, 2005a)."	One should then explain why climate change reduces food produciton by very little but hunger more substantially, given that non effect of climate variability with or without cc is included in those simulaitons. This is a very interesting point but is beyond the scope of this specific discussion. No one is implyin gthat the scope of mitigation is to reduce hunger; we are simply stating what scenarios with stabilization found. Have edited text for clarity. In fact, these are in part the conclusions of fischer and tubiello 2006. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Indur Goklany, US Department of the Interior)	
E-5-266	A	17	24			pm -> ppm (Jüri Kadaja, Estonian Research Institute of Agriculture)	OK (FNT)
E-5-267	A	17	27	17	34	The statement made here is contrary to the statements written in previous pages. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Yes. This is the temporal dynamicd. Previous stateent referred to long-term effects. Edited text for clarity (FNT)
E-5-268	A	17	29	17	31	Sentence not clear. What is 'the same degree of climate change'? What metric is used? (Andrew Challinor, University of Reading)	Changed “degree” with “magnitude.” (FNT)
E-5-269	A	17	32			Missing word (Paula Harrison, University of Oxford)	OK. Does not apply in revised text. (FNT)
E-5-270	A	17	32			Insert 'time'. (Jean Palutikof, Met Office)	OK. Does not apply in revised text. (FNT)
E-5-271	A	17	36	17	41	Which approach is more realistic? (Robin Matthews, Macaulay Institute)	“additional simulations are needed” means we do not know yet. (FNT)
E-5-272	A	17	36	17	41	I don't think that Carbone et al. used fine vs coarse scenarios. One study that did is Mearns, L. O., W. Easterling, C. Hays, and D. Marx (2001). Comparison of agricultural impacts of climate change calculated from the high and low resolution climate change scenarios: Part I. the uncertainty due to spatial scale. Clim. Change 51, 131-172. This may have been cited in the TAR, however. (Andrew Challinor, University of Reading)	Correct. Reference removed. In fact, entire subseciton removed. These studies were published in TAR or are based on that material. Not a confirmation with new research. (FNT)
E-5-273	A	17	41			Simulations have been done in various more recent projects but the results are still in the grey literature (reports) which will appear in due course. (Goetz Michael Richter, Rothamsted Research)	OK. (FNT)
E-5-274	A	17	43	17	50	Can trade in fact, under certain circumstances, not contribute to vulnerability? Isn't there a substantial literature on this? (Emma Archer, University of the Witwatersrand)	Yes, but we are not dealing with effects of trade on vulnerability per se; this subsection merely aregues that including (already existing) trade effects in simulations, results in lower climate change impacts, with respect to simulations that had not included them. We are not saying that more trade with respect to the baseline socio-economic scenario would be positive or negative. Title was slightly edited for more clarity. (FNT)
E-5-275	A	17	47			change "and" to "with" (Danny Harvey, Dept of Geography, University of Toronto)	OK

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-276	A	18	4	19	34	Assertion about ability to graph may be true but if so this "meta analysis" needs to be seriously documented, published, and evaluated. This is going way too far in terms of new analysis for the IPCC. As noted previously, this undermines the "meta analysis" wrt to CO2 fertilization effects that has been carefully carried out and published. This section MUST be removed. It is scientifically outrageous to publish these figures without even letting us know what the observations are. Doing this is a good idea and it could be very useful. I suggest whoever put this together to push on and write a fully documented article and publish it to make sure that statistical analysis is valid and well constructed, that data are a good represenation of actual literature. etc. Its just too quick and dirty and not fully documented here to include. (John Reilly, Massachusetts Institute of Technology)	We have toned down the statistical significance of these graphs, and now clearly indicate in the text that we are using them to indicate how results from the recent literature may be summarize to indicate ranges of vulnerability, with and without adaptation. We are also providing a full reference list containing the studies used in the graphs. (FNT)
E-5-277	A	18	4			The figures reported in this sub-section are very interesting, but I guess that a list of the references used to build them should be necessary. (Marco Bindi, Dept. of Agronomy and Land Management)	References included. (FNT)
E-5-278	A	18	4			Section Totally slanted to Ag & consequently the analysis is niave. In forestry the effects will be much more complex in many situations. Harvest may not occur for 60-100 years so the transient effects of changing climate become important. The simple 'equilibrium' analysis suitable for most Ag is not appropriate for many forestry situations. (Richard Fleming, Great Lakes Forest Research Centre)	Modified the title to specify this is an analysis fo crop yeilds only. Similar data does not exist to build similar information for trees. (FNT)
E-5-279	A	18	6	18	16	This passage is without reference to the individual studies summarised in Figure 5. These must be included unless a reference is given for the review of all the articles included in the evaluation of Figure 5. The reference to our paper on winter wheat in England and Wales: Richter, G.M. and Semenov, M.A., 2005. Modelling impacts of climate change on wheat yields in England and Wales: assessing.drought risks. Agricultural Systems, 84(1): 77-97. (Goetz Michael Richter, Rothamsted Research)	References included. (FNT)
E-5-280	A	18	6	18	16	Comments on Sec. 5.4.2.2 and Fig. 5.2 -- see comment 3. Also, it's not clear whether the adaptations iconsidered the development of cultivars/crops that might be more temperature tolerant in a higher CO2 world. (Indur Goklany, US Department of the Interior)	Figure caption is more clear in revised version. (FNT)
E-5-281	A	18	7	18	7	graph' is a noun and not a verb - use 'to illustrate' instead. (John Porter, The Royal Veterinary and Agricultural University)	OK (FNT)
E-5-282	A	18	16	18	16	This sentence may be misleading. I suggest changing "to all crops" to "to all cereal crops". (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	OK (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-283	A	18	18			There are some problems with the numbered points in this section ("Finally, …" followed by "Firstly, …" etc) (Philip Thornton, ILRI)	Fixed (FNT)
E-5-284	A	18	18			Section 5.4.2.3: This is one of the key sections in the chapter but is confused. The section is organised as 'first', then 'second', then 'finally' and then back to 'firstly' etc. Structure needs sorting out. The essential point is that we are able to predict crop productivity per unit area but not crop production per region or country - although Fischer hs tried to do this and you cite his work. Again Figure 5.2 is left a bit 'hanging' for the reader to interpet the results and although you mention CO2 effects in the section you do not include them in the figures, although i would have thought there were sufficient data to be able to include the CO2 as well as the T effect. Is yield 'total production' or just the 'seed yield'? where do the data for Figure 5.2 come from - these sources should be cited in the legend. (John Porter, The Royal Veterinary and Agricultural University)	Ok! First, section 5.4.2.3 was edited fo rstructure and improved clarity. Second, figure 5.2uses temperature as a prioxy for the larger dimensinos of climate change, includin geffects of co2, as it is now better discussed in the text. Third, references for the figures have now been included. Finally, yield is understood by most as seed yield, i.e., quantity per unit area. (FNT)
E-5-285	A	18	18			As general comment on sub-section 5.4.2.3. I guess that concerning "ongoing uncertainties" other tasks should be considered: a) experimentation that take into account the interaction among CO2, temperature and precipitation changes and not only singular effects; b) use common ensemble climate forecast system to deliver future impacts in terms of "probability risk". (Marco Bindi, Dept. of Agronomy and Land Management)	a) included; b) not really a generic research need.
E-5-286	A	18	23	18	23	Brassica (Uprety et al 2002 to 2006) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	OK (FNT)
E-5-287	A	18	25	18	25	Scherm not in refs? (Richard Fleming, Great Lakes Forest Research Centre)	
E-5-288	A	18	29	18	37	I have any comments related with two affirmations - Firstly, calls by the TAR to enhance crop model inter-comparison studies have remained unheeded. Secondly: b) effectively represents field-scale responses - especially when simulations of several key limiting factors such as soil and water quality, pest weeds and disease, and the like, remain eitherunresolved or untested. These aspects that aren´t solved since TAR are very important and would be more remarked. Both are very important in order to define the adaptation measures and their implementation in the time, joint with studies of interrelationship economic.trade-technologies used in the models. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Every concept written in these sections is important. There is not much spare to expand. It is hoped that groupig these point under a “research tasks” heading would make them stand out to readers. (FNT)
E-5-289	A	18	33	18	37	Good point! (Richard Fleming, Great Lakes Forest Research Centre)	Thanks. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-290	A	18	34	18	40	Greater collaboration between experimenters and modellers must be emphasised. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Included. (FNT)
E-5-291	A	18	41	19	33	The six graphs shown for maize, wheat and Rice are good aggregation of the results of the studies. These impact studies usually based on crop modeling use specific details about the irrigation quantity as well as frequency. It is not difficult for experienced modeler to manipulate these two to show significant impact of climate change on crop yield. It is unclear to me that how can we easily aggregate the results of these studies (more probably using different settings of production inputs)? I think we need to be careful on this aspect and if possible can very briefly mention the standard settings used for aggregate response model and baseline settings. (Muhammad Mudasser, Global Change Impact Studies Centre (GCISC))	New expanded text clarifies stranghts and limitations of these summaries. (FNT)
E-5-292	A	18	42	19		figure 5.2 a-f ,please indicate the literature source? Use same method or variouse? (Hui JU, Chinese Academy of Agricultural Science)	OK (FNT)
E-5-293	A	18	42			Figure 5.2a-f. Key to the reader's interpretation of this reanalysis is whether or not the slope of the fitted relationships are significant. I doubt that they are, given the variability in the observations in (a), (d) at least. If these trends cannot be detected against the variability of these data for some crops, then this should be stated. The use of different scales on the y-axis of each pair of graphs (a vs b), (c vs d), (e vs f) makes a visual comparison of each crop grown in temperature compared with tropical regions misleading. Some comment on what adaptation measures were included in the blue lines (or reference to elsewhere for this information) would be useful. (Tim Wheeler, University of Reading)	Ok for statement on significance, now fised. (FNT) Added comments on adaptations used. (FNT)
E-5-294	A	18		19		Figure 5.2. (i) How statistically significant are the polynomial fits? Some of them look considerably less than significant. Also, are the with/without adaptation results statistically significantly different from each other? This is not difficult to test. (ii) Given the importance of rainfall and CO2, as recognised in the figure caption, it would be sensible to plot the yields against CO2 levels as well as against temperature. (iii) It would be good to be able to see which studies predict which impacts. Given space constraints, perhaps this should be done by grouping: -20 to 0, 0 to 20, etc. (Andrew Challinor, University of Reading)	We now clarify sigificance in the text (see above comments). As for plotting additional variables, co2 is virtually equilvalent to temperature as a proxy for time in coming decades; we have included points to show efects of precipitation within these studies. Given the space constraints we have, this is as much as can be put in the graphs and associated legend to maintain clarity. (FNT)
E-5-295	A	19	3	19	23	In Figure 5.2, turn the vertical-axis labels the other way round (Danny Harvey, Dept of Geography, University of Toronto)	Fixed. (FNT)
E-5-296	A	19	4		23	Nice graphs. Would like to see more analysis like this done elsewhere in the chapter.	Thanks. (FNT)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Cynthia Rosenzweig, Goddard Institute for Space Studies)	
E-5-297	A	19	6	19	16	there is a lack of supported literatures. Suggest add some literatures to elucidate the research conclusions of fig 5.2a-f, especially aim at the word of "local". (Fang Sun, Institute Environment and Sustainable Development in Agriculture)	Included. (FNT)
E-5-298	A	19	26	19	26	Suggest: ordinate of each figure (a-f) should be tending to same scale. Likely, +40% and –60% for figure a and b; +40% and –40% for c and d, +45% -60% for e and f. thus, all of the figures have a good visual comparison. (Liyong Xie, Chinese Academy of Agricultural Sciences)	Done. (FNT)
E-5-299	A	19	26			Figure 5.2: Not clear if these graphs are real or simulated data - clarify. (Robin Matthews, Macaulay Institute)	Done. (FNT)
E-5-300	A	19	47	19	49	Not clear (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-301	A	20	4			It has long been known that community structure changes with climate. (Richard Fleming, Great Lakes Forest Research Centre)	Clarify, includes CO2 effects. (FNT)
E-5-302	A	20	8	20	12	Were all of these effects independent of each other, or combined? (Robin Matthews, Macaulay Institute)	
E-5-303	A	20	8	20	12	Not clear (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-304	A	20	10	20	12	Add a reference to this sentence. (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-305	A	20	15	20	15	The citation Ross et al. is incomplete (the year is missing) (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-306	A	20	19	20	24	Sentences need to be reconstructed (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-307	A	20	24			Need to say something about a move northwards of grasslands? (Robin Matthews, Macaulay Institute)	Check (FNT)
E-5-308	A	21	9			Need to say something about increased temperature effects on animal productivity in temperate areas? (Robin Matthews, Macaulay Institute)	Yes should be below. JFS
E-5-309	A	21	11			Variability as before (Nicholas Holden, University College Dublin)	Not sure what is meant here.
E-5-310	A	21	25	21	25	Table 5.2 is much too complex, and what ever message should be conveyed is lost in detail. It not clear to me what is meant by scenario: in some cases it refers to an emission scenario, in other cases to experiments (I take it that EXP mean experiment), but reference is also may to HadCM3, which is a GCM. I suggest summarising the results even more. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Revise and summarizae table. JFS

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-311	A	21	25			Table 5.2: HadCM2 or HadCM3 in the Frank and Dugas, 2001 reference? (Paula Harrison, University of Oxford)	
E-5-312	A	21				Table 5.2: Turpenny et al (2001) is not in reference list (Jean Palutikof, Met Office)	
E-5-313	A	22	3	22	3	"Incremental" generally refers to a little bit of change from some point (e.g. where we are now). Is this what is meant here? Or do you mean "gradual?" Is 2 degrees incremental? I guess I think .2 -.3 is incremental. How is this section different than earlier sections--Can't it be included with them? (John Reilly, Massachusetts Institute of Technology)	
E-5-314	A	22	3			The Heading of 5.4.3.2 " Impacts of …change" may be modified to "Impacts of…change and rainfall variability". (Futang Wang, Chinese Academy of Meteorological Sciences)	
E-5-315	A	22	18	22	20	Generalised statedment nothing new. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-316	A	22	23	22	36	I was surprised to see grape impacts under this heading, and thought at first coconut palm was because of biodiesel--but I guess you are claiming that wine and vegetable oil are industrial crops? Why not sugar cane? What makes a crop "industrial" ? Okay cotton is not edible, but that seems not to be the distinction? At least you need to give us a heads up definition to open this section on what is included in industrial--I guess tobacco and rubber. What about canola? -other oil seeds--soybean? I'd suggest you just move these crops back to crop agriculture. (Most of US crops are "industrialized" if by that you mean highly commercialized. (John Reilly, Massachusetts Institute of Technology)	Industrial crops dsefined as per FAO definition is now included. Aggarwal
E-5-317	A	22	23	23	2	Shouldn't there be a link to the chapter that covers adaptation/mitigation overlaps here? (Emma Archer, University of the Witwatersrand)	We have avoided all discussion on mitigation considering that this is the focus ofWGHI report. Aggarwal
E-5-318	A	22	23			The section 5.4.4 should be revised substantially. First of all, it is necessary to define which crops are considered as "industrial crops". For example, potato may be considered among these. In this case, there is a complete special issue of the CHIP project in the European Journal for Agronomy that was dedicated to the impact of climate change on potato (number 17, 2002). Moreover, as regard of grapevine, there some interesting works made by Gregory Jones see his web site http://www.sou.edu/geography/jones/cv.htm), the paper here reported is very old and was already mentioned in the TAR. Finally, concerning biofuel crops there is a work made within the ATEAM project (http://www.pik-potsdam.de/ateam/) and published on Science (Schröter et al., Science, 310, 1333 -1337). Some of these comments have been already made for the FOD (see comment 5-606), but the	Industrial crops defined as per FAO. Aggarwal

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						authors replied that these issues require more space than that is available, e.g. grapevine. I guess that in some cases the space available could be better used, reducing general or well known aspects and giving more emphasis on referenced results (e.g. on crops like grapevine) (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-319	A	22	49	22	51	we still can get some benefit by industrial crops from climate change,but this part not involves in the table5.6 (Hui JU, Chinese Academy of Agricultural Science)	Summary included in Table 5.5. Aggarwal
E-5-320	A	22	49	22	50	Reference to Richter et al (2006) is not included: Reference: Richter, G.M., Qi, A., Semenov, M.A. and Jaggard, K.W., 2006. Modelling the variability of UK sugar beet yields under climate change and husbandry adaptations. Soil Use and Management, 22(1): 39-47. (Goetz Michael Richter, Rothamsted Research)	Reference included. Aggarwal
E-5-321	A	22	50	23	2	The non scientific statement. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Do not agree with the comment. Aggarwal
E-5-322	A	23	0			On this page it is not clear (5.4.5.1) why you first talk about timber, then non timber, then tree growth. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	
E-5-323	A	23	7	23	7	Need to make clear that 4B refers to 4 billion. (Robin Matthews, Macaulay Institute)	
E-5-324	A	23	17	23	32	This paragraph presents a very optimistic picture of the impact of climatic change on forestry, and is at variance with a number of other studies (mostly from the carbon cycle and ecological literature, rather than than the commericalforestry literature), which suggest significant forest dieback during the transition to a warmer climate, due to rates of climatic change that are too rapid. In some regions, the nature of the climatic change is highly unfavourable (so rates of change are irrelevant). For example, some studies have much of the present Canadian boreal forest becoming more suitable for grassland [GIVE REFERENCES], while simulations by Cox et al (2000, 2004) show the Amazon rainforest becoming more suitable for grassland. Apart from being highly optimistic, this paragraph is vague. For example, nowhere is the magnitude of the change in climate associated with the positive results given. Are we talking about small changes, or large changes? And over how long a time period? Are impacts on pests and the indicidence of forest fires, and the interactions between these two accounted for? I doubt it. Mention should also be made of the greater susceptibility to warming and drought of disturbed tropical forests (Laurance and Williamson, 2001), which directly involves commercial tropical forestry both in its role as a cause of and as an impacted sector.	This paragraph presents a very optimistic picture of the impact of climatic change on forestry, and is at variance with a number of other studies (mostly from the carbon cycle and ecological literature, rather than the commercial forestry literature), which sugest significant forest dieback during the transition to a warmer climate, due to rates of climatic change that are too rapid. In some regions, the nature of the climatic change is highly unfavourable (so rates of change are irrelevant). For example, some studies have much of the present Canadian boreal forest becoming more suitable for grassland [GIVE REFAERENCES], while simulations by Cox et al. (2000, 2004) show the Amazon rainforest becoming more suitable for

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						REFERENCES: Laurance and Williamson, 2001. Conservation Biology 15, 1529-1535; Cox, P.M., Betts, R.A., Jones, C.D., Spall, S.A. and Totterdell, I.J.: 2000, 'Acceleration of global warming due to carbon-cycle feedbacks in a coupled climate model', Nature 408, 184-187. Cox, P.M., Betts, R.A., Collins, M., Harris, P.P., Huntingford, C. and Jones, C.D.: 2004, 'Amazonian forest dieback under climate-carbon cycle projections for the 21st century', Theor. Appl.Climat. 78, 137-156. (Danny Harvey, Dept of Geography, University of Toronto)	grasslanad. We modified the paragaraph to amplify the message. However, we disagree that we present an over-optimistic view at climate change impact on forestry globally, on the contrary we attempted to present a balanced view. Other comments complaining that we present an over-pessimistic view (esp. from the governments of Finland and France), which are also supported by references, demonstrate that probably we have achieved this balance. Cox et al. reference is included into the subchapter. However their results for Amazonia were obtained using rather crude simulation model under a very extreme impact scenario (temperature +O10K, precipitations -60%). Other GCM runs return lesser or none impact in the area. Laurance anad Williamson, 2001 on Amazon droughts was already included into the subchapter – see 5.4.5.3. Apart from being highly optimistic, this paragraph is vague. For example, nowhere is the magnitude of the change in climate associated with the positive results given. Are we talking about small changes, or large changes? And over how long a time period? Are impacts on pests and the incidence of forest fires, aand the interactions between these two accounted for? I doubt it. Both the magnitude of climate change and time frame in the models are given in the table 5.3; space constraints would not permit duplication of these data in the test. Neither

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
							fire incidents nor insects are adequately covered in the existing forestry model, which is repeatedly mentioned through the test as a significant drawback. E.g., at the beginning of the next paragraph you could read: "In spite of gains in forest modelling noted above, model limitations persist. Most of the major models don't include key ecological processes." There are projections on significaant expansion of forest wildfires, esp. in Canada and Russia (the author of this section could cite his own results on the latter), forest insects, paathogens, etc. However, there definitely is a large mitigation capacity and until these results are incorporated into forestry models it is unclear how they will modify the outcomes. Kirilenko
E-5-325	A	23	30	15	32	This sentence implies that there are indeed significant negative impacts, but they don't matter to commercial forestry because there is such a large forest area that the industry can compensate. If this is the argument, it is not credible. (Danny Harvey, Dept of Geography, University of Toronto)	Check Shugart 2003 Rejected. Let me cite the sentence in question. Shugart et al., 2003 concluded that the United States timber markets have low susceptibility to climate change, because of the large stock of existing forests, technological change in the timber industry, and the ability to adapt. I see nothing in this sentence that allows the suggested interpretation: it says nothing on the size/direction of the impact and suggests an adaptation through management/technology change. Shugart et al., argument was that the U.S. consumes less timber than grows, which provides a cushion for short-term impact and a possibility to adapt for long-term impacts through substitution of a particular species and afforestation. There are other views on the subject, also presented in the paper. Kirilenko
E-5-	A	23	34	23	41	The importance of NFTPs to sustainable livelihoods should be mentioned here.	This subchapter is on post-TAR knowledge,

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
326						(Emma Archer, University of the Witwatersrand)	and I am not aware of any new knowledge on NFTPs. The information on NFTP is included into 5.4.5.3. Kirilenko
E-5-327	A	23	43	23	50	Further work showing likely overestimation of CO2 fertilization in Nature or Science? (Danny Harvey, Dept of Geography, University of Toronto)	Not that I am aware of for trees, but there was a recent publication by Long et al in Science on 50% lower than expected crop yield increase in FACE experiments. There were also a few publications on combined CO2 + O3 effect for trees. (AK) There is a recent web-FACE ppublication, which we did not include as it comes from the same group with similar results reported (growth and phenology of mature temperate forest trees in elevated CO2 AU: Asshoff-R; Zotz-G; Korner-C SO: GLOBAL-CHANGE-BIOLOGY. MAY 2006; 12(5)848-861 PY: 2006 IS:1354-1013). Therae is also a recent publication by Long et al., in Science on 50% lower than expected crop yield increase in FACE experiments (reported in Agriculture block). There were also a few publications on combined CO2 + O3 effect for trees and on nitrogen limitations – e.g., Hajima et al., 2005 reported on possible overestimate of simulated NPP increase due to nitrogen limitations. Kirilenko
E-5-328	A	23	44	23	44	(Remove) "to" in -(to towards) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Corrected. Kirilenko
E-5-329	A	23	47	23	47	after four years of exposure to 530 ppm CO2 level. (Corrected sentence) (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Corrected. Kirilenko
E-5-330	A	23	49	23	50	These model assumptions must have been based on some experimwntal evidence. It is not good enough to say that models just presume large fertilisation effects as though they were figures out of thin air. Were they controlled envt data, for example? (Robin Matthews, Macaulay Institute)	Rejected. We don't have space to discuss data consisderations in the forestry models. We include the reference to FACE results instead. Kirilenko
E-5-331	A	23	51			I tried to check the Boisvenue and Runnning paper, but the reference given for it is incorrect.	The page in the reference was incorrect. The correct reference: Global Change Biology,

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Danny Harvey, Dept of Geography, University of Toronto)	20065, 12(5):862-882. Kirilenko
E-5-332	A	24	0			How is this table organized? (Cynthia Rosenzweig, Goddard Institute for Space Studies)	Poorly. The table is re-organized to include the study/coverage, scenario, production impact, and economy impact. Kirilenko
E-5-333	A	24	3	24	4	Autors admit that most of the model don't include key ecological processes thus their validation become questionable. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	The comment is misplaced. It should be sent to the authors of the models and/or to the editors of the journals the models are published. We are unaware of the details of validation. We are also unaware of any model that would include all "key ecological processes." Kirilenko
E-5-334	A	24	8	24	10	What is the key difference between these two types of models? (Robin Matthews, Macaulay Institute)	There is some confusion. We discussed only one type of model here, namely DGVM. Kirilenko
E-5-335	A	24	8	24	8	This sentence acknowledges the point that I made with regard to pg 5, lines 17-23, about there being two different worlds (ecologists and foresters) who don't seem to talk to each other very much. The point raised here is a very importanbt one, and should not be glossed over so quickly! The reasons for the differences, and possible implications for the optimistic prognosis presented here, need to be thoroughly discussed. This is a crucial issue! (Danny Harvey, Dept of Geography, University of Toronto)	There is no comment to pg. 5/17-23, but we absolutely agree to the reviewer. Since our attempt to show this disagreement does not seem to work extremely well, we modified the paragraph. However note that some of the reviewer commented on over-pessimistic message, which demonstrates that we probably reached a balanced view. The same problem exists also in agriculture: a professional in GM crops will probably tell you right away that in changed climate (s)he will need just 5-10 years to come with a new crop variety; yet I know of only one model that somehow accounts for that. (AK)
E-5-336	A	24	15	25	1	There is all to much information and detail in Table 5.3. I suggest trying to simplify this table based on scenarios, temperature change and region. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	The table is re-organized. Kirilenko
E-5-337	A	24	15			Table 5.3: item 1, col.3, row 8: the means of " 5 per m3 " is not clear, what is the unit of " 5"? Dollars or percents? (Futang Wang, Chinese Academy of Meteorological Sciences)	Obsolete. Used to be $. Kirilenko
E-5-	A	24	15			Remove Table 5.3. Given all the uncertainties & omissions of the models listed in	Rejected. Similar argument can be made on

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
338						this table (explained throughout 5.4.5), it's hard to see why anyone would take the predictions of these models seriously. (Richard Fleming, Great Lakes Forest Research Centre)	any model ever developed. Let me remind that the chapter presents the cimp0ilation of the current knowledge on climate change impact on FFF; obviously even the latest model results include a number of uncertainties are listed elsewhere in the chapter. Kirilenko
E-5-339	A	24	15			For each study listed in Table 5.3, indicate in column 2 what the assumed stimulation of NPP by 2 x CO2 is, and add a statement in the caption to the table that "Recent studies (summarized in the main text) suggest that the stimulation of NPP by higher CO2 is less than assumed in the studies reported here". (Danny Harvey, Dept of Geography, University of Toronto)	The studies are based on different scenarios, which cannot be compared easily. We re-organized the table to make the structure more transparent. The susggested message is also rejected as it is already included into the main test; given acute space restrictions we can't afford duplication. Kirilenko
E-5-340	A	25	3			Additional information on fire, insect and extreme event on forest can be find in the special issue of the MICE project just published on Climate Research Journal (http://www.int-res.com/abstracts/cr/v31/n1/) (Marco Bindi, Dept. of Agronomy and Land Management)	Reference to Schlyter et al., 2006 included. Kirilenko
E-5-341	A	25	7			Missing year in Mouillot and Field reference (Paula Harrison, University of Oxford)	Corrected. Kirilenko
E-5-342	A	25	10			Most of the information reported in this section are not supported by references (from line 12 to line 18). Please add references. (Marco Bindi, Dept. of Agronomy and Land Management)	I suspect that this comment is misplaced as the only sentence within these lines without the reference is "climate change will interact with fuel type, ignition source, topography, in determining future damage risks to the forest inductry, expecially for paper and pulp operations; fire hazards will also pose health threats (Chapter 8.2) and affect landscape recreational value" and the reference for the impact part is provided later in the same paragraph. Kirilenko
E-5-343	A	25	15			Table5.3: HadCM2 not HadMC2 (Paula Harrison, University of Oxford)	Corrected. Kirilenko
E-5-344	A	25	18	25	19	So, the assumption is that these boreal forests would remain unharvested and inaccessible during the entire 21st centruy, and hence that losses due to fire and pests don't matter. In light of growing human population and the long rotation times in the boreal forests that have already been harvested, this is not a realistic assumption. Hence, the conclusion cannot be justified.	One could also argue that the fire suppression service will be established in the previously inaccessible areas should indeed they become populated at some moment in the future, hence reducing fire incidents.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Danny Harvey, Dept of Geography, University of Toronto)	We never stated that fire and insect damage don't matter; contrarily we mentioned that those are two main limitations in the model studies. However, a 100% increase in burnt aarea in Canada as projected by Flannigan 2005 will not necessarily translate into a 100% increase in related losses in forest industry. Kirilenko
E-5-345	A	25	19			See new Paper by Westerling "Increases in Western US Forest Wildfire Associated with Warming and Advances in the Timing of Spring." in August 11 Science (Cynthia Rosenzweig, Goddard Institute for Space Studies)	Included. Kirilenko
E-5-346	A	25	29	25	32	You are talking about extremes in temperate forests. You should also discuss extremes in tropical forests, the big issue being drought associated with El Nino events. Two things might happen in the future: the average climate becomes more El Nino-like, or El Nino variability increases. The massive forest fires in Indonesia in 1998 should be mentioned here, along with the simulation results of Cox et al. (2004). REFERENCE: Cox, P.M., Betts, R.A., Collins, M., Harris, P.P., Huntingford, C. and Jones, C.D.: 2004, 'Amazonian forest dieback under climate-carbon cycle projections for the 21st century', Theor. Appl.Climat. 78, 137-156. (Danny Harvey, Dept of Geography, University of Toronto)	Cox et al., reference is included. Their results however, should not be overestimated. Climate change scenario they used is on an extreme side (temperature +10K, precipitations -60%). Other GCMs return lesser or none impact in the area of research. Kirilenko
E-5-347	A	25	29	25	36	Could give examples of wind storm damage to trees e.g., in France in December 1999, and Scandinavia January 2005. (Jean Palutikof, Met Office)	Sweden example included. Kirilenko
E-5-348	A	25	29	25	33	Almost everything is mentioned here. It would be more informative to focus on key factors. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Different regions will have different key impacts; we don't see it possible to provide just one or two universal factors here. Kirilenko
E-5-349	A	25	33	25	36	Changes in forest composition may differ region wise and the impact of climate change will be specific. This needs to be mentioned. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Corrected. Kirilenko
E-5-350	A	25	33	25	33	"… Fleming ET AL. ….". This paper notes how climate has affected the interaction of insect (spruce budworm) & forest fire disturbances. It may be better placed in the following paragraph? (Richard Fleming, Great Lakes Forest Research Centre)	Corrected. Kirilenko
E-5-	A	25	34	25	36	You make a general, global statement that human intervention can reduce (to some	I don't know how to answer an "I feel it's

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
351						vague, unspecified extent) the extensive dieback of forests that would otherwise occur, but the only reference given to support it pertains to the US. Wheher or not the statement is realistic for the US, I do not think that it is realistic for the vast boreal forests of Canada and Russia, or the Amazon rainforest (which will be gone if the mean climate becomes more El Nino like) or, at the very least, such intervention would be very costly. All of this is glossed over in the existing statement. (Danny Harvey, Dept of Geography, University of Toronto)	wrong" comment. To think over We disagree that we present an over-optimistic view at climate change impact on forestry globally, on the contrary we attempted to present a balanced view. Other comments complaining that we present an over-pessimistic view (esp. from the governments of Finland and France), which are also supported by references, demonstrate that probably we have achieved this balance. (AK) Rejected. The focus of the chapter is forestry, as opposed to Chapter 4, which is concentrated on natural forests. A possibility of 100% increase in forest fire activity does not translate into 100% increase in fire-related loss in forest indusstry, the point that we stress in the sentence in question. Kirilenko
E-5-352	A	26	8	26	8	Can the Blennow & Sallnas model simulate ALL of the effects just mentioned? (Robin Matthews, Macaulay Institute)	Agree. Sentence edited to remove ambiguity. Kirilenko
E-5-353	A	26	12	26	16	I would consider this obvious/self evident. Is it not possible to come up with some more informative evaluations of socioeconomic effects. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Other reviewers differ, asking for references. More details on the impacts are provided in 5.6, and details on vulnerable groups are added here. Kirilenko
E-5-354	A	26	13	26	15	Need a reference for this sentence. (Robin Matthews, Macaulay Institute)	The references to all of the impacts are provided at the end of the paragraph (Davidson et al., Lawrence). More references added. Kirilenko
E-5-355	A	26	16	26	16	"experiences" is to be replaced by "experience" (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Corrected. Kirilenko
E-5-356	A	26	18	26	18	The last part of the line isný clear. I propose Although forest . Based communities in the developing world ..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Corrected. Kirilenko
E-5-	A	26	18	26	18	"developing would" is to be replaced by "developing word"	Corrected. Kirilenko

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
357						(Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-358	A	26	18			world not would (Paula Harrison, University of Oxford)	Corrected. Kirilenko
E-5-359	A	26	25			General comments on the section 5.4.6. I guess that in the report of the project "Vulnerability to abrupt climate change in Europe" there is information that can be included in this section. Reference: Report of the project "Vulnerability to abrupt climate change in Europe", ESRC Environmental and Human Behavoiour Programme, project RES-221-25-0011, Coordinated by Nigel Arnell (Tyndall Centre Technical Report, February 2005). (Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-360	A	26	38			Table 5.4: what is the unit of data listed in Table? Tons or percents? (Futang Wang, Chinese Academy of Meteorological Sciences)	The units are clearly shown on the Table. Brander
E-5-361	A	26	38			Table 5.4: I suggest another column indicating the TOTAL of the other two columns. (Robin Matthews, Macaulay Institute)	OK. Brander
E-5-362	A	27	29			Box 5.3. The example summarised in the box is rather interesting, but the only results reported are related to water resources aspects (water flow, see level rise, etc.). Concerning fisheries and acquaculture there are only speculative hypotheses of the possible impact. I guess that the aim of Boxes is to show in detail the results for specific cases that exemplifying future climate impacts. Thus, in this cases, as well as for Box 5.4, quantitative assessments on fisheries should be reported. (Marco Bindi, Dept. of Agronomy and Land Management)	There is no quantitative assessment of climate impacts on fisheries for the Mekong. Box 5.4 gives a reference for coral reefs (of past, not future impacts). The title of Box 5.3 has been changed to make clearer what the aim of the Box is. Brander
E-5-363	A	28	3	28	5	This is confusing - why would increased sea level rises cause the water contour lines to move closer to the sea? Please reword. (Robin Matthews, Macaulay Institute)	This is a direct quote from the paper. I'll try to check with the authors and suggest an alternative. Brander
E-5-364	A	28	11	29	8	The section of 5.4.6.2 " New information…" may be rewritten by the form of "New knowladge" or "new findings" as in the above other Sections. (Futang Wang, Chinese Academy of Meteorological Sciences)	Done. Brander
E-5-365	A	28	11	29	41	5.4.6.2 has much on current trends, whereas 5.4 is supposed to be about the future. 5.4.6.2 could be shortened - rambles somewhat - and could be structured as the preceding sub-sections in 5.4. This is also true for 5.4.6.3 (can delete page 29 lines 27-31). (Jean Palutikof, Met Office)	New headings make it clear that it includes both. Brander Done. Brander
E-5-366	A	28	25	28	25	Is the place of the reference Curry and Mauritzen, 2005 correct or it should be placed at the end of the sentence ? (Marco Bindi, Dept. of Agronomy and Land Management)	Yes it is correct. Brander
E-5-	A	29	25	29	25	Change 'regimes' to 'regime'	Done. Brander

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
367						(Robin Matthews, Macaulay Institute)	
E-5-368	A	29	35			delete "when variability" (Paula Harrison, University of Oxford)	Brander.
E-5-369	A	29	36			…are reduced ( ). Phenological shifts in planktonic ecosystems (Edwards M & Richardson A. NATURE 430 (7002): 881-884 AUG 19 2004) are likely to influence recruitment of temperate fish that depend on the spring phytoplankton bloom for larvae food (Edwards M. et al. MARINE ECOLOGY-PROGRESS SERIES 239: 1-10 2002; Richardson AJ & Schoeman DS. SCIENCE 305 (5690): 1609-1612 SEP 10 2004; Edwards M. et al, LIMNOLOGY AND OCEANOGRAPHY 51 (2): 820-829 MAR 2006) (Stephen John Hawkins, The Marine Biological Association of the United Kingdom)	This was edited out of the earlier draft. See comment E-5-365 about rambling. Brander
E-5-370	A	29	37			…higher levels by reducing overfishing. (Stephen John Hawkins, The Marine Biological Association of the United Kingdom)	Done. Brander
E-5-371	A	29	42	29	52	I suggest to add in Box 5.4. At temperatures over 30 gradus centigrades it is demonstrated that coral reefs expel the algae that live in simbiosis with it, and then occur their bleaching and death. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Rambling and dealt with in another box on coral. Brander
E-5-372	A	29	43	29	52	Is a box really needed for this short message (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	No, but I was asked to put it there for the cross-cutting theme. Brander
E-5-373	A	29	44			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. (Paul Marshall, Great Barrier Reef Marine Park Authority)	Yes, but therae is no space and it would be rambling. Brander
E-5-374	A	29				Comment: I think more evidence needs to be put in here rather than refeering to Chapter 1. This chapter should stand alone (Stephen John Hawkins, The Marine Biological Association of the United Kingdom)	Jean says less, Stephen says more. Brander.
E-5-375	A	30	3			General comments on section 5.4.7. As in other sections, many of the information reported in this section are not supported by references. It is clear that this is a new topic, so only a few research activities have been carried out, however it is	I am happy to make a last push for more references. Of the bullet points mentioned, the first two seem to be implicit in an

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						necessary to avoid as much as possible speculative interpretations (e.g. generalizations from line 51 at page 30 to line 3 at page 31) (Marco Bindi, Dept. of Agronomy and Land Management)	argument that runs through WG1 findings, through importance of extreme events> The third and fourth are accumulated observations of countless disasters and processes of immiseration. (JM)
E-5-376	A	30	15	30	15	I suggest to add: ....with crises such as drought or floods. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Not accepted because of lack of space and because dorughts involve more specifically *agricultural* coping strategies, as referenced
E-5-377	A	30	17	30	35	These statements are not well supported by literature and no indication is given of the confidence with which they are made (Nicholas Holden, University College Dublin)	The reason for lack of confidence statements is given in lines 8-9 above, and the words "*hard to predeict*" have also been reinstated at the beginning of the paragraph. New references have been added, including the Barnett article, as suggested below. The most important reference remains the cross-reference to earlier sections.
E-5-378	A	30	18	30	25	In first bullet take into account the possible products enhancement for bad harvests, which possibly do that the smallholder couldn´t to pay the prices (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Not clear what this means
E-5-379	A	30	26	30	28	The paper by Barnett et al. (2005) (Nature 438, 303-309) should be cited along with the main points. In particular, 1/6 of the world's population, including 1/4 of China's population, is dependent on glacier meltwater during the dry season, and much of this will be gone within a few decades. (Danny Harvey, Dept of Geography, University of Toronto)	This has now been prominently cited
E-5-380	A	30	29	30	29	effects on soils' such as? (Andrew Challinor, University of Reading)	This was admittedlyy unclear and has now been deleted
E-5-381	A	30	33	30	33	I suggest to add.....: provide labour for agriculture, impacts in animal health, and..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	No, impacts on animal health are one of the *direct* impacts covered by the cross reference to 5.4.3 above
E-5-382	A	30	52	30	52	I suggest to add: increased of diseases and mortality of livestock ..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Accepted
E-5-383	A	31	10	31	28	This message in this figure seems to be that everything is connected. However, this is conveyed in a very complex way, and I am not really sure that this figure actually helps. If possible, I suggest to simplify.	Figure has been deleted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	
E-5-384	A	31	10	31	28	I suggest to add in right column: Effects of climate change on human and animal health,..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Figure has been deleted
E-5-385	A	31	35	31	35	I suggest to add: ....responses to climate change, for example droughts, also needs..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Disagree – we know about crop vulnerability to short-term extremes – need to know more about long term effects
E-5-388	A	31				Figure 5.3 is difficult to read and follow (Nicholas Holden, University College Dublin)	Figure has been deleted
E-5-389	A	31				Figure 5.3 -- I don't think this is a very useful figure -- reality is much more complicated than is shown here (all sorts of landscape-scale interactions, social capital, labour, etc) (Philip Thornton, ILRI)	Figure has been deleted
E-5-376	A	30	15	30	15	I suggest to add: ....with crises such as drought or floods. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Not accepted because of lack of space and because dorughts involve more specifically *agricultural* coping strategies, as referenced
E-5-390	A	32	11	32	29	It would be useful to split the references, and put them at the end of the appropriate bullet points. A reference for the first bullet would be: Challinor, A. J., T . R. Wheeler, P. Q. Craufurd, C. A. T. Ferro and D. B. Stephenson (2006). Adaptation of crops to climate change through genotypic responses to mean and extreme temperatures. Agric. Ecosys. Env. (accepted). A reference for the last bullet would be: Washington, R., M. Harrison, D. Conway, E. Black, A. Challinor, D. Grimes, R. Jones, A. Morse, G. Kay, M. Todd (2006). African climate change: taking the shorter route. Bulletin of the American Meteorological Society. In press. (Andrew Challinor, University of Reading)	
E-5-391	A	32	11	35	18	These parts could be shortened, simplified and induced/concluded as in section 5.6 without the larger texts. (Futang Wang, Chinese Academy of Meteorological Sciences)	Editing done and Planned Adaptation section shortene by 20% - however, there is text for specific sectors (e.g. cropping etc., that differs from other sectors and this information is not covered elsewhere. Howden
E-5-392	A	32	32	32	36	Need to make clear this is a modelling study (Jean Palutikof, Met Office)	Text changed. Howden
E-5-393	A	32	36	32	36	I suggest to reorganise the sentence "We have ……" in "Results from many crop adaptation studies for wheat, rice and maze have been synthesised in Fig. 5.2"	Text change according to suggestion. Howden

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-394	A	32	36	32	36	Add the reference after (0 to +12%; 2002). (Marco Bindi, Dept. of Agronomy and Land Management)	Reference included. Howden
E-5-395	A	32	36			Reference? (Nicholas Holden, University College Dublin)	Reference included. Howden
E-5-396	A	32	36			Is there an author missing here? (Paula Harrison, University of Oxford)	Reference included. Howden
E-5-397	A	32	42	37	42	We have probably missed a paragraph on "Access to food". As the present world food production can meet the food demand yet the main cause of food insecurity is the poor access to food or problematic distribution. Hope literature on food (in)security and poverty would be helpful in this matter. (Muhammad Mudasser, Global Change Impact Studies Centre (GCISC))	Needs to be dealt with in a different section of this chapter (i.e. 5.6) Howden
E-5-398	A	32	42			either before or after the reference (depending on what the reference itself says or does not say), add "while potential negative impacts increase" (Danny Harvey, Dept of Geography, University of Toronto)	Text change according to suggestion. Howden
E-5-399	A	32	46	32	46	"given" is to be deleted (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Text change according to suggestion. Howden
E-5-400	A	32	49			variability? (Nicholas Holden, University College Dublin)	Text changed to ‘extremes’. Howden
E-5-401	A	33	1			(1) Start this line with the following: "However, adaptive capacity should increase in the future if populations become weallthier and more technologically advanced as assumed under the various SRES scenarios which should mean that they would have access to -- and be better able to afford and implement -- a wider range of adaptation options than noted above (Goklany 2005c, 2006a). Moreover, such advances should also boost access to human and social capital." (2) Replace "caveats" with "considerations" on line 1. (Indur Goklany, US Department of the Interior)	This point is made later in the section. Howden
E-5-402	A	33	6	33	6	Correct in the sentence " the use of of adapted" (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Corrected. Howden
E-5-403	A	33	7			Holden instread of Hodden? (and in references) (Nicholas Holden, University College Dublin)	Reference changed. Howden
E-5-404	A	33	8			Missing year in Balgis reference (Paula Harrison, University of Oxford)	Reference still to be found. Howden
E-5-405	A	33	13	33	13	I suggest to add: .....increased mortality, and water shortages(gaughan et al., 2002) (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Text change according to suggestion. Howden
E-5-	A	33	15	33	32	I suggest to include: integrated management of pests	There is mention of insect issues. Howden

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
406						(Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-407	A	33	15	33	15	Delete comma after strategies (Robin Matthews, Macaulay Institute)	Done. Howden
E-5-408	A	33	18	33	19	Because fire & insect outbreaks are contagious disturbances, their impact often increases with connectivity. (Richard Fleming, Great Lakes Forest Research Centre)	Text deleted. Howden
E-5-409	A	33	35	33	35	shifted. Their distribution (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Text not changed as it would be coherent.
E-5-410	A	33	40	33	41	What is meant by 'non exclusive access to shared resource' in this context? (Jean Palutikof, Met Office)	Text clarified. Howden
E-5-411	A	33	44	33	44	therefore, (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Text reviewed. Howden
E-5-412	A	33	46	33	46	population, age, structure and (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Hypen added. Howden
E-5-413	A	34	1	34	4	References needed for this statement. (Robin Matthews, Macaulay Institute)	Need a reference from Keith Brander. Howden
E-5-414	A	34	4	34	4	Add a reference at the end of the sentence. (Marco Bindi, Dept. of Agronomy and Land Management)	Need a reference from Keith Brander. Howden
E-5-415	A	34	7	35	18	Section on Planned Adaptation is too general for Chapter 5 and overlapping with Chapter 17. Authors need to condense and focus more on FFF issues. (Jean Palutikof, Met Office)	Section reduced by 20% and has more agricultural examples provided. However, inspection of chapter 17 sugggests that they have not covered this material – and where they have they have not done it in the same structured way. Howden
E-5-416	A	34	7			General comments on section 5.5.2. First of all, I guess that it is necessary to codify the use of the some terms through the whole report. In this case, I refer to the use of "planned adaptations" that in other chapter are called in a different way (e.g. long-term adaptations). Moreover, even if the information reported in this section are very interesting, I guess that some space should be saved reporting this in a more concise way (Marco Bindi, Dept. of Agronomy and Land Management)	The tems 'Autonomous' and 'Planned' have been defined in the glossary. We use the in this Chapter in accord with those definitions. Section shortened. Howden
E-5-417	A	34	10	34		And referring to opening section on adaptation. The conceptual distinction between autonomous and planned adapation is fairly confused. This section tells us that what it means by "planned" is "policy-based." Individual farmers can obviously "plan" even as policy makers can plan--and policy will autonomously adjust (perhaps ill-adjust) as climate changes unaware that climate is driving this	The tems 'Autonomous' and 'Planned' have been defined in the glossary. We use the in this Chapter in accord with those definitions and in concert with at last several other chapters. Whilst there is considerable merit in

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						adjustment--ever increasing disaster payments or subsidized crop insurance because of increasing losses. This might be compared with policy that was planned recognizing explicitly that climate was changing, and observing the change would raise insurance rates or reduce disaster payments--or make them conditional on farmer not continuing to grow the same crops the same way that were no subject to a disaster every year. A well-thought out distinction here is planned versus unplanned--responses that happen after the fact, or keyed to direct observables rather than forecast ahead in a forward-thinking fashion based on an explicit projection of how climate was chaning and how that would affect decisions. Both planned and autonomous adaptation can occur at the farmer/industrial concern level and at a planning agency (local, state/provincial, national, international) level. Whether autonomous or planned then depends on one's perspective--if worrying about what will happen to national agriculture is your job then you can take as given that farmers will react to climate change (autonomously and in anticipation). I guess that is the perspective here--that all farm level adaptation is autonomous and all that needs to be planned is governmental response. However, those involved in helping farmers plan ahead for climate change see their clients as the farmers themselves and good forethought (i.e. planning) might help them make better decisions, and so from that perspective not useful to lump all farmer adaptation as "autonomous." I suggest you break this down into farm (and firm)-level adaptation and "adaptation policy" rather than autonomous and planned. Then you can intelligently discuss issues of autonomous and planned adaptation at both levels. Having been a contributor to this discussion myself, I think that overemphasis of the autonomous and planned distinction has really led to confusion--whereas what has really driven differences in how to think about adaptation is whether you are thinking about telling a farmer what the best strategy is for him(her) or whether you are designing policies that support/encourage adaptation. The autonomous/planned debate comes from the impact assessment work which sometimes estimated national/global impacts as if farmers would not react at all--which was clearly a stupid thing to do, and no one does that much any more so we don't need to continue to carry on that silly debate. (John Reilly, Massachusetts Institute of Technology)	the arguments presented, the Chapter Authors considered the best way of presenting the material available in the literature in a structure that we considered was useful to the likely readership. We certainly did not intend to represent farmers as 'non-reactive' – quite the opposite. Howden I have some sympathy with the recommendation at the heart of this. (JM)
E-5-418	A	34	25	34	25	I suggest to add: .....knowledge of consequent risks, negative or positive impacts or opportunities..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Text changed. Howden
E-5-	A	34	37	34	37	Delete "and the like"	Text changed. Howden

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
419						(Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
E-5-420	A	34	48	34	48	I suggest to add: .....enhanced investments in efficient water managment, irrigation infrastructure and efficient water use and reuse technologies,..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Text changed as suggested. Howden
E-5-421	A	35	6			"…the above planned adaptations…" In the above section there is a list of pre-condition for planned adaptation, not a list of planned adaptations so this sentence is perhaps not appropriate. Perhaps the list on page 35-35 mixed pre-condition and adaptations and could be modified to make it clearer? (Nicholas Holden, University College Dublin)	Text changed as suggested to more clearly focus on these as steps in a process. Howden
E-5-422	A	35	9	35	11	About the affirmation: The capacity to plan and implement adaptation at local, national and international levels, in most sectors of economy including agriculture and forestry, remains largely untested and uncertain - ¿What we can do? This answer is the most important aspect to solve in the Chapter and I think that will be convenient to dedicate any paragraphs to write any guidelines in this sense (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	These guidelines are what the six points in the planned adaptation section are. However, to provide the detail needed for such a huge and varied range of activities (food, fibre, forestry, fisheries across the globe) is clearly not manageable here. Howden
E-5-423	A	35	13	35	13	Add the year at the reference (Dietz et al.,). (Marco Bindi, Dept. of Agronomy and Land Management)	Text removed – along with reference. Howden
E-5-424	A	35	13			Missing year in Dietz et al. reference (Paula Harrison, University of Oxford)	Text removed – along with reference. Howden
E-5-425	A	35	14	35	16	There are, however, some drawbacks here - such as the increased reliance on monocultures (which is even mentioned earlier in the chapter). (Emma Archer, University of the Witwatersrand)	Text removed – along with reference. Howden
E-5-426	A	35	16			Add just before the end of the period the following:"and, historically, have helped bring down the price of food globally which has been a major factor in reducing hunger and malnutrition (Goklany 1998)." (Indur Goklany, US Department of the Interior)	Text removed – along with reference. Howden
E-5-427	A	35	21	35	42	This box needs to updated. In addition to drought and temperature, other forms of stresses that would be relevant in a warmer world are: increased pest pressure, salinity, changes in flowering times, and, possibly, water-logging (Goklany 2001b). In addition, there might be additional opportunites that might be created by higher CO2 levels. We would recommend a broader view of the possibilities for bioetechnology to assist in adaptation to climate change. (Indur Goklany, US Department of the Interior)	Box text altered to include these points. Howden
E-5-428	A	35	22	35	42	This biotechnology box is interesting but seems to take a way to narrow approach. Anything that improves yield, stress tolerance is likely to be helpful as this would	Box text altered to include these points. Howden

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						allow lots of production to concentrate in pockets of remaining good climates if overall climate degrades. Also, a big push of biotech is disease/pest so if those are increasing then biotech seems like a very useful tool. What about biotech to enhance response to CO2. I.e just thinking about climate change as higher temperature and less water and how biotech might affect that doesn't do justice to a chapter that has just examined the many facets of climate change and how it interacts through markets... (John Reilly, Massachusetts Institute of Technology)	
E-5-429	A	35	45			This section on the costs and socio-economic aspects is hampered by the fact that it does not encompass the ranges of responses possible, and statements are made without much in the way of a listing of the key assumptions and drivers (Philip Thornton, ILRI)	There simply was not room to make a detailed assessment complete with assumptions.
E-5-430	A	35	49	35	7	I think there needs to be a word of caution here, since the studies mention have been concerned with food production, virtually only. However, with the rapid increasing oil prices there is likely to be an increased competition for biomass for biofuel production, some of which will compete with food and feedstuffs. This may very well have a much higher effect on food prices than climate change alone, but there may also be interactions with climate change. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	This point has been addressed in the revised draft. Food and agricultural prices will rise with higher energy prices but cannot rise faster than energy prices. If they do, they become unattractive for energy use; differently put, if agricultural prices rise faster than energy prices, agricultural feedstocks price themselves out of the energy market. Schmidhuber
E-5-431	A	35	49	35	50	Giving the impacts of climatic change on agriculture in terms of the impact on agricultural GDP does not shed light on the most important impacts for societies at large, which are the availability of food and the ability of poor people to buy it in order to avoid starvation or malnourishment. Thus, every statement of impacts on agricultural GDP should be accompanied by a statement of the corresponding change in total yield and in average prices. Here, the impact on GDP is given for a given year, but we need to be told the corresponding global mean temperature change so that we can relate this information to that given in Figure 5.4. Assuming that the -1.5% to +2.6% change in GDP corresponds to 3 K global mean warming, then from Fig 5.4 the output price has gone up by 16%. For total agricultural GDP to be about the same, this means (I think) that total yield has fallen by 16%. This in turn is a very serious impact, and implies the death of 100s of millions of people (unless those who overeat all decide to eat less or to eat less meat). Thus, it appears that an optimistic sounding statement in fact masks a brutal consequence. This is why it is important to give all of the information that I have requested in this comment. By 5 K warming, output prices have risen by 40% in Fischer's analysis	This comment is very difficult to comprehend. As it is stated, it doesn't make sense from an economic point of view. Schmidhuber Part of the problem may be that Mr Harvey confonds AG-GDP with AG-GVP. Schmidhuber People are not starving because food production may become more costly and rise less rapidly than without CC; as chapter 5.6 brings out clearly, access to food and the change in macro-economic conditions (mostly from out side of agriculture) will be much

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						according to Fig 5.4 - tell the reader what this means in terms of food production and number of people starving! (Danny Harvey, Dept of Geography, University of Toronto)	more important than the impats of CC and changes in food production/availability. Schmidhuber
E-5-432	A	35	49	36	7	This section of the paper and the associated Figure 5.4 desribes the potential effects of climate change on food prices. But, given the above comment, it is likely that diversion of food crops to biofuel production will subtantially raise the prices of basic food commodities such as sugar, cereals, and oilseeds above historical ranges. Therefore, here again, unless the increased diversion of food crops to biofuel in considered in the analysis of climate change impact on commodity prices, this section of Chapter 5 will be obselete before it is published. (Kenneth Cassman, University of Nebraska)	No doubt, biofuel use will underpin agricultural prices. In fact for some commodities, energy prices have already created a floor price for agricultural prices (sugar). However, as mentioned above, food prices will not rise faster than energy prices in the long-run. Schmidhuber
E-5-433	A	35	49	36	1	this material is presented in a way that, I think, obscures a number of harsh realities. As well, it does not seem to be consistent with other information given. (Danny Harvey, Dept of Geography, University of Toronto)	See comment above. Schmidhuber
E-5-434	A	35	49	36	7	This figure (5.4) should not be included as is as it abuses the studies on which it is based to pretend that they are the basis for some extrapolation on the temperature scale. This is such a pathetically short section that does so little justice to these studies, I'm not sure why it is included here all by itself. It would be better if this were another section under "What is new since the TAR" If there are some newer studies that confirm or otherwise support earlier conclusions that is fine but this won't be stuck here so pathetically by itself. (John Reilly, Massachusetts Institute of Technology)	We disagree—the main point of the graph is that it shows, for the few studies in the literature, a general tendency for prices to take an up-turn after a certain range of warming—i.e., prices don't immediately rise with earliest warming.
E-5-435	A	35	51	36	1	If cereal production is essentially unchanged and prices are up 16% by 2080, how can there almost no change in agricultural GDP? Are the agricultural GDP numbers suppose to remove effects of price changes? If so, so say. (Danny Harvey, Dept of Geography, University of Toronto)	See comments above
E-5-436	A	36	3	36	7	GMT not defined (neither is GDP elsewhere in the chapter) (Nicholas Holden, University College Dublin)	Will do.
E-5-437	A	36	4	36	4	Has GMT been defined previously? I would prefer it being written out in full here anyway. (Robin Matthews, Macaulay Institute)	Will do.
E-5-438	A	36	6	36	6	Define the acronym GMT (Marco Bindi, Dept. of Agronomy and Land Management)	Will do.
E-5-439	A	36	7			Given the uncertainties, it is important to quote the range on this 30% increase (Andrew Challinor, University of Reading)	Will do.
E-5-440	A	36	14	36	14	I suggest to add:.....and economic welfare, and possible land - use changes. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the	Not the intent of the statement.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Environment)	
E-5-441	A	36	17	36	17	Add the year at the reference (Sohngen et al.,). (Marco Bindi, Dept. of Agronomy and Land Management)	Fixed.
E-5-442	A	36	17			Missing year in Sohngen et al. reference (Paula Harrison, University of Oxford)	Fixed.
E-5-443	A	36	20			Figure 5.4: First, the content of this figure is not described in the text, no sources are given and the only discussion is to Fischer's predictions, which are by a long way the most extreme. The Y axis is labelled as 'output prices' but the text refers to 'food prices' - are these the same? Are the prices corrected for inflation? Figure 5.2 is very important and needs to be presented properly. (John Porter, The Royal Veterinary and Agricultural University)	Now better described.
E-5-444	A	36	21			Figure 5.4: add years to references in graph (Paula Harrison, University of Oxford)	Fixed.
E-5-445	A	36	22	36	22	Add references of the work reported in the Fig. 5.4 (Marco Bindi, Dept. of Agronomy and Land Management)	Fixed.
E-5-446	A	36				Fig. 5.4: The point estimates referred to in the caption should be shown on the figure. (Andrew Challinor, University of Reading)	Too few pionts to be meaningful.
E-5-447	A	37	1	37	51	too many lines come from Fisher 2002, in this page there are six place, are there other researches to show more information on the topic rahter than just based on one paper (Hui JU, Chinese Academy of Agricultural Science)	Yes, the revised version includes citations of other sources, notably Parry and Tubiello. Schmidhuber
E-5-448	A	37	1	37	1	Should there not also be a section on 'Global costs to fisheries'? (Robin Matthews, Macaulay Institute)	
E-5-449	A	37	11	37	36	Section 5.6.4: Shouldn't there be separate sections for Europe and the Americas here as well for balance? (Robin Matthews, Macaulay Institute)	Had been there before but had to be deleted for space reasons Schmidhuber
E-5-450	A	37	17			most challegen… particularly in Southeast Asia (Hui JU, Chinese Academy of Agricultural Science)	Not sure what this means.
E-5-451	A	37	22	37	22	There are some far more sensitive crops than maize -- what about beans, for example? (Philip Thornton, ILRI)	Beans more climate sensitive than maize?
E-5-452	A	37	22	37	22	I suggest to add:....concentrations, and water shortages with the necessity to introduce irrigation systems. Some crops..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Will consider.
E-5-	A	37	28	37	36	Are there any costs and socioeconomic impacts to describe here to make it fit better	The term ‘production’ has economic

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
453						with the subsection heading? (Paula Harrison, University of Oxford)	implications.
E-5-454	A	37	29	37	30	The report on Murdiyarso (2000) misses the most important point made in that paper, namely, "the more crucial and complicated ongoing issue is how to cope with climate variability" (Murdiyarso 2000: 130). Accordingly, we refer you to comment 7. The issue of climate change needs to be put into its wider context; dealing with current climate and variability will go a long way toward dealing with the problems of food production and food security due to both non-climate-change-related factors and climate change (see, e.g., Goklany 2005a, 2006a). (Indur Goklany, US Department of the Interior)	A fair point, though hardly limited to Asia! (JM)
E-5-455	A	37	30	37	31	Our reading of Lin et al. (2004) is that the effects are much more variegated than indicated here. With CO2 effects, the B2 scenario should indeed reduce China's rice production; however, the A2 scenario, which usually gives a higher temperature and CO2 concentrations, rice production increases. This should be noted. (Indur Goklany, US Department of the Interior)	But the reference point for the statement is amount of warming not SRES scenario.
E-5-456	A	37	35	37	36	delete afterwards word ",but wheat production…..taken into account", as we all know the CO2 effect is overestimate. (Hui JU, Chinese Academy of Agricultural Science)	Will consider.
E-5-457	A	37	39	38	27	I don't like this section. On page 37 line 47 authors list 4 categories but follow with only three sub-headings. In the 'Utilization' sub-heading, the first paragraph is all about health and so is inappropriate for this chapter, second paragraph is about production and should go under first sub-heading. (Jean Palutikof, Met Office)	Has been addressed; the section is essentially re-written. Schmidhuber
E-5-458	A	37	39	39	29	It should be noted that food security also depends on the ability to purchase food, hence economic growth and livelihoods are important in helping adapt (Goklany 1995, 1998). (Indur Goklany, US Department of the Interior)	Yes, this still needs some more emphasis, despite lines 49-51 below. (JM)
E-5-459	A	37	47	37	48	This sentence is too vague to be of any use. You have to indicate the amount of climatic change up to which global food production may increase, and the assumptions associated with this assessment. (Danny Harvey, Dept of Geography, University of Toronto)	See revised 5.6
E-5-460	A	37	51	37	51	I suggest to add:.....to the burden of such countries, and a significative increase of poverty and hunger (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Will consider.
E-5-461	A	38	1			General comment on sub-section "Stability". The information reported should be stated by references	Is FAO language.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Marco Bindi, Dept. of Agronomy and Land Management)	
E-5-462	A	38	3	38	3	I suggest to add:....to FAO(FAO, 2005b), and floods,..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Will consider.
E-5-463	A	38	6	38	7	Why would these crops be at risk? The sorghums and millets are generally quite resilient compared to wheat, rice, etc. (Robin Matthews, Macaulay Institute)	But we know less about them. (JM) Good point; perhaps it would be important to point out that these crops are already grown on marginal land. Schmidhuber
E-5-464	A	38	6			Define 'orphan crop' (Jean Palutikof, Met Office)	Agree: little grown, only grown in restricted areas, widely grown but rarely traded, or widely grown but underresearched? (JM)
E-5-465	A	38	13	38	27	It should be mentioned here in addition that negative impacts of climate change may also substantively affect agricultural livelihoods, other livelihoods and hence food access. (Emma Archer, University of the Witwatersrand)	This is an important topic, but we could not have presented it without a great deal more discussion of what this meant, which would have put us over length limits.
E-5-466	A	38	13			General comment on sub-section "Utilisation". The information reported should be stated by references (Marco Bindi, Dept. of Agronomy and Land Management)	Unclear comment. Schmidhuber
E-5-467	A	38	14	38	21	What exactly is meant by 'food utilisation' in L14? The following paragraph is not at all about the use of food in any sense. (Robin Matthews, Macaulay Institute)	Has been rewritten for clarity.
E-5-468	A	38	17	38	17	I suggest to add:....of human settlements and agriculture..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Will consider.
E-5-469	A	38	23	38	27	You have to indicate the amount of climatic change that you are talking about here. As written, this section is too vague to be very useful. (Danny Harvey, Dept of Geography, University of Toronto)	Are mainly using temperature change or time in the future as a the reference points.
E-5-470	A	38	23	38	27	This is seemingly at odds with statements in section 5.3.2.1 on "declines in the number of undernourished" (Philip Thornton, ILRI)	Now clarified that absolute declines will occur, but marginal changes will increase with climate change, i.e. the decline will be smaller with climate change than without.
E-5-471	A	38	25			FAO (2005a: page 3) does indeed make the claim that climate change may "drastically" increase the number of undernourished people. However, an examination of that report reveals that this claim is not based on any quantitative estimate of the increase in the population of undernourished people. In fact, while the report (on page 2) notes that "Sixty-five developing countries, representing more than half the developing world's total population in 1995, will lose about 280	Has been addressed in the completely changed version 5.6. Schmidhuber

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						million tons of potential cereal production as a result of climate change ... [c]hanges in actual cereal production are more difficult, if not impossible, to assess, ..." In other words, the FAO report cannot itself be used to justify the claim that the number of undernourished would increase "drastically". Moreover, FAO (2005a) does not provide either a time frame and/or temperature increase over which the effect would be drastic. Accordingly, we would eliminate "drastically" from line 25 and "severely" from line 26, since both are unproven claims. (Indur Goklany, US Department of the Interior)	
E-5-472	A	38	30	39	52	This sentence should be linked better to the chapter on sustainable development. (Emma Archer, University of the Witwatersrand)	Section has been completely rewritten.
E-5-473	A	38	30			Section 5.7: How is this connected to the issues of FFFF? What point are you trying to make here? (John Porter, The Royal Veterinary and Agricultural University)	Section has been completely rewritten.
E-5-474	A	38	30			It struck me as odd not to even mention the MA, in terms of how these indicators of SD may play out in the future -- of course it's not possible to ascribe particular ups and downs to CC alone, but the information content of this section I thought was rather low. (Philip Thornton, ILRI)	Section has been completely rewritten.
E-5-475	A	38	32	38	37	Poorly written (Paula Harrison, University of Oxford)	Section has been completely rewritten.
E-5-476	A	38	33	38	33	I suggest to add:....countries(Aggarwal et al, 2004), as the first constitute too the necessary way for economic development in developed countries. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Section has been completely rewritten.
E-5-477	A	38	37			Insert the following new material at the end of the paragraph that would read as follows: "Noting that (a) several determinants of adaptive and mitigative capacities (e.g., availability of technological options, and access to economic resources, social capital and human capital) largely overlap, (b) many factors underlying or related to these determinants are themselves indicators of sustainable development (e.g., per capita income; and various public health, education and research indices), (c) climate change could exacerbate existing climate-sensitive hurdles to sustainable development (e.g., hunger, water shortage, and threats to biodiversity) faced specifically by many developing countries, Goklany (2006a) identifies integrated approaches to formulating strategies and measures to concurrently advance adaptation, mitigation and sustainable development. These approaches range from broadly moving sustainable development forward (by developing and/or nurturing institutions, policies and infrastructure to stimulate economic development,	Mr Goklany's work has been taken into account in the revised section 5.7 . His sources have been used to revise the section and some of the wording proposed has been taken directly into the revised draft. Schmidhuber

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						technological change, human and social capital, and reducing specific barriers to sustainable development) to reducing vulnerabilities to urgent climate-sensitive risks such as hunger that hinder sustainable development and would worsen with climate change. The resulting sustainable economic development would also help reduce birth rates, which could mitigate climate change and reduce the population exposed to climate change and climate-sensitive risks, thereby reducing impacts, and the demand for adaptation. Goklany (2006a) also offers a portfolio of pro-active strategies and measures consistent with the above approaches, including example measures that would simultaneously reduce pressures on biodiversity, hunger, and carbon sinks." (Indur Goklany, US Department of the Interior)	
E-5-478	A	38	43			Add to the end of the paragraph, the following: "Goklany (2005a, 2006a) shows that meeting the goals of the MDGs would help advance adaptation to the current climate, climate variability and climate change, arguing that in the short-to-medium term this would be more cost-effective than schemes to stabilize GHG concentrations." (Indur Goklany, US Department of the Interior)	Section has been completely rewritten.
E-5-479	A	38	45	38	49	Population control needs to be strongly emphasised. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Section has been completely rewritten.
E-5-480	A	39	1	39	4	I need to realice the followig explanation - Caribbean don´t contain a large quantity of forests, and think that author refers to Latin America and the Caribbean as Region, Caribbean is only a sub-region.Need clarification too, because in Africa it is true, but in the Caribbean it isn´t the case(the levels of safe water and sanitation are among biggest in Latin America and the Caribbean, with the exception of Haiti that decreases the average. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Section has been completely rewritten.
E-5-481	A	39	6	39	37	I don´t know very clear how it is the functioning of figures 5.5a, 5.5b,5.5c, especially with the undernourishment for country group. Please explain in the text (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Section has been completely rewritten.
E-5-482	A	39	6	39	38	I do not see the relevance of this information in a climate change context. In stead it would be good to see a figure or table, which links the number of hungry people with change in food production. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Section has been completely rewritten.
E-5-483	A	39	6	39	22	Figures 5.5 (a) and 5.5 (b) seems unsuitable here. These seems more appropriate in some other chapter than chapter on "Food, Fibre, and Forest Products".	Section has been completely rewritten.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Muhammad Mudasser, Global Change Impact Studies Centre (GCISC))	
E-5-484	A	39	23			Figure 5.5: I am not sure that I would use 'progress' here. 5.5c doesn't show progress. Need a more descriptive caption. (Robin Matthews, Macaulay Institute)	Section has been completely rewritten.
E-5-485	A	39	25	39	26	It took me some time to figure out what Fig 5.5 is showing, because the caption is not very informative and, in fact, is a bit misleading. I suggest changing the caption to read : "Correlation between the prevalence of undernourishment and various development indicators" (Danny Harvey, Dept of Geography, University of Toronto)	Section has been completely rewritten.
E-5-486	A	39	48	39	49	it is unclear whether in this line we are mentioning about the Europen country "Hungry" or the population facing hunger. (Muhammad Mudasser, Global Change Impact Studies Centre (GCISC))	Section has been completely rewritten.
E-5-487	A	40	6	41	6	It should be noted in Findings 1, 3, 4, and 5 that these analyses did not consider the full range of adaptation options that would be available if populations become wealthier and more technologically advanced per the SRES scenarios. See comment 18 for more details. (Indur Goklany, US Department of the Interior)	OK.
E-5-488	A	40	11	40	11	For literatures limited, it is maybe more suitable for substituting “most regions” by “all regions” here (Liyong Xie, Chinese Academy of Agricultural Sciences)	We like our version.
E-5-489	A	40	16	40	19	I think the reason for this discrepancy between new and old experiment results needs to be explained somewhere. Why should the new results be any more reliable than the old ones? (Robin Matthews, Macaulay Institute)	It is. For reasons explained in the revision.
E-5-490	A	40	18			high confidence change to "medium confidence" is more appropriate as the ideal condition in crop simulation for CO2 effects (Hui JU, Chinese Academy of Agricultural Science)	We disagree.
E-5-491	A	40	20	40	25	warming accompnies with precepitation in tropics. It will have different effect on crops and forest systems. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	OK.
E-5-492	A	40	26	40	26	Replace 'change' with 'increase' to indicate the direction of change. (Robin Matthews, Macaulay Institute)	Statement is meant to accommodate both directions.
E-5-493	A	40	26	40	35	Make two conclusions - separate out forests and fisheries (Jean Palutikof, Met Office)	Done.
E-5-494	A	40	26	40	35	I suggest to split this paragraph separating forest and fisheries sectors (Marco Bindi, Dept. of Agronomy and Land Management)	Done.
E-5-	A	40	46	40	47	I suggest to change in this manner: ...., although adaptation may to fall into water	Not sure what is intended by this statement.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
495						availability and press over environmental resources..... (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-496	A	40	48	40	48	Has FFFF been defined previously? Again, I would prefer it being written out in full here. Need to avoid jargon for general readers. (Robin Matthews, Macaulay Institute)	Will be defined or dropped.
E-5-497	A	40	51	40	52	these simple adaptation could avoid 10-15% yield reduction, is it too competent like that? please add source leterature! (Hui JU, Chinese Academy of Agricultural Science)	This comes from intrepretation of Fig. 5.2—will be clarified.
E-5-498	A	40		44		This section is a good attempt to summarize the findings. The relatively few conclusions (page 40-top of 41) are much better worded and convey more accurately the literature than the executive summary. I would suggest mostly getting rid of the current executive summary and using this one. I still have concerns about the conclusions drawn about crop yields and commodity price impacts from the "meta analysis" of these results to the extent these are refected in Table 5.5 key results but with some modification this would also be a good executive summary addition. I think the table on knowledge gaps and needed research is very good, and should definitely be in the executive summary. To this I would add: (1) Conclusions of moderate/beneficial impacts of climate change up to 3 degrees are a based on climate scenarios and methods that yield gradual climate change, and may underestimate possibility of change in precipitation patterns and in extreme events such as drought, floods, storms. NEED: More studies. (2) Multiple environmental stresses will affect agriculture-climate, CO2, ozone, particulate haze, nitrogen/acid deposition NEED: more crop studies of combined effects of multiple stresses and model studies that include these in regional and global analyses. (John Reilly, Massachusetts Institute of Technology)	We took this advice and rewrote the Exec. Summ. To follow the pattern of this section.
E-5-499	A	41	0			Again, there is not a clear logical or relative order to this table. Sometimes forestry goes first, other times food crops. (Cynthia Rosenzweig, Goddard Institute for Space Studies)	We tried to make the order moreconsistent.
E-5-500	A	41	8			Summary of impacts and adaptive results by temperature and time. Maybe better to use it as subheading 5.8.2 (then present 5.8.2 on page 43 changes to 5.8.3) (Jüri Kadaja, Estonian Research Institute of Agriculture)	Not quite sure what the point of this is.
E-5-501	A	41	8			Is there anything on adaptation in the table or figure? (Jean Palutikof, Met Office)	No.
E-5-502	A	41	14	41		Table 5.5:This Table as a résumé is a good idea, and it is well conceived. Fibre isn´t well reflected. The delimitation of each sub-sector with findings would be	Was revised to add more fibre.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						improved. I suggest to include a column with uncertainties and confidence levels, becaquse show the grade of certainty.In part of +1-2 gradus centigrades isn´t reflected nothing about fisheries, for example coral reefs, when talk about prices the range isn´t clear -10 - -30% because don´t coincide with Figure 5.4. In part with +2 - 3 gradus celsius global findings of forestry write a number +20% that isn´t clear in Table 5.3, maybe among 15-20%. For Food crops the elements written don´t have the source. In prices the range isn´t clear -10 - +20 %, maybe -10 - +15%. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-503	A	41	14	42	1	The data presented in Table 5.3 are too complex and mixed, and it does not provide any overview. I suggest to simplify (in particular the findings in the table) (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Yet, others liked it (i.e., Reilly above).
E-5-504	A	41	15	42	2	Table 5.5. Rows in colums 'Sub-sector' and 'Finding' do not correspond each other in several places (are shifted) (Jüri Kadaja, Estonian Research Institute of Agriculture)	Will be fixed.
E-5-505	A	41	15			Table 5.5: Sub-sector writing not lined up correctly with Findings column making it difficult to read (Paula Harrison, University of Oxford)	Will be fixed.
E-5-506	A	41	15			table 5.5, more conclusion present on the relationship of temperature increase and production change, also link with Co2 concentration, but less support source! (Hui JU, Chinese Academy of Agricultural Science)	Not sure of the point here.
E-5-507	A	42	1	42	1	In the continuation of Table 5.5 when write about +3 - 5 gradus celsius isn´t clear the range for agricultural prices+10 - +40 %. To add in Tropical the Food crops as sub-sector. By 2080 isn´t clear the range 5-20% for water requirement increases, in page 17 line 6 it is written 20%. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	The numbers in Table 5.5 are meant to be a general range covering the literature reviewed and may not match up exactly with the numbers in the text.
E-5-508	A	42	1	42	2	In Table 5.4, under +3-5 C, Forestry Prices and Trade: If timber production continues to increase with increasing temperature, then why is the downward trend in prices reversed once warming reaches 3-5 C? A few words of explanation would clear up what appears to be an inconsistency. (Danny Harvey, Dept of Geography, University of Toronto)	Good point, will clarify in the revision.
E-5-509	A	42	1			There are reports of climate change induced increases of fire & insect activity in Canada already. Have we really warmed 3-5C already? You have the wrong source section. (Richard Fleming, Great Lakes Forest Research Centre)	The section number is not correct—will need to be fixed at final edit.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-5-510	A	42	4			Table 5.6: item 4, col.2, row 3: the word of " section" could be deleted because of no specific meanings in the corresponding " Finding " column (col.4). (Futang Wang, Chinese Academy of Meteorological Sciences)	Cannot find the word "section." (JM)
E-5-511	A	42	4			Table 5.6: item 1, col.2, row 4 & 7: the word of " fishing" could be deleted because of no corresponding content in the " Finding " column (col.4). (Futang Wang, Chinese Academy of Meteorological Sciences)	A fair point, unless we can come up with a suitable finding for artisanal fishing/aquaculture. (JM)
E-5-512	A	42				Table 5.6: assuming what range of scenarios? (Andrew Challinor, University of Reading)	
E-5-513	A	43	1	43	24	I find it too difficult to get the whole picture from this map. Perhaps it could be split into three maps, one for each of the three sectors. (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	Tried to present the entire picture here. Kirilenko
E-5-514	A	43	1	43	24	Figure 5.5 Very good Figure. (Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	Thanks. Kirilenko
E-5-515	A	43	22			Figure 5.6. -- a minor point, maybe, but if there are likely to be problems with crop productivity in the Sahel (as seems to be shown), it is hard to imagine how that is not going to have an impact on livestock productivity as well, given the proponderance of mixed systems there. (Philip Thornton, ILRI)	No data. Kirilenko Agreed. (JM)
E-5-516	A	43	27			Section 5.8.2: I would suggest the following as research gaps: food nutritional quality as well as quantity as it is affected by CC; the link between the use of fossil energy in agriculture and CC in the sense that as energy prices rise then agriculture might expect to get less and this would have serious consequences for farming and food production - the SRES also has generally ignored the question of energy availability; what is the link between the total costs of CC damage, adaptation and mitigation and CO2 stabilisation level. Parry et al has done some work on this to which you refer but this deserves more attention. (John Porter, The Royal Veterinary and Agricultural University)	Food non-food competition has been addressed in the revised draft. Schmidhuber
E-5-517	A	43	33	43	33	Table 5.7 - For agriculture is very important the water availability, and for this reason the results of crop yields in the presence of different levels of water shortage is of grear importance, in each country, regional and global. It is necessary to include in Research priority the affirmation in page 18 line 29-30 ¨Firstly, calls by the TAR to enhance crop models inter-comparison studies have remained unheeded ¨ and too an answer to affirmation in the same page but in lines 35-37 b) effectively represents field-scale responses - especially when simulations of several key limiting factors such as soil and water quality, pest weeds and disease, and the like, remain either unresolved or untested	We agree with the point made here, but prefer to keep the recommendation general so as to cover a range of limitations to the models.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Cristobal Felix Diaz Morejon, Ministry of Science, Technology and the Environment)	
E-5-518	A	43	33	43	33	Table 5.7 (many of them important to the rural poor such as oil seeds, root crops and millets. (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	I would put oilseeds last, but yes. (JM)
E-5-519	A	43	33	43	33	I would like to mention another research gap. In general, impact assessment studies on various crops are conducted on single crop by using crop simulation models. However, what is missing is that these studies should be focusing on "cropping system approach" such as rice-wheat, wheat cotton,etc. (Muhammad Mudasser, Global Change Impact Studies Centre (GCISC))	I support this. (JM)
E-5-520	A	43	33	43	33	At the end of the third research priority mentioned in Table 5.7, I suggest to add ", and better knowledge on how extreme events affect production". (Jørgen E. Olesen, Danish Institute of Agricultural Sciences)	I support this. (JM)
E-5-521	A	43	33			Table on knowledge gaps is interesting, but it needs to follow some kind of storyline. Why did you decide in this order? How are the knowledge gaps related to one another? (Cynthia Rosenzweig, Goddard Institute for Space Studies)	The order follows roughly the order of the impacts discussed in 5.4
E-5-522	A	43	33			Table 5.7. I would agree that further knowledge of the CO2 response of plants is important, but I would suggest that the priority should now be more focused on the interaction of elevated CO2 with water and nutrient availability, and low soil fertility. That is, research should move beyond investigating the CO2 response in near-ideal field conditions, to those that more closely match the sub-optimal climate and soil conditions that are characteristic of much of the world's agriculture and forestry. (Tim Wheeler, University of Reading)	I support this. (JM)
E-5-523	A	43	33			Table 5.7 (and I think this relates to Table 5.6 also) -- there is a tendency to look at 20-50 years into the future, but the intermediate time scale of 10-20 years into the future is a key one. In terms of research and knowledge gaps, on the one hand the impacts and adaptations will be extremely important (as they will set the trends for longer time-scales), but on the other hand they are "difficult" for scientific enquiry (GCM problems, links to current activities, etc). I think something needs to be added about this here. (Philip Thornton, ILRI)	We disagree. Short-term problems are addressed either explicitly or implicitly throughout.
E-5-524	A	43	33			Other forest research priorities?: How CO2 & CC affect the interaction of disturbances & the outbreak cycles of forest pests. (Richard Fleming, Great Lakes Forest Research Centre)	This is a good point, but too detailed given the space limits.
E-5-	A	43				Table 5.7. I think that much more research on the CO2 x temperature interaction	We agree, but are so space limited that it is not

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
525						needs more investigation, preferrably with combined FACE and temperature free-air controlled enhancement experiments (T-FACE). (Bruce Kimball, USDA, Agricultural Research Service)	possible to reach this level of detail.
E-5-526	A	43				Table 5.7. I think that much more research on cereals with FACE at higher CO2 levels needs to be done to determine how close the lower-than-expected stimulations of yields at 550 ppm are to the maximum plateau expected at very high concentrations. (Bruce Kimball, USDA, Agricultural Research Service)	Again, we agree, but could not go even to this level of detail because of space lmits.
E-5-527	A	43				Table 5.7, second row: add zone? (See Box 5.2) (Andrew Challinor, University of Reading)	Sorry, can't quite locate this comment.
E-5-528	A	43				Table 5.7, fourth row: it is not simple a case of comparing crop models, but of understanding the differences between them, and also understanding the impact of parameter uncertainty within a given model. This point is touched up on page 14 and it is worth repeating here. (Andrew Challinor, University of Reading)	We agree, but space limits preclude even going to this level of detail.
E-5-529	A	43				Table 5.7, first row: also, very few studies have been carried out in the tropics (this largely overlaps with 'developing countries', but as the climate of the tropics differs from that of temperature zones, use of 'tropics' makes clear why this gap is important). See Slingo, J. M., A. J. Challinor, B. J. Hoskins and T. R. Wheeler (2005). Food crops in a changing climate. Phil. Trans. R. Soc. B 360 (1463) 1983-1989. (Andrew Challinor, University of Reading)	Agreed. (JM)
E-5-530	A	43				Figure 5.6 not particularly legible or meaningful? (Nicholas Holden, University College Dublin)	Is the only complaint out of dozens of reviewers.
E-5-531	A	44	1			Table 5.7. There is a need for another high priority as follows: review assumptions about the amount of food crops used to produce biofuels and bio-based feedstocks in the next 10-30 years and quantify the impact on land use trends, global food security and food prices, and the net impact on greenhouse gas emissions/sequestration. (Kenneth Cassman, University of Nebraska)	We added one.
E-5-532	A	45	0			References: needs completion (John Porter, The Royal Veterinary and Agricultural University)	Done.
E-5-533	A	48	37	48	38	Das, R and UpretyD.C.2006 Interactive effect of moisture stress and elevated CO2 on the oxidiative stress in Brassica species J. food,agri. Environment 4 (2) 298-305, (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-534	A	48	37	48	38	Das, R and UpretyD.C.2006 Effect of elevated CO2 on the on water relation components in Brassica species under moisture stress conditions.Indian J.	Ditto.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						Plt,Physiol. 11,1, 48-56 (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	
	A	52	37			Insert reference to Jones et al. (2005) (Goetz Michael Richter, Rothamsted Research)	Will consider.
E-5-536	A	56	27			Insert references to Richter and Semenov (2005) and Richter et al. (2006) (Goetz Michael Richter, Rothamsted Research)	Will consider.
E-5-537	A	58	18	58	18	Uprety.D.C. Dwivedi.N,Saxena. D.C.Raj.A.and Paswan,G. (2004) Impact of enhance of enhanced CO2 concentration on crop growth Agriculture Forestry Natural ecosystem (Govt of India) pp 19-22 (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-538	A	58	18	58	18	Uprety D.C. Dwivedi,N Jain.V, Mohan. R. Saxana D.C. , Jolly. M and Paswan. (2003). Responses of rice varieties to elevated CO2 . Biologia plantarum 46,35-39 (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-539	A	58	18	58	18	Uprety D.C. 2004 Effect of rising atmospheric CO2 on the photosynthesis and productivity of crop plants. National Fellow Project consolidated report (2000-2004) Indian council of agricultural research (ICAR) New Delhi India (Dinesh Chandra Uprety, Indian Agricultural Research Institute)	Will consider.
E-5-540	A	58	38			After Line 38 and before Line 39 to supplement a chinese reference: " 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". (Futang Wang, Chinese Academy of Meteorological Sciences)	Will consider.
E-5-541	A	58	43			Insert reference to Weigel et al. (2005) (Goetz Michael Richter, Rothamsted Research)	Will consider.