#	Ch	From Page	From Line	To Page	To Line	Comment
1	7	0	0	0	0	General comment 1: Relying on worldwide refereed scientific articles and well-reported experiences the authors undertook a thorough work that set the basis for a sound interpretation of reality. At the same time, it should be noted the effort of contributors to consolidate essential concepts through the support of uncertainty analysis and empirical agreement. In general, I believe that Chapter 7 offers a complete picture to analyze the issue of food security under a concerning scenario of global warming and climate change. (Viglizzo, Ernesto, INTA/CONICET)
2	7	0	0	0	0	General comment 2: the general structure of the text looks rather intricate. I was unable to capture the logics of this chapter after a first reading because it appears unnecessarily divided into an excessive amount of sections and sub-sections (e.g.: 7.3,...)7.3.2... 7.3.2.1... (7.3.2.1.1, etc.). Inevitably, complex structures conspire against clarity and the interpretation of various topics treated across the chapter. I believe that the presentation needs simplification in order to facilitate the understanding by both, specialized and non-specialized readers. Editors should work hard to get a friendly version of chapter 7. (Viglizzo, Ernesto, INTA/CONICET)
3	7	0	0	0	0	General comment 3: In relation to the general comment 2, I wonder if it is necessary to split the texts into paragraphs treating similar issues. I perceive concepts reiteration in different sections, especially those that report the effect of warming and CO2 enrichment on crops physiology. In fact, I perceive conceptual overlapping in sections and subsections that repeat topics on "production systems", "crop production", "livestock production", "fisheries", etc For example, I do not find arguments to undertake sections 7.2 (Observed impacts) and 7.3 (Assessing impacts...) as separate units. (Viglizzo, Ernesto, INTA/CONICET)
4	7	0	0	0	0	The influence of climate change on rice wheat and corn should be included according to Table5 of SPM (Song, Yanling, China Meteorological Administration)
5	7	0	0	0	0	We suggest making a brief reference to the relationship between climate extremes and food security, and link to the recent findings of IPCC SREX. (Scaramella, Carlo, World Food Programme)
6	7	0	0	0	0	I suggest to add in Section 7.2.1..1 some discussions on the effect of diming on crop production as a single or as interactiion with other climate change factors. (Pan, Genxing, Nanjing Agricultural University)
7	7	0	0	0	0	I think a relevant Chinese publication“Pan et al., editor-in-chief.Assessment Report of climate change impacts on agricultural production of China. China Agriculture Press, Beijing China. 2011.pp243-256. in Chinese . ” could be used for disucssion on crop production changes in response to climate change. (Pan, Genxing, Nanjing Agricultural University)
8	7	0	0	0	0	References to other WGII chapters should refer to specific sections (e.g. 5.4.2.4 not simply Chapter 5) (AUSTRALIA)
9	7	0	0	0	0	With a few exceptions, this chapter seems to lack reference to the important FORESIGHT Global food and farming project, the findings of which are written up in PtRS: http://rstb.royalsocietypublishing.org/content/365/1554.toc; a key overview paper on climate change is Gornall et al 2010: Jemma Gornall, Richard Betts, Eleanor Burke,\n Robin Clark, Joanne Camp, Kate Willett, and Andrew Wiltshire, Implications of climate change for agricultural productivity in the early twenty-first century Phil. Trans. R. Soc. B. 2010 365 2973-2989 doi:10.1098/rstb.2010.0158 (Falloon, Peter, Met Office Hadley Centre)
10	7	0	0	0	0	Food production is considered from a one-eyed point of view, only referring on impacts on the components of the agricultural sector. Looking in the WGIII Chapter 11 in both chapters are missing links. Overall they should be better connected. In general nothing was said about future emissions from the agricultural sector in terms of life style changes, changes in the production styles and what happen under demographic growth in terms of future emissions. Here new literature exists (cf. Pradhan et al. 2013, PlosOne, in press). These two chapters perfectly provide an option to discuss anthropogenic interference (what happens with emissions and climate when people proceeds as in the past) with climate and agriculture. But in both chapters this do not play an important role. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

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11	7	0	0	0	0	this AR 5 chapter on food addresses the issue of food security, which is more relevant to policy and is a great improvement since AR 4. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
12	7	0	0	0	0	Please consider including the report by Oxfam: Extreme Weather, Extreme Prices - the costs of feeding a warming world (Ref: http://www.oxfam.org/en/grow/policy/extreme-weather-extreme-prices) (Lee, Sai-ming, Hong Kong Observatory)
13	7	0	0	0	0	The chapter is not entirely consistent with the use of the word "food". In some places (e.g. p13 L3) the material is about "crop" not "food" (Gregory, Peter, University of Reading)
14	7	0	0	0	0	General comment: What researchers really need is more accurate data for impact assessments. For example, for farm studies, we need more detailed information on when farmers plant, when farmers harvest and weather stations on agricultural holdings to be able to assess effects of weather extremes that are spatially selective. This way, we could better assess adaptation strategies, such as adjusting planting and harvesting dates, strategies to reduce damage through heavy precipitation events etc. (Trapp, Natalie, University of Hamburg and International Max Planck Research School on Earth System Modelling)
15	7	0	0	0	0	Many regional and local examples make it difficult to get a global picture, the chapter should be completed by graphics showing worldwide trends. Sometimes expected developments are shown for 2050 and sometimes 2100 > there should be a general line mentioning both time frames. (GERMANY)
16	7	0	0	0	0	Section 7.3: Agrobiodiversity as an important factor to reduce the risk of food insecurity should be mentioned. (GERMANY)
17	7	0	0	0	0	The Chapter is well composed and nicely written. It takes in to account the components of food security in addition to the Production part. The previous four IPCC reports mostly covered the production aspect of the Food Security but this chapter touches around other components (although data scarcity still remains a core issue) of the food security as well which is praise worthy. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
18	7	0	0	0	0	At places typographical errors like placing of 'comma' before 'and' and non-uniformaity of abbrevaitaions etc are observed. These may be placed in order. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))

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19	7	0	0	0	0	In spite of what the title suggests the chapter mainly deals with food production. It is indicated that food production is an important element for food security but at the same time it's incomplete to cover food security. Food security deals with availability of food, access to food, stability and utilization just like the IPCC-report mentions. We recommend that IPCC spend more efforts and give a clearer view on the relation between climate change and the several aspects of food security;\n\nIn the executive summary it is stated that food prices are important to food security. We agree completely with that statement. At the same time the authors state that the role of weather on prices remains unclear. We recommend that the impact from climate change to food prices at least scientifically based is indicated;\n\nA significant part of food production takes place within small farmers conditions or even in subsistence situations. It seems that the impact of climate change to food production mostly is related to the more sophisticated production systems missing socio-economic triggers for food production by small farmers and subsistence farmers due to climate change. We recommend that the authors consider these aspects too in this report or develop some guidelines for the next report;\n\nFor the coming decade the importance of and attention to nutrient security will increase. We recommend that the relation between climate change and food nutrition is addressed and if possible has been clarified;\n\nThe report gives also some statements on the impact from climate change to fisheries, aquaculture and oceans. For the Netherlands, in cooperation with World Bank, emphasises the role of oceans for food security, we would appreciate more scientific reviews on the impact of climate change on oceans within the IPCC –reports;\n\nThe report states that adaptation leads to lower reduction of food production but most studies are focussed on food production. Obviously there's a greater need of studies on adaptation possibilities, hopefully IPCC can report about that next time. \n\nMainstreaming and integrating climate change in for instance 'good agricultural practices' is important. We suggest IPCC to report on this issue.\n\n (NETHERLANDS)
20	7	0	0	0	0	Effects of climate change on food production is put in context of other factors influencing food security. However, the effect of climate change is not put in context of other drivers clearly. Technological development, markets and policy also play a large role in both food supply and demand. It would be good to say more about the relative impact of climate change compared to other drivers. Effects may be negative, but still relatively small. The message of this Chapter is now very clearly that climate change has negative impacts almost everywhere, while the impact may be relatively small in many regions. As yield gap analyses (Van Ittersum et al., 2013, Field Crops Research 143: 1-3) show, in many regions yields are limited by other factors than climate. Other references are given in detailed comments. In the main text, climate chnage is sometimes put in context (e.g. p. 31, line 14), but this not come back clearly in the figures, conclusions and main messages. If there is ont enough information on this, this is not mentioned in section 7.6 on research gaps.\n\n (NETHERLANDS)
21	7	0	0	0	0	reference list not consistent, reference list not complete, citations not consistent (et al./et al/et al in italic, etc.)\n\n (NETHERLANDS)
22	7	0	0	0	0	Although this chapter relies less on crop models compared to previous IPCC reports, their results are still not much discussed in this chapter. Among others, model comparisons for wheat (Palosuo et al. 2011, European Journal of Agronomy 35 103- 114) and barley (Rotter et al. 2012, Field Crops Research 133: 23-36) showed that no model can give accurate predictions of actual yield levels in Europe. In developing countries, crop model simulation results are often even less accurate, as actual yields deviate more from potential and/or water limited yields. A review paper discussing this is White et al. (2011, Field Crops Research 124, 357-368). Like many topics, it is discussed in the chapter (f.e. on p. 12), but in the main text, and not in figures, conclusions and main messages. Highlighted results still rely too much on crop models, which may not always give reliable projections. \n\n (NETHERLANDS)

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23	7	0	0	0	0	The only impact mentioned for Europe in the SPM on p.19 is the stagnation of wheat yields due to climate (based on Ch.7). It may however be argued whether climate change is the reason. Prices of wheat decreased until 2008, and wheat became less important relative to other crops in rotations. It may be the case for some countries, but a study accepted with minor revisions in Field Crops Research (Rijk, B., M. van Ittersum, J. Withagen, 2013. Genetic progress in Dutch crop yields) shows that in the Netherlands genetic progress still increases linearly as in the past for all major crops. Actual yields do not keep up, so yield gaps increase. Yields are less limited by climatic conditions, but more by management factors. For example, in the Netherlands wheat is often grown after sugar beet. As sugar beet can be harvested later than in the past, to obtain higher yields, farmers do this. This implies wheat needs to be sown later than optimal, but as revenues for sugar beet are higher than for wheat, they prefer higher sugar beet yields.\n\n (NETHERLANDS)
24	7	0	0	0	0	With the exception of a few scarce remarks into the effectiveness of policy measures in limiting price increases during the 2008 food price hike, there is no explicit analysis of potential economic policy measures that could be taken to mitigate the impact of climate change on food security. It would be worthwhile to add a paragraph discussing the effectiveness of such potential measures. Such a paragraph could deal with issues as the effects of export bans or market regulation on food markets under climate change. \n\n (NETHERLANDS)
25	7	0	0	0	0	The chapter presents a very interesting analysis of likely climate change effecst on various food production systems. The discussion of literature on direct effects of climate change on crop yields and other food production systems is extensive and covers all important crops and regions. In contrast the 'food security' element of the chapter, i.e. the analysis of economic effects and behavioural responses to these projected yield changes, is relatively limited (paragraph 7.3.3 & 7.4.3). We feel that this is limitation that should be addressed by including a more thorough review of the economic (academic) literature of this field of study. Such a review should ideally also considere demographic projections for the human populations studied, in order to truly assess future food security issues and there relationship to climate change. Particularly, this is important as the food security component of the chapter is probably of most interest to policy makers. \n\n (NETHERLANDS)
26	7	0	0	0	0	Animal welfare issues with climate change - e.g. heat stress, extreme weather events, are not discussed. Is there literature in this area that could be assessed? (CANADA)
27	7	0	0	0	0	As written, although there are a few places where the chapter identifies clearly severe risks that climate change poses to food security, especially over the 100 year time frame, it is possible to read the chapter and come away with the impression that, really, the risk may not be so large -- the situation not too bad. This impression contrasts starkly with papers like Battisti and Naylor (2009). From their abstract: "We used observational data and output from 23 global climate models to show a high probability (>90%) that growing season temperatures in the tropics and subtropics by the end of the 21st century will exceed the most extreme seasonal temperatures recorded from 1900 to 2006." This is purely observational; it does not employ alarmist language. But it puts the situation in a very different perspective. These findings are without doubt highly policy-relevant and readers of the IPCC report need to see them.\nBattisti, D. and R. Naylor (2009). "Historical Warnings of Future Food Insecurity with Unprecedented Seasonal Heat." Science 323: 240-244.\nAbstract: Higher growing season temperatures can have dramatic impacts on agricultural productivity, farm incomes, and food security. We used observational data and output from 23 global climate models to show a high probability (>90%) that growing season temperatures in the tropics and subtropics by the end of the 21st century will exceed the most extreme seasonal temperatures recorded from 1900 to 2006. In temperate regions, the hottest seasons on record will represent the future norm in many locations. We used historical examples to illustrate the magnitude of damage to food systems caused by extreme seasonal heat and show that these short-run events could become longterm trends without sufficient investments in adaptation. (UNITED STATES OF AMERICA)

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28	7	0	0	0	0	Building soil organic matter is a key agricultural action that improves soil fertility (and hence productivity) and water holding capacity (and hence resilience in the face of drought). The potential for building soil organic matter as a key component of climate change adaptation for food security, contributes to mitigation via carbon storage, and should be discussed more fully in this chapter. As is, the term appears only twice: first on page38 (lines 38-53), in the context of a case study, and second on page 44 line 26, in relation to OM inputs to the ocean.\nThere are many references to support the relationship of soil organic matter to soil water holding capacity, soil fertility, and carbon storage:\nRawls et al.(2003)"Effect of soil organic matter on soil water retention".Geoderma 116:61-76.\nChivenge, P., et al. (2009). "Organic and Mineral Input Management to Enhance Crop Productivity in Central Kenya." Agronomy journal 101: 1266-1275.\nManlay, R. l. J., et al. (2007). "Historical evolution of soil organic matter concepts and their relationships with the fertility and sustainability of cropping systems." Agriculture, Ecosystems and Environment 119: 217‰ÛÒ233.\nBhardwaj, A. K., et al. (2011). "Ecological management of intensively cropped agro-ecosystems improves soil quality with sustained productivity." Agriculture, Ecosystems & Environment 140(3-4): 419-429.\nMagdoff, F. and H. Van Es (2010). Building Soils for Better Crops, Sustainable Agriculture Research and Education (SARE).\nNational Research Council (2010). Toward Sustainable Agricultural Systems in the 21st Century. Washington, DC, National Academies Press. (UNITED STATES OF AMERICA)
29	7	0	0	0	0	Chapter 9 focuses on rural areas and there seems to be a slight amount of overlap between Chapter 7 and Chapter 9. Recommend that the authors of both chapters (7 & 9) to ensure that duplication is minimized and synergies are maximized. (UNITED STATES OF AMERICA)
30	7	0	0	0	0	It is laudible that the IPCC WG2 decided to broaden the focus of climate change impacts on agriculture beyond production to the food system more broadly, but the way this decision played out is confusing for two reasons. First, the chapter still focuses primarily on climate change impacts on production -- which leads to the second reason. Upon reflection, it may be that other aspects of food security simply are not strongly linked to climate change, at least not directly. The authors should address both of these points in concert, one way or another, because as it stands there is a large gap between what the chapter purports to do and what it actually does.\nOne way to address this problem that could be extremely helpful is a figure and accompanying text that shows how climate change could impact food security via impacts on different parts of the food system (production, infrastructure, trade, access, storage, distribution, income), including some explanation of which impacts are direct and likely, which are probably not of great importance by comparison with other stressors on food security, and which could become critical via indirect routes even though they intuitively seem not so important. With that frame, the chapter could then reasonably ignore those areas of food security that are not particularly linked to climate, while setting the stage for future reports to revisit assessment of the strength of these links. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
31	7	0	0	0	0	The chapter could be tighter and more synthetic, with clearer framing of debates and identification of conclusions from those debates, especially those where policy action is needed. Some sections seem to be more of a summary of what information is available rather than an analysis of what is most important. There is significant repetition and some sections include what appears to be more of a cutting and pasting of notes than conclusions from an overview of the weight of evidence. Parallel treatment of topics would also be helpful, for example, there is no discussion of pests and diseases for livestock on p. 10 Sec 7.2.1.3. The research conclusions seem hastily done and token rather than comprehensive, but this is more of an impression than systematic analysis on my part. \nRegarding balance, it is always too easy to point out what has not been addressed, however several key issues do seem to require more attention: (1) the basis for future projections of food needs or the uncertainty associated warrants discussion; (2) consumption and the possibilities for redirecting consumption into the future (this could be incorporated throughout, but one place where consumption really should be mentioned is on p. 24 lines 41-48); (3) the distribution of food within the household or the organization of food production as food production becomes more limited in certsain places and food more scarce; and (4) food security and conflict (currrently has one line). \nIn addition, much of the discussion seems focused on temperature and precipitation changes, with less attention to seasonality. The discussion of genetics and breeding strategies for new cultivars seems limited. As an example of where policy actions could be highlighted, the suggestion of a gene bank is currently buried at the end of a paragraph, yet given the importance of new cultivars, this might be one of the most important actions required. Treatment of regional variation seems ad hoc. It also might be helpful to note where evidence is from modeling versus empirical data. (UNITED STATES OF AMERICA)
32	7	0	0	0	0	The chapter includes text on some key assumptions about population growth rates and trajectory of diets. Dietary trends, in particular, could change -- either for reasons we do not currently understand or in response to targeted information or incentive programs that could be part of adaptation planning. The chapter does not address the benefits and practicality of transitioning towards a plant-based diet. Dietary assumptions need to be clearly identified as assumptions rather than as a fixed playing field that cannot change. (UNITED STATES OF AMERICA)
33	7	0	0	0	0	The chapter should address, at least briefly, food waste, which accounts for between 30-40% of food production globally, and the potential for reductions in food waste to both reduce emissions and to increase food security. As with energy, if waste can be reduced, demand decreases which means lower emissions from the agriculture sector, at all stages of the supply chain. And reduced food waste in industrialized countries also means less food decomposing after purchase by consumers, and hence lower methane emissions. \nThe references below document and quantify the climate change impacts of food waste and the potential for food waste reduction to be an important part of addressing food security, including food security in the context of climate change impacts and mitigation. The US Government -- efforts at the Dept of State, for example -- recognizes the role food waste reduction can play in ensuring food security, showing that major institutions whose participation is required to tap the potential for using this approach are in fact participating. \nEnergy efficiency is now widely regarded as the first critical step towards increasing resilience to climate change in the energy system. Reducing food waste could play a very large role in ensuring food security -- including resilience of the food system to climate change. This chapter should highlight that opportunity, both in the text and in the figures.\nKey references:\nGustavsson, J., et al. (2011). Global Food Losses and Food Waste: Extent, Causes, and Prevention. Rome, Italy, Food and Agriculture Organization of the United Nations.\nHall, K. D., et al. (2009). "The Progressive Increase of Food Waste in America and Its Environmental Impact." PLOS One 4(11): e7940.\nParfitt, J., et al. (2010). "Food waste within food supply chains: quantification and potential for change to 2050." Philosophical Transactions of the Royal Society B: Biological Sciences 365: 3065-3081.\nVermeulen, S. J., et al. (2012). "Climate Change and Food Systems." Annual Review of Environment and Resources 37: 195-222.\nFoley, J. A., et al. (2011). "Solutions for a cultivated planet." Nature 478(7369): 337-342. (UNITED STATES OF AMERICA)

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34	7	0	0	0	0	The potential of small holder agriculture that integrates agroecology and "land-sharing" to increase food security needs more attention. The agricultural landscape and its implications for food security in the face of climate change (or even without) could look radically different than it does today. Just as we have embraced the vision of a low-carbon economy that differs dramatically from the current fossil-fuel based economy, we could envision and achieve a very different agricultural production system than dominates the most productive agricultural areas today. For example, perennials could be much more widely integrated with food crops to restore soil health and increase staple yields.\nSee: Glover, J. D., et al. (2012). "Agriculture: Plant perennials to save Africa's soils." Nature 489(7416): 359-361.\nThese possibilities need to be identified and included in the portfolio of available tools that need to be pursued. We don't know which ones will prove most successful and we expect that a variety of practices and agricultural systems will be needed depending on soil, climate, culture, and other place-based factors. But the full range of possibilities need to be identified in this IPCC chapter on food security -- possibilities including agroecological approaches like using perennials to increase soil organic matter, or N-fixers to enable rural poor in developing countries to avoid heavy reliance on costly synthetic fertilizer. (UNITED STATES OF AMERICA)
35	7	0	0	0	0	The treatment of uncertainty and confidence in this and other IPCC chapters has evolved with careful consideration over a number of years. It could be taken a step further to enable readers including governments to take advantage of a risk management perspective. \nA good resource for understanding how to interpret and present data about climate change and adaptation using a risk management framework might be:\nMabey, N., et al. (2011). Defining a Risk Management Framework for Climate Security. London, UK, Third Generation Environmentalism Ltd: 177.\nMabey et al. describe their report as "strongly informed by the experience of senior security, intelligence and defense officials and experts from the United States, Europe and developing countries through a series of closed-door meetings..." so it represents views that IPCC authors should care about. \nScenarios that present climate change impacts to food production/food security that are low-probability, high-consequence is not only appropriate but needed. Similarly, adaptation options could be classified as most appropriate to high-probability or low-probability impacts, and that understanding could influence how governments and other entities choose to allocate resources among the portfolio of response options. (UNITED STATES OF AMERICA)
36	7	0	0	0	0	South Asian studies are very sparse (Nair, Malini, Indian Institute of Science)
37	7	0	0	0	0	General: I am surprised that nothing is mentioned about extreme events (froughts and hearvy rainfall or hail) and impacts on crops. This however has become an issue and there are a few papers published. (Vasseur, Liette, Brock University)
38	7	0	0	0	0	I didn't see anything in realtion with national policies for food and nutrition. However in several developing countries they have huge impacts in increasing the likelihood of food insecurity. This is well known in Subsaharan Africa. (Vasseur, Liette, Brock University)
39	7	0	0	0	0	As a human geogrpaher, I read this chapter with great interest. Food security is an important intervening variable between climate and all kinds of human behaviours, such as the things people do to adapt to changes in the climate. I feel that this chapter treats adaptation too narrowly as adjustments in agricultural production techniques. There is some mention of other things people and other actor do to adjust, but I think it would good to make clearer from the onset that agricultral change is just one of a larger set of options people and societies have. (van der Geest, Kees, United Nations University)

#	Ch	From Page	From Line	To Page	To Line	Comment
40	7	0	0	0	0	This chapter has improved considerably as compared to the FOD; still there are a few weak points, mainly need for clearer presentation, missing information, and a few errors; suggestions for amendments, including detected errors are presented in teh detailed comments below; with respect to some important missing references, I have compiled a supporting file (IPCC_AR5_WGII_chapter 7_addREFs_(RP-Rotter)); I will refer to those Refs in detailed comments below (Rötter, Reimund, MTT Agrifood Research Finland)
41	7	0	0	0	0	One of the shortcomings is that the chapter does not clearer present what's new since AR4 (and, partly, findings that had already been well establised in the 1995 IPCC WGII chapter: Agriculture in a changing climate - are presented as new); here one could more prominently present as NEWS: more detailed, high resolution agricultural modelling since AR4 (e.g. Nelson et al. 2009, 2010) report substantial declines in yield for some crops in key producing areas (biophysical effects only); climatic risks more severe and earlier (already at +2oC); food price increases under most scenarios; etc. (Rötter, Reimund, MTT Agrifood Research Finland)
42	7	0	0	0	0	Summary of most severe omissions (see, also detailed page and line-explicit comments below):\n(i) Omission1: in sub-section 7.3.1 (methods..), section not detailed and complete enough: regarding differentation of capabilities of various. methods; better information available on recent advances in Multi-Model Ensemble (MME) crop simulations and uncertainty evaluation\n(ii) Omission1: also in methods section, lacking is mentioning of (global) economic models – they are not treated at all in the methods section\n(iii) Omission3: adaptation not presented and discussed sufficiently detailed (& and also too narrow) \n(iv) Omission4: claims on improved quantification and presentation of uncertainties since AR 4; this hardly or at least not not sufficiently reflected in this chapter \n\n (Rötter, Reimund, MTT Agrifood Research Finland)
43	7	0	0	0	0	Summary of most important errors detected (see, also detailed page and line-explicit comments below): (Rötter, Reimund, MTT Agrifood Research Finland)
44	7	0	0	0	0	1) Executive summary, message 9: it should read ”Without adaptation....in tropical regions (instead of temperate) (Rötter, Reimund, MTT Agrifood Research Finland)
45	7	0	0	0	0	2) Executive summary, message 9: Error or Omission? ”Reductions of more than 5% are more likely than not beyond 2050 and....” [if 5% true, then this is a major discrepancy with AR4 results! – thus, an omission] (Rötter, Reimund, MTT Agrifood Research Finland)
46	7	0	0	0	0	3) Possible error /section 7.3.2: ”Heat stress effects have been better quantified at regional and local scales ..” => at least doubtful, as most models not capable to capture impacts of extreme weather events (heat, drought) sufficiently reliable (either relationships are oversimplified and/result from erroneous process description) (Rötter, Reimund, MTT Agrifood Research Finland)
47	7	0	0	0	0	4) Possible error/omission, Section 7.6: ”..neglect include the need to update and revise food production impact models... ” – many of the research gaps mentioned have been (during past 2 years) and are currently actively tackled by international research network (such as AgMIP; CCAFS, Facce-MACSUR; ISI-MIP, etc) – see, e.g. my additional references compiled in supporting file such as Rosenzweig et al., 2013; Soussana et al., 2012, etc.: IPCC_AR5_WGII_chapter 7_addREFs_(RP-Rotter) (Rötter, Reimund, MTT Agrifood Research Finland)
48	7	0	0	0	0	The general comment for Chapter 7: The relative titles and the clearly contents. However, when we mention the issues of Food Security and Food Production Systems, we should divide it into 2 parts: Food Security Systems and Food Production Systems for analysis.\nIn The Introduction and Context, we should clarify the concept of Food Security Systems and Food Production Systems. And then we must also clarify The current State of food security and production Systems. Besides we should determine the Methods of Assessing Impacts. To clarify current state of it and its relation to weather and Climate as well as Effects of climate change on Food Security Systems and Food Production Systems (VIETNAM)

#	Ch	From Page	From Line	To Page	To Line	Comment
49	7	0	0	0	0	In AR4 there was a very useful diagram giving the impacts on production of different crops with different climate change scenarios, including the impacts of Co2 fertilisation. It was very interesting, but the ranges were so wide it was difficult to make use of. We would like to see an update of this to see how the ranges have changed. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
50	7	0	0	0	0	The chapter is on food security and food prduction system however it does not elaborate much on aspects of food production systems that go beyond the biophysical or the crop production. (Chatterjee, Monalisa, IPCC WGII TSU)
51	7	0	0	0	0	Section 7.3 is about impacts, vulnerailities and sensitivities and not so much about risks. (Chatterjee, Monalisa, IPCC WGII TSU)
52	7	0	0	0	0	1) Overall -- The chapter team has developed a strong 2nd-order draft. In the final draft, the chapter team is encouraged to continue prioritizing compact and rigorous assessment, effective figures, clear writing, and high specificity. (Mach, Katharine, IPCC WGII TSU)
53	7	0	0	0	0	2) Coordination across Working Group II -- In developing the final draft of the chapter, the chapter team should continue to ensure coordinated assessment, both in the chapter text and at the level of key findings. As appropriate, cross-references to the sections of other chapters and/or their assessment findings should be used, continuing to ensure that overlaps are reduced and assessment harmonized. (Mach, Katharine, IPCC WGII TSU)
54	7	0	0	0	0	3) Harmonization with the Working Group I contribution to the AR5 -- In developing the final draft, the chapter team should also ensure all cross-references to the Working Group I contribution are updated, with discussion of climate, climate change, and climate extremes referencing the assessment findings in that volume. Where cross-references are made, wherever possible and appropriate they should specify the specific relevant sections of Working Group I chapters, instead of generic references to whole chapters. (Mach, Katharine, IPCC WGII TSU)
55	7	0	0	0	0	4) Presentation of uncertainty language within parentheses -- As much as possible, the chapter team should present calibrated uncertainty language within parentheses at the end of sentences. Such placement maximizes the directness and clarity of statements. Wherever possible, formulations such as "there is high confidence that" should be nixed and replaced by "(high confidence)" at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
56	7	0	0	0	0	5) Report release -- The chapter team should be aware that the final drafts of the chapters will be posted publicly at the time of the SPM approval, before final copyediting has occurred. Thus, the chapter team is encouraged to continue its careful attention to refined syntax and perfected referencing. (Mach, Katharine, IPCC WGII TSU)
57	7	0	0	0	0	6) Tightening the assessment and supporting a maximally rigorous executive summary -- In developing the final draft, the chapter team is encouraged to revise each section so that the core nuanced key findings emerge clearly with full and traceable support. Continuing with such focus, the chapter team should aim to shorten and tighten the assessment as much as possible. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
58	7	0	0	0	0	7) Characterization of future risks -- In characterizing future risks for food security and systems, to the degree appropriate the chapter team should continue to indicate the extent to which risks (or key risks) can be reduced through mitigation, adaptation, or other responses. That is, is it possible to indicate how risks may increase as the level of climate change increases or, potentially, to indicate the relative importance of changes in mean conditions, as compared to changes in extreme events, as compared to potential non-linear changes associated with biome shifts or tipping points? And then, how much can risks be reduced through adaptation or development, in the near-term and the long-term? How are factors or stressors that multiply risks relevant in this context? As supported by its assessment of the literature, the author team should consider communicating risks for the era of climate responsibility (the next few decades, for which projected temperatures do not vary substantially across socio-economic/climate scenarios) and for the era of climate options (the 2nd half of the 21st century and beyond). As might be helpful to the chapter, the framing of table SPM.4 could be considered in characterization of future risks, along with the key and emergent risk typology of chapter 19. (Mach, Katharine, IPCC WGII TSU)
59	7	0	0	0	0	8) Informing the summary products -- To support robust and insightful summary products for the report, the chapter team is encouraged to maximize nuance and traceability in its key findings, continuing to use calibrated uncertainty language. In addition to highlighting key findings throughout the chapter and characterizing future risks (see the previous comments), the chapter team is encouraged to consider themes emerging across chapters, indicating for example how extreme events have demonstrated adaptation deficits and vulnerability to date and may relate to future risks, how limits to adaptation may be relevant in the context of this chapter, how adaptation experience has been relevant to date, and how interactions among mitigation, adaptation, and sustainable development may occur. (Mach, Katharine, IPCC WGII TSU)
60	7	0	0	0	0	9) Assessment of food security -- Is it possible to provide more assessment of the economic factors determining vulnerabilities and sensitivities in the context of food security? Such material could be placed between section 7.3 and 7.4. (Mach, Katharine, IPCC WGII TSU)
61	7	0	0	0	0	GENERAL COMMENTS: I congratulate the author team for all their work on an interesting and informative SOD. Please see my detailed comments for suggestions related to specificity of ES findings and traceable accounts, refining figures and tables, and various specific clarifications. I have two general comments. (1) The executive summary and chapter text use a mixture of all three forms of calibrated uncertainty language (agreement/evidence, confidence, likelihood), and the reasons for the different choices are not always clear. Please consider the overall approach to using calibrated language, particularly in the context of the executive summary, and how the usage can be better harmonized. Given that some key findings already use confidence, I would recommend shifting from agreement/evidence statements to confidence where possible (e.g., in cases where evidence is not "limited" and/or agreement is not "low"). The agreement/evidence terms can be retained as "XX confidence based on XX agreement, XX evidence" if desired, but keep in mind that this is quite a wordy construction, and it may be clearer to include the description of the evaluation of evidence and agreement in the chapter text. Where likelihood terms are used ("likely," "very likely," etc.), it is also not always clear whether they are intended as calibrated language or not--please carefully check this and avoid casual usage. (2) The chapter text would benefit from an edit aimed at tightening and focusing the discussions even further. When considering the suite of review comments, please look for opportunities to hone the text in revision. (Mastrandrea, Michael, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
62	7	0	0	0	0	SUMMARY PRODUCTS: In preparing the final draft of your chapter and particularly your executive summary, please consider the ways in which your chapter material has been incorporated into the draft SPM and TS. For Chapter 7, this includes presentation of observed impacts and vulnerabilities in section A.i and sectoral risks in section C.i, as well as related figures and tables. Are there opportunities for presenting chapter findings and material in a way that further supports broad themes highlighted in the summary products and that facilitates additional cross-chapter synthesis in specific findings or figures/tables? Do the existing summary product drafts suggest additional coordination that should occur between Chapter 7 and other chapters at LAM4? (Mastrandrea, Michael, IPCC WGII TSU)
63	7	0	0	0	0	Again complete disregard of the current absence of warming for the past 15 years. No mention of the possible influence of the recent persistent Northern Hemisphere cold winters on food supply (Gray, Vincent, Climate Consultant)
64	7	1	0	0	0	General Comments: limited to fisheries. (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
65	7	2	0	0	0	Executive Summary: Please carefully check the line of sight to underlying chapter sections throughout the executive summary, and ensure that indicated chapter sections provide clear traceable accounts and support for the presented findings. In this context, I would recommend further thought as to how the executive summary can most clearly communicate the findings of the chapter. The current draft contains much good material, but I feel that the clarity of the presentation can be improved, and there are a few cases where support in the chapter text is not clear (see specific comments). (Mastrandrea, Michael, IPCC WGII TSU)
66	7	2	1	3	20	The language used to decribe the effect of global warming on food security is extremely cautious. The danger of a food crisis by 2050 is severely understated. To a lay reader, this executive summary will seem ambiguous, with sufficient uncertainty to justify a "do nothing" response. While alarmism is to be avoided, the report will fail politically if it is too cautiously worded. Too little attention is paid to the increasingly concentrated corporate ownership of the world food system, including land water and seeds (cf Amartya Sen). (Reuter, Thomas, University of Melbourne)
67	7	2	4	2	8	It would be helpful to include specific estimates as in previous paragraphs. (UNITED STATES OF AMERICA)
68	7	2	10	2	21	Both sections address extreme heat. Suggest that the authors combine these paragraphs. (UNITED STATES OF AMERICA)
69	7	2	29	0	0	Characterizing Future Risks in the Executive Summary -- As much as possible and with firm grounding in the assessment of the chapter, the chapter team should continue to specify the degree to which future risks change or increase with increasing levels of climate change. Which risks emerge in the near-term, and which emerge in the long-term? What is the potential for reducing risks through adaptation and mitigation? The chapter team should also continue providing quantitative information on the ranges of possible outcomes. (Mach, Katharine, IPCC WGII TSU)
70	7	2	29	0	0	Ensuring Traceability of Key Findings -- The chapter team should make sure the key findings in the executive summary clearly and robustly communicate the core findings of the chapter's assessment. For each statement, the chapter team should ensure that a reader is able to understand the traceable account of the finding, within the chapter sections referenced. (Mach, Katharine, IPCC WGII TSU)
71	7	2	29	0	0	Confidence -- For some findings within the executive summary, the chapter team may be able to move from its evaluation of evidence and agreement to assignment of a level of confidence, following the guidance for authors. Wherever it is possible to do so, the chapter team is encouraged to present levels of confidence, building from the assigned summary terms for evidence and agreement. (Mach, Katharine, IPCC WGII TSU)
72	7	2	29	0	0	Care with Extrapolation -- In making extrapolated statements about sensitivity and population, the chapter team should exercise care, ensuring rigorous support for the statements in the assessment of the chapter. In some places, more conditional framings may be appropriate where extrapolation is occurring. (Mach, Katharine, IPCC WGII TSU)
73	7	2	29	4	20	This is all standard alarmist fare. Why don't you emphasize positive trends in yields, the great potential of genetic engineering, the potential of narrowing yield gaps? You neo-Malthusian we're all gonna starve story rings hollow. (Tol, Richard S.J., Vrije Universiteit Amsterdam)

#	Ch	From Page	From Line	To Page	To Line	Comment
74	7	2	31	2	38	The bolded statement appears to attribute effects on human causes of climate change while the underlying text appears to attribute to observed climate trends (not necessarily attributable to human causes). It is also unclear if climate change is meant to include changes in CO2. Noting lack of confidence in attribution of precipitation changes to human activities, suggest that this paragraph be clarified and any attribution assessment be clear and explicit. (Kheshgi, Haroon, ExxonMobil Corporate Strategic Research)
75	7	2	31	2	38	In mid-latitude, there are both positive and negative impacts which depend on regional climate pattern and adaptation measures. (Zheng, Dawei, China Agricultural University)
76	7	2	31	2	38	In mid-latitude, there are both positive and negative impacts which depend on regional climate pattern and adaptation measures. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
77	7	2	31	2	38	Because the role of climate change on food prices is poorly understood, it is difficult to say that "periods of rapid food price increases" demonstrate the "partial sensitivity of current markets to climate variability." The last statement of this paragraph does not clearly support the link between climate change and food production. Suggest revising appropriately. (UNITED STATES OF AMERICA)
78	7	2	31	2	38	The chapter has very limited evidence on the effects of climate change on food production. (Chatterjee, Monalisa, IPCC WGII TSU)
79	7	2	33	2	33	Even at high latitudes, some of the native species get affected. (INDIA)
80	7	2	33	2	34	That would be weather variability rather than climate variability. There are also studies that attribute price rises to climate policy, particularly the US biofuel mandate, rather than climate change. (Tol, Richard S.J., Vrije Universiteit Amsterdam)
81	7	2	33	2	34	The sentence "demonstrating partial sensitivity of current markets ..." is not well supported by the evidence presented in the actual chapter. Confidence estimate is also lacking. Moreover, the current phrasing of this sub-sentence suggests a logical connection between rapid food rise increases and an attribution to climate change, which is unwarranted. As a matter of fact economic (e.g. production and transaction costs, speculation, expectations) and social forces (population growth and structure, consume patterns etc.) are entangled and interplay in very dynamic conditions (see TS page 13 line 40). The sentence can be reformulated building upon the fact that climate change related factors are increasingly taken into account considered in food markets, but studies are required. Suggestion: "Since AR4, there have been several periods of rapid food price increases. These increases can partially be contributed to climate variability (low evidence, medium agreement) as factors related to climate change are increasingly considered in food markets even if extensive studies are required.\n\n (NETHERLANDS)
82	7	2	33	2	36	the contents here seem not very well match the heading title of the bullet (Pan, Genxing, Nanjing Agricultural University)
83	7	2	34	0	0	The authors state that food prices have a "partial sensitivity of current markets to climate variability." and the authors continue to correlate short-term price changes to "climate change". In these cases the authors might receive more credibility if they correlate short-term price changes and weather variability. The authors' attempts to connect rapid food price increases with partial sensitivity to climate variability may overstep the science, and if not, they should provide a citation. (UNITED STATES OF AMERICA)
84	7	2	34	2	34	Suggest to delete "demonstrating the partial sensitivity of current markets to climate change." (Pan, Genxing, Nanjing Agricultural University)
85	7	2	34	2	34	partial sensitivity of current markets to climate variability is hard to understand and potentially ambiguous; I think the authors intend "sensitivity of current markets to climate variability among other factors", but a skip-reader might well read "current markets are a bit sensitive to climate variability" (Moore, Andrew, CSIRO)

#	Ch	From Page	From Line	To Page	To Line	Comment
86	7	2	34	2	36	This statement is not fully explained in 7.2.2. Please explain the basis for the comparison of the role of climate change compared to other factors. (Mastrandrea, Michael, IPCC WGII TSU)
87	7	2	36	2	37	Query the statement that 'energy policy' is one of the 'main drivers' of changes in food security in the near term. The Chapter goes on to establish arguments for it being a driver, but does not establish it is a main economic driver over and above other important social and economic issues such as poverty, lagging agricultural development and inadequate market infrastructure. Recommend deleting 'energy policy' so the sentence reads: "Social and economic issues, such as changes in household income, will remain the main drivers of changes in food security in the near-term, regionally and locally". If a second example is needed recommend inserting "and rural development" after 'income'. (AUSTRALIA)
88	7	2	36	2	37	The sentence starting with "social and economic" is inconsistent with other parts of the chapter. For instance, at page 6 line 49-50 at page 24 line 43-45 or at page 10 line 14 and following, it is stated something different. It is therefore impractical to say that "the social and economic remain the main drivers of change", rather, a sentence like "they are so far considered the better understood/more studied drivers of change" is more acceptable and reflect more fairly the content of Chapters 7.\n\n (NETHERLANDS)
89	7	2	36	2	37	Which energy policies would effect food security? We presume this is referring to biofuels but please clarify. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
90	7	2	36	2	38	Civil wars and military conflicts should be added as main drivers of change in food security. (GERMANY)
91	7	2	37	2	38	The authors point out that other policies will drive food security in short-term but do not identify the scale at which food security is being discussed. Here and elsewhere, to be both meaningful and understandable, the discussion of food security needs to be more specific to include locations and types of people affected. (UNITED STATES OF AMERICA)
92	7	2	40	2	40	How relevant is it to mention global population here? (Mach, Katharine, IPCC WGII TSU)
93	7	2	40	2	47	The seriousness of effects on yield is sensitive to the assumed improvement in yield (constant climate). Suggest that this paragraph state assumptions about baseline yield growth (and the uncertainty in this assumption) as well as effect of climate so that the magnitude of effects and uncertainties can put into context. (Kheshgi, Haroon, ExxonMobil Corporate Strategic Research)
94	7	2	40	2	47	In line 43, after '…from the mid-21st century onwards.', it is suggested to add ', the combined global population increasing and climate change will pose a huge pressure on the poor in the vulnerable areas.'. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
95	7	2	40	2	47	In some countries arable area may decrease due to urbanization particularly in east and south Asia. (Zheng, Dawei, China Agricultural University)
96	7	2	40	2	47	In some countries arable area may decrease due to urbanization particularly in east and south Asia. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
97	7	2	40	2	47	The header for this paragraph describes the "food system" but the paragraph content focuses on arable land. Decline in arable land would impact "food production" more directly than the "food system", unless there are other climate change impacts throughout the food system not described in the summary. Please clarify and/or elaborate. (UNITED STATES OF AMERICA)
98	7	2	40	2	47	It is unclear what impacts this paragraph is focusing on; changes to yields or changes to arable area due to climate change, and how that translates into changes in the amount of land that is cropped. (Coughlan, Erin, Red Cross / Red Crescent Climate Centre)

#	Ch	From Page	From Line	To Page	To Line	Comment
99	7	2	40	2	47	The logic of this paragraph is not completely clear. The first sentence mentions global population in 2050, but it is not clear what comparison the authors intend with the rest of the paragraph, which focuses on changes in cropping area globally and regionally and a general statement about adverse impacts in the second half of the century. Please clarify the points being made here, and ensure clear traceability to the underlying assessment. What elements of the food system will be affected and how? Is there evidence to support statements about how this intersects with population growth and demand for food? In addition, how do these statements intersect with the conclusions on page 3, lines 38-44? (Mastrandrea, Michael, IPCC WGII TSU)
100	7	2	41	2	43	Thereafter ... onwards. The current wording suggest an absolute and universal negative of climate change on the human food system after 2050. This is inconsistent with predictions that some sites will benefit from predicted climate projections, e.g. Page 27 lines 29-36. A proposed improvement can be the addiction of "However, at a local scale some sites may benefit from increases yields, particularly in temperate regions". \n\n (NETHERLANDS)
101	7	2	41	2	43	It would be preferable to indicate more specifically what is meant by "seriously and negatively." Consistency of this statement with page 3, lines 38-54, as well as 7.4.1 should be ensured. (Mach, Katharine, IPCC WGII TSU)
102	7	2	44	2	44	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
103	7	2	44	2	45	I suggest you re-word the sentence to: "Global arable area is projected to increase between 9% and 25% (medium evidence, medium agreement) over the period from 2007 to 2050…" (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
104	7	2	44	2	47	The first sentence of the period ("Global arable area") provides a positive message which is qualified in the immediately following sentence. In fact the mentioned agro-economic studies including global warming (which should be the most relevant for WGII) in line 45 47 weaken the initial positive message giving a more plausible and accurate message. The whole period should be reformulated, possibly just mentioning those studies that include global warming.\n\n (NETHERLANDS)
105	7	2	44	2	47	There are opportunities, it seems, to make these more clearly reflect the paragraph on page 28. Additionally, it would be helpful to further clarify how the 2 statements on these lines differ--would it be clearer to use a single sentence only? Finally, for the increase in the arable area described on line 44, it would be helpful to specify the various assumptions or scenarios underpinning the estimate. (Mach, Katharine, IPCC WGII TSU)
106	7	2	44	2	47	Please clarify that this means that the projected 9 to 25% increases in global arable area do not take into account climate change, and that the range is -9 to 20% for studies that do include climate change, per page 28. Please also clarify the reason for the change in agreement/evidence language between estimates. Finally, is the "likely" in line 44 intended as calibrated language? It appears not to be. (Mastrandrea, Michael, IPCC WGII TSU)
107	7	2	45	2	47	What are the reasons for the high uncertainty regarding the increase/decrease of cropping land from - 9 % to + 20 % by 2050? (GERMANY)
108	7	2	49	3	2	The timeframe for the high levels of warming scenario should be clarified. (UNITED STATES OF AMERICA)
109	7	2	49	3	2	The support for this paragraph is not completely clear in the chapter text. Please ensure clear traceability to the assessment of the underlying literature, and ensure that the text in the executive summary is clear and precise. For example, what does "very severe" mean in line 51? How would risks affect 90% of the population as noted also in line 51? What does "extrapolation from current models" mean in line 50, and is such extrapolation supported by the literature? (Mastrandrea, Michael, IPCC WGII TSU)
110	7	2	50	2	50	Is this extrapolation robustly supported by the literature? (Mach, Katharine, IPCC WGII TSU)
111	7	2	51	0	0	Please be more specific than "very severe" and explain what this actually means. (GERMANY)

#	Ch	From Page	From Line	To Page	To Line	Comment
112	7	2	51	2	51	It would be preferable to indicate more specifically what is meant by "very severe." Additionally, for the risks affecting 90% of the population, is it possible to indicate to what extent people are affected, or to indicate more precisely the mechanism of the effect? (Mach, Katharine, IPCC WGII TSU)
113	7	2	51	2	52	90% of population affected by risks how? This is very interesting, but needs a bit more context - at risk of food shortages? At risk of higher prices? Both or a mixture? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
114	7	2	53	2	53	Suggest replacing 'additively compounded' with 'compounded' to make simpler and clearer. (AUSTRALIA)
115	7	2	53	3	1	Not completely obvious why increasing tropospheric ozone levels will contribute to "risk" to food production (Could we describe this briefly and parenthetically for those just reading the ES?) (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
116	7	3	3	3	5	Impacted how? Positively or negatively? Could you include some numbers? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
117	7	3	4	3	5	The timeframe for this finding should be specified. (Mach, Katharine, IPCC WGII TSU)
118	7	3	4	3	5	Is this statement an observation or a projection, or a mixture of both? Please clearly separate what can be said in each context. (Mastrandrea, Michael, IPCC WGII TSU)
119	7	3	4	3	8	Please mention ocean acidification. What is the time frame of "long term"? (GERMANY)
120	7	3	4	3	8	Suggest this paragraph should come after the paras discussing impacts on crops - tells a better story. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
121	7	3	4	3	8	This finding should be coordinated with the key findings of chapter 6 and 30 ensuring harmonized assessment. (Mach, Katharine, IPCC WGII TSU)
122	7	3	4	3	9	Please add"However, the understanding of the response of quatic food production system to climate change is still very poor" at the end of line 9 (Song, Yanling, China Meteorological Administration)
123	7	3	4	3	9	might be worth trying to bring out the interaction of climate change with over fishing more. Climate change makes matters worse. (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
124	7	3	6	3	6	Here it is not clear what "these" refers to. (Mach, Katharine, IPCC WGII TSU)
125	7	3	7	3	7	add: such as higher latitudes (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
126	7	3	7	3	7	Are there indications of which regions fall in each category? (Mastrandrea, Michael, IPCC WGII TSU)
127	7	3	7	3	8	The reference to "benefits … 7.5.1.1.3" forgets to mention the adoption of adaptation strategies which are exactly mentioned in 7.5.1.1.3. The sentence should specify that benefits can occur should successful adaptation strategies are put in place.\n\n (NETHERLANDS)
128	7	3	8	3	8	Other marine chapters have mainly used summary terms for confidences. Authors should make sure their assignments of evidence and agreement match those. (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
129	7	3	10	3	11	The construction of this finding, to be fully understood, requires the reader to be familiar with the findings of the 4th assessment report. It would be preferable to make the finding fully stand-alone, alongside secondary reference to the 4th assessment report. (Mach, Katharine, IPCC WGII TSU)
130	7	3	10	3	12	Very interesting but we would like to see some more information about how this has changed projections of impacts - is there something you can pull from the rest of the chapter? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
131	7	3	10	3	14	Not only the importance of temperature changes in the average, but also changes to temperature distributions and the likelihood of extreme hot temperatures. (Coughlan, Erin, Red Cross / Red Crescent Climate Centre)

#	Ch	From Page	From Line	To Page	To Line	Comment
132	7	3	10	3	14	Clearer support in the chapter text is needed for this finding. Here and in the text please specify what new understanding has emerged since AR4 and how temperature changes are important for determining impacts on crop yields. (Mastrandrea, Michael, IPCC WGII TSU)
133	7	3	13	3	13	difference in precipitation just includes one aspects neglecting more important and more general climate extremes as mentioned for instance in 7.3.2.2.2. This specification should be include for the sake of completeness. \n\n (NETHERLANDS)
134	7	3	16	0	0	nutrition and processing appears imprecise andambiguous. I did not find robust evidence in the text for effects of high heat on food processing activities. High temperature is a common food processing technique so why should a few degrees of global warming have negative effects? (Gregory, Peter, University of Reading)
135	7	3	16	3	16	Extreme heat also a negative, verb is missing, the sentence should read "Extreme heat also has a negative" (or 'produces' as alternative to 'has')".\n\n (NETHERLANDS)
136	7	3	16	3	16	Typo: Extreme heat also [has?] a negative… (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
137	7	3	16	3	17	This statement is very generic (and appears to have a word missing) - is it applicable to livestock and cropping? What is meant by processing? (AUSTRALIA)
138	7	3	16	3	17	The sentence needs rephrasing. (Chatterjee, Monalisa, IPCC WGII TSU)
139	7	3	16	3	21	The context of the paragraph is not consistent with the first sentence with bold font, so it is suggested to change the whole context as 'Extreme climatic events have negative effects on both food quality and food productivity. Extreme heat also has the negative effect on food quality in terms of nutrition and processing (robust evidence, high agreement). Extreme weather and climatic events, are important for all food and fodder production, but particularly for annual determinate crops in which yield is harvested as seeds.' following the first bold font sentence. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
140	7	3	17	3	17	If here "extreme events" refers only to heat waves, it would be much preferable to use a more specific term. (Mach, Katharine, IPCC WGII TSU)
141	7	3	20	3	21	but ... seeds. In 7.3.2 no explicit comparison of determinate vs. indeterminate crops can be found, nor of seeds crops vs. other crops. This statement therefore probably represents an expert judgement that may very well be relevant, but it is currently insufficiently clear how it was reached. \n\n (NETHERLANDS)
142	7	3	23	3	23	It would be preferable to frame this finding so that the core conclusion here can be fully understood without knowledge of the findings in the 4th assessment report, making the reference to the 4th assessment report secondary in its construction. (Mach, Katharine, IPCC WGII TSU)
143	7	3	23	3	24	In the heading " positive effect of CO2" better as "of CO2 as a single factor in experiment ". For the positive effect on grain produciton by CO2 is likely overweighted by warming, as evidenced in our field experiments with both factors. (Pan, Genxing, Nanjing Agricultural University)
144	7	3	24	3	25	The calibrated uncertainty language here could be moved to the end of the sentence for clarity of reading. (Mach, Katharine, IPCC WGII TSU)
145	7	3	24	3	26	It will be useful if you clarify if the interaction will be a benefit or a challenge. (Chatterjee, Monalisa, IPCC WGII TSU)
146	7	3	26	3	30	While important, these statements leave the reader wondering, "what ARE the key findings that this advanced approach and knowledge base has allowed?" (Mach, Katharine, IPCC WGII TSU)
147	7	3	26	3	30	Please clarify why the chapter takes more account of model and other uncertainties than has been the case previously (l. 27), and what conclusions this leads to. In addition, what more robust statements can be made (l. 28), and why is less confidence given to simulated increases in yield variability? (Mastrandrea, Michael, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
148	7	3	27	3	29	Why is there less confidence in yield variability? I think you mean less confidence than in mean changes, but please clarify. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
149	7	3	32	3	36	Would it be appropriate to add a conclusion regarding insects ? (Anne, Blondlot, Ouranos)
150	7	3	33	3	34	The confidence level here associated with the statement that climate change will increase the competitiveness of weeds seems at odd with remarks on page 17, lines 47-50 suggesting CO2 to increase typical crop competitivity compared to many weeds (generally C4-plants). Suggestion: lower evidence and agreement. \n\n (NETHERLANDS)
151	7	3	34	3	36	The period starting with "The effects" should specify that assertions are made in spite of the scarcity of long term studies as specified at page 17 line 24. This is an important specification to be added.\n\n (NETHERLANDS)
152	7	3	36	3	36	Wrong referencing to the chapter. The actual part of the chapter on invasive weeds, pests and disease is 7.3.2.3. \n\n (NETHERLANDS)
153	7	3	36	3	36	I am curious if there is a more appropo word to describe what you mean by "disease intensity" (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
154	7	3	36	3	36	I believe the line of sight for this finding should be 7.3.2.3. (Mastrandrea, Michael, IPCC WGII TSU)
155	7	3	38	0	0	1) Clarify meaning of 'up to 2 deg C'. Does it many any small amount of warming reduces yield potential in this region, eg 0.2, .04 on the way up to 2. Unlikey. If so, suggest rephrasing as a effect under 'warming of about 2 deg C' 2) Is this an everage across the whole region? I presume so; and there will be areas where warming of more than 2 deg c which might produce incs in yield potential, eg Iceland. Suggest making it clear this is a generalisation across the region as a whole. 3) .And you do not mean' temperate' do you, but 'mid and mid-high latitude'. Or are you specifically excluding continental mid latitude. if former, use mid and mid-high lats; if latter, include additional ref to effects in non-temperate mid and mid-high latitudes latitudes. 4) this seems a revision of the conclusion in 4AR which states, p38 of SPM: "in mid to highlat regions moderate to medium increase of T (1 to 3 deg C can have small beneficial effects on crop yields." Worth clarifying if this is a change in conclusion. 5) The issue is complicate by whether or not one assumes adaptation (eg adopting culticars that make most of the longer growing season at higher lts under warmer conditions) . Can solve this, maybe, by separating out two statements: on a) altered yield potential without adaptation and b) likley changes in output after adaptation. (Parry, Martin, Imperial College)
156	7	3	38	3	44	Is this para referring to global values? (GERMANY)
157	7	3	38	3	44	This section comes after the section on high levels of warming. Recommend that the authors discuss the effect of 2 degree increase and then the effect of 4 degree increase. (UNITED STATES OF AMERICA)
158	7	3	38	3	44	In the Executive Summary, Page 3, Lines 38-44 (Message 9): it should read ”Without adaptation....in tropical regions (instead of temperate) - and next in the same paragraph, it is unclear whether there is an error or omission in following sentence: ”Reductions of more than 5% are more likely than not beyond 2050 and....” [if 5% true, then this is a major discrepancy with AR4 results! – thus, an omission] (Rötter, Reimund, MTT Agrifood Research Finland)
159	7	3	38	3	44	In the bolded section, can we say what the overall affect on global food production will be? It will leave the policy maker wondering. Some of the text needs to be explained better - for example, is the 5% a global average? The final sentence here isn't clear at all I assume it means that if there's an overall reduction in yields, with some increase in temperate regions, then reductions in tropical regions must be large. This paragraph is also a little confusing as it mixes up temperature change and timing. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
160	7	3	40	3	40	The phrase "there is confirmation" is ambiguous--as compared to what? (Mach, Katharine, IPCC WGII TSU)
161	7	3	41	3	42	Where are the reductions of more than 5% projected to occur? This is currently unclear. (Mastrandrea, Michael, IPCC WGII TSU)
162	7	3	43	3	33	Biological stresses should plus diseases and pests, no tonly weeds. (Zheng, Dawei, China Agricultural University)

#	Ch	From Page	From Line	To Page	To Line	Comment
163	7	3	43	3	43	very likely should be italicized if it is being used as a likelihood term or avoided if it is being used casually. (Mach, Katharine, IPCC WGII TSU)
164	7	3	44	3	44	This conclusion is important, but is it possible to make it more accessible to the reader? Adaptation will increase in the effectiveness by what metric, what are the net benefits, etc.? (Mach, Katharine, IPCC WGII TSU)
165	7	3	46	3	49	This sentence currently reads '...that adaptation will increase in effectiveness with increasing local mean temperature up to ca. 3C…'. Does this mean to suggest that adaptation becomes more effective as temperatures increase? Or should it read that adaptation will increase the effectiveness/productivity of food systems with increasing local mean temperatures up to ca. 3C? (AUSTRALIA)
166	7	3	46	3	49	Deleting content after “after”, effects of 3? increase needs to be evaluated. (Zheng, Dawei, China Agricultural University)
167	7	3	46	3	49	What types of adaptation are considered in this context? It would be helpful to understand the scope of actions included. (Mastrandrea, Michael, IPCC WGII TSU)
168	7	3	46	3	54	It would be informative to mention here already what is included in 'adaptation'. For crop production, it can include change of cultivation timing (change of sowing date and cultivar change (higher/lower thermal requirement)) but also more systematic and drastic adaptations (introducing new crops) (e.g. Howden SM, Soussana J-F, Tubiello FN, Chhetri N, Dunlop M, Meinke H (2007) Adapting agriculture to climate change. Proc Natl Acad Sci U S A 104:19691-19696). (Vanuytrecht, Eline, KU Leuven)
169	7	3	47	3	47	Suggest changing this to 'the benefits of adaptation will increase… since it is the benefits, not the effectiveness that will increase. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
170	7	3	50	3	53	This sentence is too long, making it difficult to understand. Consider re-phrasing. (AUSTRALIA)
171	7	3	51	3	51	The directionality of the difference should be clarified--"overall crop yield greater in adaptation cases"? (Mach, Katharine, IPCC WGII TSU)
172	7	3	53	3	53	The logic of the transition "thus" is not fully apparent to the reader. (Mach, Katharine, IPCC WGII TSU)
173	7	4	2	4	8	Adaptation for livestock system is not clear, which should include adjustment of animal varieties, load capacity and grazing lands, improvement of feed ingredient and diseases control, and forage store. For indoor feeding, environment improving such as ventilation and air conditioner against heat stress is also important. (Zheng, Dawei, China Agricultural University)
174	7	4	2	4	8	Adaptation for livestock system is not clear, which should include adjustment of animal varieties, load capacity and grazing lands, improvement of feed ingredient and diseases control, and forage store. For indoor feeding, environment improving such as ventilation and air conditioner against heat stress is also important. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
175	7	4	9	4	20	importance of CO2 fertilisation effect on crop yield is missing from the summary. this is however very important to mention as with the benefit of CO2 fertilisation effect, yields of C3 crops would increase globally whereas it would decrease without it. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
176	7	4	9	4	20	This list could be added to the SPM. (GERMANY)
177	7	4	9	4	20	We like this set of summary bullets, but suggest a re-think as to whether these are really the 'key' messages that policymakers would be interested in. For example 'adaptation is predicted to be partially effective in ameliorating the negative effects of warming', is pretty self-evident. We would prefer to see some numbers - for example global average observed and projected impacts. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)

#	Ch	From Page	From Line	To Page	To Line	Comment
178	7	4	9	4	20	These points are generally covered by the previous paragraphs of the executive summary, and it is strange to repeat them again here in an even more compact form. I would recommend deletion. If retained, these statements must include calibrated uncertainty language as their counterparts on previous pages do, and ensure clear traceability and precision in each statement. For example, it is not clear what effects of climate change are meant in l. 11, or what "immense pressure" means in l. 18. (Mastrandrea, Michael, IPCC WGII TSU)
179	7	4	11	4	20	Deletion of these statements is encouraged, with integration of any additional points into the preceding paragraphs. If these statements are retained, calibrated uncertainty language must be assigned to characterize the author team's degree of certainty in the statements. (Mach, Katharine, IPCC WGII TSU)
180	7	4	12	4	14	This statement should be made clear in the summary paragraph on page 2. As currently stated, this is the first time this idea is clearly outlined in the document. (UNITED STATES OF AMERICA)
181	7	4	12	4	15	The statement needs to be qualified by adding 'without adaptation' (INDIA)
182	7	4	12	4	15	To be added "… in combination with changing diets…". (GERMANY)
183	7	4	12	4	15	Is this statement consistent with page 3, lines 38-54? (Mach, Katharine, IPCC WGII TSU)
184	7	4	14	4	14	The description, "more than ca. 2-3 degree C", is "local mean temperature rise", isn't it ?\nIf that is so, "local mean temperature" should be explicitly mentioned. Otherwise, readers may confuse it with global mean temperature rise. (HAYASHI, Ayami, Research Institute of Innovative Technology for the Earth (RITE))
185	7	4	16	4	16	Some regions may increase yields with adaptation (INDIA)
186	7	4	16	4	18	Nuance in these statements should be ensured, in line with characterization elsewhere in the executive summary. Additionally, what is meant by "immense pressure" should be specified. (Mach, Katharine, IPCC WGII TSU)
187	7	4	17	4	18	It would be good to split the effect of high scenarios on food availability, and food price. Is the availability of food itself threatened in the high scenarios, or is the food going to be very expensive, or both? the implication of these effects is very important. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
188	7	4	25	4	25	sentence not clear: 'noted over 200 as early as 1992 and more'\n\n (NETHERLANDS)
189	7	4	28	4	30	The glossary could be cross-referenced for this definition. (Mach, Katharine, IPCC WGII TSU)
190	7	4	30	4	30	Please insert "at" between words "food" and "centre" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
191	7	4	31	4	33	Suggest adding the following lines to clarifying the problems of overconsumption and obesity at the end of this paragraph: "For example, the number of overweight women exceeding the number of underweight women in most developing countries (Mendez M, Monteiro C,Popkin B. 2005. Overweight exceeds underweight among women in most developing countries. American Journal of Clinical Nutrition 81:714 –21). And a shift to increased meat production and consumption due to 1990's trade liberalization in Central America has been implicated in the region's rising epidemic of obesity and related diseases (Thow AM and Hawkes C. 2009. The implications of trade liberalization for diet and health: a case study from Central America. Globalization and Health 5(5). http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2729306/pdf/1744-8603-5-5.pdf. Accessed May 20, 2013). Popkin and Du (2003) have urged agricultural development policy to address the link between increase consumption of animal source foods and possible negative health effects (Popkin BM and Du S. 2003. Dynamics of the nutrition transition toward the animal foods sector in China and its implications: a worried perspective. The Journal of Nutrition 133(11 Suppl 2):3898S-3906S (abstract))." (Evans, Geoffrey, Humane Society International)
192	7	4	37	4	38	By now, numerous peer-reviewed estimates have been made of the number of people affected by the 2007-2008 price hikes, so referencing to grey (and rather old) literature should be unnecessary. \n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
193	7	4	37	4	42	Unclear if this 'price spike' was a global trend (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
194	7	4	41	0	0	FAO, 2012 not in references; FAO et al. 2012 is. (UNITED STATES OF AMERICA)
195	7	4	41	4	41	The word "hungry" can be substituted by "undernourished", which seems more appropriate. This word is also used at page 5 line 40.\n\n (NETHERLANDS)
196	7	4	42	4	42	Replace word "nutrient" with "nutrition" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
197	7	4	47	0	0	Section 7.1.1. Line-of-sight references to corresponding chapter sections are required for each statement within this section. (Mach, Katharine, IPCC WGII TSU)
198	7	4	49	4	50	Poorly drafted sentence, consider revising. (AUSTRALIA)
199	7	5	1	5	2	By 'adaptive capacity will be exceeded…' do you mean it will be difficult to execute adaptation measures? Unclear as worded. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
200	7	5	2	5	4	The appropriateness of this statement here should be considered. Is it the most relevant finding on impacts for fish and fisheries, and how consistent is it with the assessment of chapter 6 and 30? (Mach, Katharine, IPCC WGII TSU)
201	7	5	3	5	4	The mention of the 'meridional overturning circulation' is really specific and not obvious (as to why/what this is) (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
202	7	5	7	0	0	Section 7.1.2. Overall, the chapter team should ensure this section provides as effective a frame for the chapter as possible. Is it possible to introduce the food chain more clearly? In addition to figure 7-1, is it possible to provide a summary diagram for the major crops assessed in the chapter and how they fit into food systems more broadly? (Mach, Katharine, IPCC WGII TSU)
203	7	5	8	0	0	Add: There are 6 million children of hunger (VIETNAM)
204	7	5	18	5	24	This figure should include “animal welfare” as a socioeconomic factor. As listed in IAASTD, 2009 (section 7.3.2.4, pp. 471-72), animal welfare is important. People around the world care about the welfare of animals raised for food (World Society for the Protection of Animals (2007); WSPA International Farm Animal Survey (China & Brazil), Dec. 14; Zogby International (2003). Nationwide views on the treatment of farm animals. Poll for the Animal Welfare Trust; Lusk J.L., F. B. Norwood, and R.W. Prickett (2007). Consumer preferences for farm animal welfare: results of a nationwide telephone survey. Available at http://asp.okstate.edu/baileynorwood/AW2/InitialReporttoAFB.pdf; Penn, Schoen & Berland Associates (2005). Poll for the Humane Society of the United States, Washington, DC. (Illustrating consumer concern for farm animal welfare in the United States of America)). This is further evidenced by the mission of the World Organization for Animal Health (OIE) (inter alia “to promote animal welfare”), which has 178 member countries (OIE. 2013. Objectives: food safety and animal welfare. http://www.oie.int/index.php?id=53#c203; OIE. 2013. Member countries. http://www.oie.int/about-us/our-members/member-countries/). (Evans, Geoffrey, Humane Society International)
205	7	5	20	5	24	Fig 7.1: Proximity and preference to food also are important drivers. (INDIA)
206	7	5	26	5	26	If possible replace 'good agreement' with a standard certainty degree (low, medium or high) (AUSTRALIA)
207	7	5	26	5	26	Where "good agreement" is used, it would be preferable to specify summary terms for evidence and agreement or delete the phrase. (Mach, Katharine, IPCC WGII TSU)
208	7	5	26	5	35	Through emphasising the importance of increasing food production, emphasis is also needed on infrastructure improvements as it is previously stated that there is currently enough food being grown but still hungry people. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
209	7	5	29	5	35	I understand and approve of the shift in framing of this chapter from food production to food security, but in this paragraph I think that the authors have tied themselves in something of a knot. Yes, research to date has predominantly focussed on the production strand of food security; but this is an eminently defensible piece of collective priority-setting given that (i) change in food production is a major - and more likely than not *the* major - determinant of change in food security, and (ii) attacking the interactions and feedbacks from the upstream (production) end first makes strategic sense. In my view the authors would do better to shift the last sentence of this paragraph precede "Changes in food system activities...", and then re-frame the sentances at lines 28-33 along the lines of "nonetheless, the time has come for the initial, well-justified emphasis on production to be extended along the chains of causation & feedback in Figure 7-1". (Moore, Andrew, CSIRO)
210	7	5	30	5	30	(i.e., …); comma needed (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
211	7	5	30	5	30	Is "needs consideration" the clearest wording here? Could it be improved? (Mach, Katharine, IPCC WGII TSU)
212	7	5	32	5	32	(e.g., …) comma needed (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
213	7	5	33	5	35	Suggest adding more references for this statement, given its importance. See, for example, page 5, line 46, concerning difference between FAO citation and Smith et al. 2006. (UNITED STATES OF AMERICA)
214	7	5	34	5	34	50% more food as compared to what baseline? (Mach, Katharine, IPCC WGII TSU)
215	7	5	38	0	0	Section 7.1.3. For this subsection, more references should be provided, building from the key findings of other chapters. How has food security improved from its historical status? (Mach, Katharine, IPCC WGII TSU)
216	7	5	40	5	41	Suggest adding two lines after sentence ending “sufficient food” that reads: “In fact, over 1.4 billion adults were overweight in 2008, and over 10% of the adult population was obese. And the double burden of obesity and undernutrition exists in many low and middle-income countries.” World Health Organization. 2013. Obesity and overweight. Media Centre Fact Sheet No. 311. http://www.who.int/mediacentre/factsheets/fs311/en/. (Evans, Geoffrey, Humane Society International)
217	7	5	41	0	0	Delete the phrase, "thus, the vast majority of people currently have sufficient food." This statement detracts from the point of the paragraph. (UNITED STATES OF AMERICA)
218	7	5	41	0	0	thus, the vast majority… -> this phrase may give a wrong message. As the same report (FAO et al., 2012) states the number of hungry people in the world remains unacceptably high. Suggest taking out the phrase. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
219	7	5	41	5	41	We suggest removing the phrase "thus, the vast majority of people currently have sufficient food". We consider that this may generate confusion about the state of food security, especially in the context of "hidden hunger" and seasonal hunger - which the FAO estimates do not consider. (Scaramella, Carlo, World Food Programme)
220	7	5	41	5	41	thus, the vast majority of people currently have sufficient food - delete this, as it does not provide any relevant information; and with 870 million people being undernourished, I find this sentence rather cynic… (GERMANY)
221	7	5	41	5	41	thus the vast majority … is an unnecessary and rather obvious observation not relevant for the clarity of the text.\n\n (NETHERLANDS)
222	7	5	41	5	41	In place of "vast majority" the percentage could be specified: approximately 88%? (Mach, Katharine, IPCC WGII TSU)
223	7	5	41	5	42	Again, what percentage is meant by "vast majority"? (Mach, Katharine, IPCC WGII TSU)
224	7	5	46	5	46	In place of "the same period" it would be preferable to specify a timeframe. (Mach, Katharine, IPCC WGII TSU)
225	7	5	48	5	49	It would be preferable to place the summary terms for evidence and agreement within parentheses. (Mach, Katharine, IPCC WGII TSU)
226	7	5	48	5	50	this statement is not supported by any reference (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

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227	7	5	48	6	48	The food security bill of India deserves a special mention. (eac.gov.in/reports/rep_NFSB.pdf) (Nair, Malini, Indian Institute of Science)
228	7	5	49	5	50	with ... life. The percentage of 60% is a misreading of Figure 2 in the original FAO (2012) report. That figure reports absolute numbers and percentages, however the 60% is obtained by using the line indicating absolute numbers in combination with the axes for percentage (right axis). The accurate number is about 28%, also see Table 1 in the same report. Change accordingly. \n\n (NETHERLANDS)
229	7	5	50	5	50	What is an "active life"? (GERMANY)
230	7	5	53	6	1	It would be preferable to place the summary terms for evidence and agreement within parentheses. (Mach, Katharine, IPCC WGII TSU)
231	7	6	1	0	0	I am very surprised that you don't mention Iron. This is the one that I see the most with vitamin A in Africa. I should say there are a few more up to date articles that may help. (Vasseur, Liette, Brock University)
232	7	6	1	6	2	Iron nutrition for female population deserves a mention as it is the most important factor affecting health of female population in several age groups. (INDIA)
233	7	6	2	6	2	Incomplete sentence, insert 'people' after additional. (AUSTRALIA)
234	7	6	4	6	13	We suggest making a more explicit reference to rural poverty and food insecurity and highlighting that rural households are often highly vulnerable to climate due to the fact that they rely on climate-sensitive activities for their income and their food. Given that this section focuses on the current status of food security, we consider that at least a brief analysis of the situation in rural areas would be appropriate.\n\nSuggested text includes: "Rural households, especially in developing countries, are often highly vulnerable to climate due to their reliance on activities that are heavily dependent on climate, such as rainfed agriculture (robust evidence, high agreement; also Chapter 13). Evidence from several countries shows that the poorest households are vulnerable in two inter-related ways. First, the poorest rural households are often unable to produce sufficent food for their own consumption and therefore buy a large proportion of their food. In this context, the availability of labour and income may be limited as a result of seasonal and climate variability, reducing the ability of households to purchase food. Second, even when poor households produce a significant amount of their food, they often lack assets, resources and technology to manage climate-related risks. Therefore, climate variability can affect the amount of food that is produced."\n\nSuggested references: UK Met Office Hadley Centre and WFP (2012) Climate impacts on food security and nutrition: A review of exisitng knowledge". Exeter/Rome: Hadley Centre and WFP. (Scaramella, Carlo, World Food Programme)
235	7	6	5	0	0	Surprised $1 to $2 since it is now over a year that we use $1.25 as the minimum. (Vasseur, Liette, Brock University)
236	7	6	5	6	13	Chapters 8, 9, 13 could be cross-referenced here, ensuring harmonized assessment. (Mach, Katharine, IPCC WGII TSU)
237	7	6	6	6	8	These sentences would be more logical, if in the first sentence reference is made to the % of poor people in rural areas, instead of in urban areas, as the 2nd sentence gives an explanation based on nr of people in rural areas\n\n (NETHERLANDS)
238	7	6	15	6	16	There are other studies, such as Lee-Smith 2010, Environ and Urbanization 22: 483-499. (see page 495 --- http://eau.sagepub.com/content/22/2/483) that suggest in some urban areas in Africa people produce more than 'relatively small amounts'. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
239	7	6	15	6	23	We recommend clarifying the discourse about potential benefits of price volatility to rural households. The complexity of effects of food price volatility on rural households is highlighted, it is necessary to stress that evidence highlights that weather shocks are the most important sources of variability in agricultural commodity prices. Weather shocks affects yields as well; therefore effects on rural households are more complex. Suggested references: \n\nMirzabaev, A. and Tsegai, D. " Effects of weather shocks on agricultural commodity prices in Central Asia". ZEF-Discussion Papers on Development Policy No. 171. Center for Development Research. University of Bonn, Germany. November 2012, pp. 30.\nGilbert, C. L., & Morgan, C. W. (2010). Food price volatility. Philosophical Transactions of the Royal Society B: Biological Sciences, 365(1554), 3023-3034. (Scaramella, Carlo, World Food Programme)
240	7	6	15	6	23	There are a number of issues with this paragraph. 1. The paragraph is not referenced. 2. The average farm ize of rural poor is less than 3 hectares (e.g. fixed land, lack of technology and inputs) on the average and cannot take advantage of higher prices. 3. Lack of facilities (e.g. transport, storage) will not assist them to cash in on higher prices. 4. The intention of the rural poor in producing food stuff is to feed the family and there is no room for any significant commercial gains. 5. The farmers can only benefit from higher prices if they have cash crop (s) as part of their farming system and the prices increases and even then, in the short term, they cannot adjust. (AUSTRALIA)
241	7	6	15	6	23	Citations should be provided in full support of these statements. (Mach, Katharine, IPCC WGII TSU)
242	7	6	17	6	17	The statement “which stands to benefit if prices rise” is not founded as benefits ultimately depends on the structure of the market and society. Many studies proves the poverty trap of rural areas in many parts of the world, just few examples DOI 10.1016/j.jpolmod.2008.09.004 (China); DOI 10.1111/j.1467-7660.2012.01779.x (Mozambique), and the lack of improvement of rural conditions even in the case of price increase.\nThis sentence has to be revisited and re-written and backed with relevant references.\n\n (NETHERLANDS)
243	7	6	20	0	0	Conpletely disagree that leads to a new increase in well being since in most cases they buy things that are of lesser nutritional values. I am concerned here that no literature is cited. (Vasseur, Liette, Brock University)
244	7	6	24	0	0	Add: There are some causes of poverty in the word:\n- Overexploitation of natural resources\n- Extreme weather: Storms, Floods, Sea level rise, Saltwater Intrucsion,…\n- Global agriculture is the lack of investment. (VIETNAM)
245	7	6	25	6	29	This part need to be backed by a reference, which is currently lacking.\n\n (NETHERLANDS)
246	7	6	25	6	36	This section should include a brief discussion of the fact local food prices in regions with food insecurity are likely to be POORLY CORRELATED to international food prices. Although the paragraph mentions 'the level of integration into global markets', the consequences of this lack of integration is not discussed. If a market is isolated, price levels and volatility at the international market may or may not reflect the conditions at the locality where food insecure reside. Poor infrastructure, extremely high transportation costs, poor market functioning and a poorly developed food marketing system in regions that grow their own food all come together to isolate some food insecure regions that are particularly vulnerable to changes in weather and climate. See Brown, M.E., Tondel, F., Essam, T., Thorne, J.A., Mann, B.F., Leonard, K., Stabler, B., & Eilerts, G. (2012). Country and regional staple food price indices for improved identification of food insecurity. Global Environmental Change, 22, 784-794 (UNITED STATES OF AMERICA)
247	7	6	29	6	31	Please discuss other drivers of volatility such as monocultures, lack of diversity, etc. This assertion is dependent upon how you think about volatility. (UNITED STATES OF AMERICA)
248	7	6	29	6	32	Another reason for price volatility that is not mentioned would be disease and pest outbreaks. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
249	7	6	30	6	30	…weather conditions, and greater reliance…; comma needed (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
250	7	6	30	6	30	intended sounds awkward to me (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)

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251	7	6	33	6	33	A description of the 'adverse effects' in the markets would benefit this statement. Explain or just list a couple of the impacts to the local and global market. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
252	7	6	39	0	0	Section 7.2: Please be very clear about attribution to climate change vs. anthropogenic climate change throughout this section. (Mastrandrea, Michael, IPCC WGII TSU)
253	7	6	39	10	42	More emphasis on impacts to ecosystems, their services and human health required throughout section 7.2. Soil erosion, water quality, biodiversity loss. Also the societal demands causing monocropping (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
254	7	6	43	0	0	It is important to note in what way the food systems are changing. The current statement is vague. (UNITED STATES OF AMERICA)
255	7	6	43	6	47	Is it possible to provide citations for these statements? (Mach, Katharine, IPCC WGII TSU)
256	7	6	45	6	45	Only herbicides are mentioned, should this be pesticides (including insecticides and fungicides as well) (Hannukkala, Asko, MTT Agrifood Research Finland)
257	7	6	53	7	1	There may not be many studies that simulate historical trends in food-related outcomes, but there are several that assessed historical trends, and also used these for future projections. These cannot be ignored in such a statement. For example, Ewert et al. (2005, AGEE 107:101-116) and Hermans et al. (2010, Ecological Modelling 221: 2177-2187) used statistics to estimate the impact of climate change compared to technological development and management changes for crop yields in Europe, and concluded that the impact of climate change was and will be relatively small. Although for a short time series, Reidsma et al. (2010, European Journal of Agronomy 32: 91-102) and related papers, used detailed farm level data to distinguish the impacts of climate change from socio-economic and management factors on crop yields and farm income in Europe. At a higher level, Mandryk et al. (2012, Landscape Ecology 27: 509-527) analysed the influence of climate change, technological development, policy and market developments on farm structure in a province in the Netherlands, and used the historical analysis to make projections towards 2050. Also here, the conclusion was that the influence of climate change was relatively small.\n\n (NETHERLANDS)
258	7	7	0	0	0	Fig 7-2: the box plot on the right hand shows no positive changes in yields, while the first paragraph of 7.2.1.1 and ES state with high confidence, that warming has had beneficial effects on some crops in some cold/temperate regions, and the left hand panel shows a number of studies with positive yield effects. Please clarify. Please also state what the colored bars, black line and whiskers refer to. (GERMANY)
259	7	7	0	0	0	Figure 7-2 Does it make sense to include studies that do not consider CO2 concentration and its effect on crop growth and production? There is much evidence that this greatly affects crop production. How were these studies selected? (Vanuytrecht, Eline, KU Leuven)

#	Ch	From Page	From Line	To Page	To Line	Comment
260	7	7	7	7	13	Although models may show small differences between simulations with and without adaptation, comparing model simulations with observations does give large deviations. Crop models generally focus on adaptation measures that can be simulated; mainly changing cultivar and changing sowing date. In practice, there are much more adaptation measures. At the same time, crop simulation models simulate potential, water- and/or nutrient limited yields, not actual yields. Actual yields are often lower because of pests, diseases and weeds, and sub-optimal management. For example, for Europe, Reidsma et al. (2010, European Journal of Agronomy 32: 91-102) show that observed yields are differently influenced by climate variability compared to simulated yields, indicating a large influence of management and adaptation. Model comparisons for wheat (Palosuo et al. 2011, European Journal of Agronomy 35 103- 114) and barley (Rotter et al. 2012, Field Crops Research 133: 23-36) also showed that no model can give accurate predictions of actual yield levels. In addition, Angulo et al. (2013, Agricultural and Forest Meteorology 170: 32-46) show that when calibrating a crop model based on more parameters and processes, climate change impact projections are smaller. The reliability of crop model results should be more discussed in the chapter (also along with highlighted results); results still rely to much on crop models, which may not always give reliable projections.\n\n (NETHERLANDS)
261	7	7	8	7	9	Do changes of sowing date and varieties belong adaptation measures? Farmers will do certainly although they do not understand climate change. (Zheng, Dawei, China Agricultural University)
262	7	7	8	7	9	Do changes of sowing date and varieties belong adaptation measures? Farmers will do certainly although they do not understand climate change. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
263	7	7	16	8	47	it is not evident why confidence levels for estimated impacts, as given in the first paragraph of 7.2.1.1, and those for detection and attribution of observed changes, as given in Figure 7.3, are different, given that they are based on the same set of studies, and both relate to climate trends, not anthropogenic forcing. Please clarify. (GERMANY)
264	7	7	18	0	0	The example of the Russian fires shows that temperate regions could suffer from lower yields through such extreme events and drying trends, instead of just trends towards higher yields as indicated in the figures. This sort of variation warrants brief mention. (UNITED STATES OF AMERICA)
265	7	7	18	7	18	Please specify the timeframe meant by the past few decades. (Mastrandrea, Michael, IPCC WGII TSU)
266	7	7	18	7	25	Since this paragraph discusses the impacts of climate change on crop yields in both global and regional contexts, it may be more effective to provide a table rather than a figure so that the information can be summarized in regional contexts as well as in different crop types. Figure 7-2 does not provide any helpful data to support regional specific statements. (Estrada, Yuka, IPCC WGII TSU)
267	7	7	19	7	23	As much as possible, it would be preferable to move all uncertainty language within these sentences to the end of the sentences (or respective phrases), placed within parentheses, in order to maximize directness of wording. Additionally "medium confidence" on line 22 should be italicized. (Mach, Katharine, IPCC WGII TSU)
268	7	7	20	7	20	Why negative effect not for rice? Here no confident reference. I do think negative also for rice production, at least observed in China.Pan et al., 2011.) (Pan, Genxing, Nanjing Agricultural University)
269	7	7	21	7	21	for negative ... these crops. It is unclear how the authors reach the conclusion that global aggregate production of wheat and maize will be negatively affected. The associated figure indeed shows that most studies find a negative effect of climate change on yields for these crops but also includes a number of studies that find positive effects. The authors seem to think that negative yields effects will outweigh positive ones on a global scale, but do not substantiate this implicit analysis. \n\n (NETHERLANDS)
270	7	7	23	7	15	Also Canada benefits from climate change (Mendelsohn and Reinsborough, 2007; Mendelsohn and Dinar, 2012) (Trapp, Natalie, University of Hamburg and International Max Planck Research School on Earth System Modelling)

#	Ch	From Page	From Line	To Page	To Line	Comment
271	7	7	23	7	23	I think it would be more informative to mention 'Northern and certain areas in Western Europe' instead of 'the UK' (e.g. Audsley E, Pearn KR, Simota C, Cojocaru G, Koutsidou E, Rounsevell MDA, Trnka M, Alexandrov V (2006) What can scenario modelling tell us about future European scale agricultural land use, and what not? Environ Sci Policy 9:148-162; Olesen JE, Carter TR, Diaz-Ambrona CH, Fronzek S, Heidmann T, Hickler T, Holt T, Minguez MI, Morales P, Palutikof JP, Quemada M, Ruiz-Ramos M, Rubaek GH, Sau F, Smith B, Sykes MT (2007) Uncertainties in projected impacts of climate change on European agriculture and terrestrial ecosystems based on scenarios from regional climate models. Clim Change 81:123-143). (Vanuytrecht, Eline, KU Leuven)
272	7	7	24	7	24	The word "cold regions" should be substituted with "high-latitude regions" as more accurate and to better reflect the samples provided and what asserted in other parts of the chapter.\n\n (NETHERLANDS)
273	7	7	33	7	33	CO2 - subscript (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
274	7	7	35	7	35	Other studies are available from India which may be considered. (INDIA)
275	7	7	40	7	40	Suggest inserting 'spatial' before scale for clarity (as on page 8, line 17). (UNITED STATES OF AMERICA)
276	7	7	40	7	47	We suggest highlighting examples of studies at the national level which have also shown the importance of climate trends on national crop production. We consider that illustrating country-level analyses of climate impacts on food production will add significant value to the chapter, and show what type of analysis can be done at more detailed scales.\n\nSuggested reference: National Planning Commission, Central Bureau of Statistics, World Food Programme, World Bank, AusAid, and UNICEF (2013) Nepal Thematic Report on Food Security and Nutrition 2013. Kathmandu: NPC. (Pages 76-80).\nDownloadable from: http://wfp.nepasoft.com.np/nefoodsec/publications/Nepal%20Thematic%20Report%20Food%20Security%20%20Nutrition%20Mar%2019_Final.pdf (Scaramella, Carlo, World Food Programme)
277	7	7	49	7	51	What is the baseline from which these changes are detected? Additionally, the different types of attribution--to climate trends versus anthropogenic emissions--should be fully clarified within the figure 7-3 caption. (Mach, Katharine, IPCC WGII TSU)
278	7	7	49	8	2	These are references that could be added to illustrate significant climate trends. The first one in Quebec where most stations considered in the study show a significant increase in the growing degree days above 5°C : Abderrahmane Yagouti , Gilles Boulet , Lucie Vincent , Luc Vescovi & Éva Mekis (2008): Observed changes in daily temperature and precipitation indices for southern Québec, 1960–2005, Atmosphere-Ocean, 46:2, 243-256. The second one regarding Canada. The results indicate a significant lengthening of the growing season due to a significantly earlier start and a significantly later end of the growing season. Significant positive trends are also observed for effective growing degree-days and crop heat units at most locations across the country : Qian, Budong, Xuebin Zhang, Kai Chen, Yang Feng, Ted O'Brien, 2010: Observed Long-Term Trends for Agroclimatic Conditions in Canada. J. Appl. Meteor. Climatol., 49, 604–618. \ndoi: http://dx.doi.org/10.1175/2009JAMC2275.1\n\n (Anne, Blondlot, Ouranos)
279	7	8	0	0	0	Fig 7-3: please specify "adaptation has not been considered". Does this imply zero adaptation has been assumed? (GERMANY)
280	7	8	0	9	0	Section 7.2.1.2: Literature available in tropical regions (on marine and fresh water species) needs to be considered (Das et al., Vivekanandan et al., etc…) (INDIA)
281	7	8	4	0	0	Figure 7-3 It is not clear to me how this Figure was made. Which method was used to determine the degree of confidence? (Vanuytrecht, Eline, KU Leuven)
282	7	8	15	8	16	The line "In general…climate system" is noty self explainatory. It is not clear what is intended to be said, Whether work on the impact of climate change on food production is not ascertained yet or the attribution of anthropogenecity to climate system has yet to be determined. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))

#	Ch	From Page	From Line	To Page	To Line	Comment
283	7	8	15	8	16	Is it important here to attribute changes to the source of the impacts (either antropogenic or natural)? Isn't the actual impact on productivity most important in this Chapter? (Vanuytrecht, Eline, KU Leuven)
284	7	8	15	8	31	Please address what is needed to support better climate attribution. What , if any of the trends noted in lines 21-31 can be quantified? (UNITED STATES OF AMERICA)
285	7	8	15	32	8	This would be a good place to explain 'degree days' but this paragraph should come before Figure 3. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
286	7	8	19	8	22	The authors could also consider that climate change impacts, combined with possible increases in fossil fuel prices in the future, could lead to higher cost of production for farmers, offsetting the benefits of higher food prices. (CANADA)
287	7	8	20	8	20	This is one example, where references are not used in the right way. Should be: 'Min et al. (2011) attribute' instead of '(Min et al., 2011) attribute'. Should be checked throughout the chapter.\n\n (NETHERLANDS)
288	7	8	20	8	20	attribute[d]; past tense needed (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
289	7	8	20	8	29	The timeframe for the changes/trends described on lines 20, 22, 24, and 29 should be specified. (Mach, Katharine, IPCC WGII TSU)
290	7	8	24	8	24	The sentence "Positive trends" should instead start with "However" as it provides an important statement that contrasts with the previously mentioned evidence.\n\n (NETHERLANDS)
291	7	8	24	8	24	The term "Positive trends" should be substituted with for instance "High frequencies" as the adverbial forms refers to occurrences. \n\n (NETHERLANDS)
292	7	8	34	8	40	referring to Long et al. Science's paper is inadequate as it has been demonstrated by Tubiello et al. (European Journal of Agronomy, vol. 26, 2007) conclusions of a lower than expected CO2 fertilisation effect were incorrect, being based in part on technical inconsistencies and lacking statistical significance. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
293	7	8	35	8	35	It could be preferable to move "virtually certain" to " has virtually certainly enhanced." (Mach, Katharine, IPCC WGII TSU)
294	7	8	36	0	0	It would be useful to provide examples of C3 crops for the general reader. (CANADA)
295	7	8	37	0	40	This sentecne about coral reefs is quite out of context. Move to next section? (Vasseur, Liette, Brock University)
296	7	8	37	8	32	As described earlier : I don't see where this was described before this page. (Anne, Blondlot, Ouranos)
297	7	8	37	8	39	Chapters 5, 6, 30 should be cross-referenced here, ensuring consistent assessment. Additionally, the wording of "are expected to have had" could be clarified. (Mach, Katharine, IPCC WGII TSU)
298	7	8	37	8	40	Comment on coral reefs seems out of place in this section on impacts on cropping. Consider moving to another section or link more clearly to preceeding paragraphs. (AUSTRALIA)
299	7	8	37	8	40	This statement about CO2 effects on coral reefs is valid, however, it is out of place in this section, which is otherwise dealing with crops. Sentence needs to be removed, and aded elsewhere, where a whole paragraph on CO2 effects in ocean systems is warranted. (UNITED STATES OF AMERICA)
300	7	8	37	8	40	Be more explicit about how this relates to fishing/food security. {You don't do this until page 9, line 13). (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
301	7	8	42	0	0	In this sentence it is difficult to understand how "Emissions of CO2 have been associated with ozone precursors...." Is the author trying to say that NOx and VOC emissions accompany CO2 emissions? The authors could further explain how CO2 emissions have been "associated" with O3 precursors. O3 is formed photochemically, so the authors should explain the attempted "association" more thoroughly. (UNITED STATES OF AMERICA)
302	7	8	43	8	44	very likely could be moved to "has very likely suppressed." (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
303	7	8	46	8	47	How reliable is this data, stating it is the most severe over India and China? Details of the science and evidence to back this statement is needed. Was the research done on a global scale? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
304	7	8	50	0	0	Section 7.2.1.2. The chapter team should ensure consistency of all statements within this section with the final key findings in chapters 6, 30, and 5. (Mach, Katharine, IPCC WGII TSU)
305	7	8	52	9	11	Range shift of fish are dealt in Chpater 6 (also Chapter 30 in regional context). Here, implications and impacts of range shifts to fisheries production need to be highlighted. In addition to range shfits, changes in potential fish production through bottom-up controls such as climate change and primary production may be introduced here. Ryther (1969) paper. (Jung, Sukgeun, Jeju National University)
306	7	8	54	9	8	Bring out the relevance for EU policy as species richness has been found to increase with rising water temperatures in the North Sea, thus impacting on fisheries and aquaculture. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
307	7	9	1	9	11	Specific relevant sections of chapter 6 and 30 should be cross-referenced here. (Mach, Katharine, IPCC WGII TSU)
308	7	9	2	9	2	A possible reference to incorporate in this section is "Hannesson, 2007" (after of "Brander, 2007"). This author shows that there is some indication of a positive correlation between the ocean temperature and the catches of mackerel in the North Sea and the Norwegian Sea, and between the ocean temperature and the catches of\nsardines in the North Sea. (Garza-Gil, M. Dolores, University of Vigo)
309	7	9	2	9	2	Insert “Genner at al 2004” and “Simpson et al 2011”\nGenner, MJ., Sims, DW., Wearmouth, VJ., Southall, EJ., Southward, AJ., Henderson, PA., Hawkins, SJ 2004. Regional climatic warming drives long-term community changes of British marine fish PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES, 271: 655-661.\nSimpson, SD., Jennings, S., Johnson, MP., Blanchard, JL., Schon, PJ., Sims, DW., Genner, MJ. 2011. Continental Shelf-Wide Response of a Fish Assemblage to Rapid Warming of the Sea. CURRENT BIOLOGY, 21: 1565-1570 \n (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
310	7	9	5	0	0	replace "inferring" with "implying" (Gregory, Peter, University of Reading)
311	7	9	5	9	5	implying, not "inferring" (Moore, Andrew, CSIRO)
312	7	9	6	9	6	Recent work by Genner et al 2011 has separated the effects of fishing pressure and climate change on fish assemblages in the English Channel using data stretching back 100 years. Small fish track climate variability and change; in lower bodied fish, fishing pressure has truncated any climate signal. \nBody size-dependent responses of a marine fish assemblage to climate change and fishing over a century-long scale \nGenner, MJ., Sims, DW., Southward, AJ., Budd, GC., Masterson, P., Mchugh, M., Rendle, P., Southall, EJ., Wearmouth, VJ., Hawkins, SJ. 2010. Body size-dependent responses of a marine fish assemblage to climate change and fishing over a century-long scale. GLOBAL CHANGE BIOLOGY ,16: 517-527. \n (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
313	7	9	13	9	13	They provide 20-25% of fish caught in developping countries. Coral reefs have lost 40% of their coral cover by 2008 5Wilkinson C, 2008, Tab. p 11) Wilkinson CR (ed) (2008) Status of Coral Reefs of the World: 2008. Aust Inst Mar Sci, Townsville, Australia, 296 pp. Available at www.reefbase.org (Pecheux, Martin, Institut des Foraminifères Symbiotiques)
314	7	9	13	9	15	Reference is lacking. If the reference is Burke et al. 2011 as in the following sentence, it should be made clearing, interposing a colon or a semicolon between the two sentences.\n\n (NETHERLANDS)
315	7	9	13	9	16	More ... impacts. Two statements on the number of coral reefs under threat are referenced by grey literature only, while there is a large body of work on threats to coral reefs in the primary literature. Adding reference from this body would strengthen the present statements. \n\n (NETHERLANDS)
316	7	9	13	9	22	This paragraph focuses on global evidence, regionality is needed to provide more informative statements to be made. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
317	7	9	14	9	19	It would be preferable to indicate more precisely what is meant by "immediate threat of damage," "under threat," and "additional threat." (Mach, Katharine, IPCC WGII TSU)
318	7	9	18	9	18	(Munday et al., 2008; Box CC-CR; Chapter 5.4.2.4, 6.2.5.4, 30.6.1.1.2) (Pecheux, Martin, Institut des Foraminifères Symbiotiques)
319	7	9	19	9	19	since 1979 (Pecheux, Martin, Institut des Foraminifères Symbiotiques)
320	7	9	19	9	19	The reference to Box 5-3 is incorrect, perhaps refer to Box CC-OA or section 5.4.2.4? (AUSTRALIA)
321	7	9	19	9	19	7.2.1.2. this is now Cross Chapter Box Coral Reefs (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
322	7	9	20	9	20	Should read 'Wilson et al. (2006)'\n\n (NETHERLANDS)
323	7	9	24	9	26	This paragraph is discussing forecasts, which is inappropriate in the context of observations. There is evidence of impact of warming on migration of Salmon (see e.g. Chapter 6.6.3). (GERMANY)
324	7	9	25	9	0	Author should not be parenthetical. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
325	7	9	25	9	25	Should read Xenopoulos et al. (2005)\n\n (NETHERLANDS)
326	7	9	29	9	29	In place of "up to 75%" the range should be specified. (Mach, Katharine, IPCC WGII TSU)
327	7	9	29	9	30	by 2070 ... water consumption. The article mentions up to 75% of fish biodiversity, but also reports a quartile range of 4-22% for its estimates. Mentioning the high outlier estimates without this information is misleading and would lead the reader to overestimate the effect on fish biodiversity. Please include the range of estimates. \n\n (NETHERLANDS)
328	7	9	33	9	36	Some statements throughout this chapter are made with a bit too much confidence given the uncertainty in the data. This is one example. These should be rephrased to account for the disagreement/uncertainty. (UNITED STATES OF AMERICA)
329	7	9	48	9	49	The sentence beginning "This dry period..." implies that the sole reason behind the decrease in the size of Lake Chad was the decline in precip. whereas others cite other reasons e.g. see http://www.unep.org/dewa/vitalwater/article116.html which states that "about 50% of the decrease in the Lake's size since the 60s is attributed to human water use, with the remainder attributed to shifting climate patterns." Other cites include:\n1) Gao et al. 2011. On the causes of the shrinking of Lake Chad Environ Resource Letters 6 : July-Sept\n2) GIWA 2004. Lake Chad Basin: GIWA Regional Assessment 43, UNEP (UNITED STATES OF AMERICA)
330	7	9	49	9	51	The decreasing.. Present. The fish catch figures in Chad reported in this part of text are wrong. The figures are presumably taken from Figure 17 in the Welcomme (2011) report. The text reports catch figures of over 100.000 tonnes in the late 1960 falling to under 70.000 tonnes in the early 1990s. However, Figure 17 clearly shows that the purple line, indicating Chad, rises from about 70.000 tones in 1969/1970 to about 85.000 tonnes in 1991/1992, effectively showing the opposite trend. The text of chapter 7 would be more consistent with the blue line, which is for Mali, but even then it would be misleading as Mali does report a recovery of fish catches back to 100.000 tonnes in 2006. Please change the wordings of the report to accurately reflect fish catches in Chad. \n\n (NETHERLANDS)
331	7	10	0	10	0	Section 7.3.1.1: Some of recent references from South-Asia may be incorporated (INDIA)
332	7	10	0	12	0	We recommend making an explicit reference to country-level vulnerability analyses to assess the food security implications of climate change. Suggested references are included below. These references also expore the sensitivity of food production to weather and climate at national level, and can therefore also be relevant to Section 7.3.2\n\nIRI and WFP (2011) Climate risk and food security in Mali. IRI/WFP: New York/Rome.\nWFP, ANACIM, and CCAFS (forthcoming) Climate risk and food security in Senegal: Analysis of climate impacts on food security and livelihoods. ANACIM/WFP: Dakar.\nWFP, DRMFSS, AAU, and CCAFS (forthcoming) Climate risk and food security in Ethiopia: Analysis of climate impacts on food security and livelihoods. DRMFSS/WFP: Addis Ababa. (Scaramella, Carlo, World Food Programme)

#	Ch	From Page	From Line	To Page	To Line	Comment
333	7	10	0	12	0	The inclusion of the Section on "Methods and Associated Uncertainities" is appreciable especially to make the reader understand that what sort of limitations and uncerainintes the mentioned results include. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
334	7	10	0	27	0	Section 7.3 separates the discussion on food availability and other dimensions of food security. Most notably availability and accessibility should not be separately dealt with. By so doing the section totally fails to account for the fact that impacts of climate change on agriculture also impact the only source of income for small holders, totally impeding their access to food. The section 7.3 may be restructured to give a complete picture of food security by taking account of all dimensions. A sub-section could be added to bring food production and non-production food security elements together. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
335	7	10	1	0	0	Section 7.2.1.3: it is hard to believe that nothing can be discussed abouut livestock production. The authors should look at regional chapters which present relevant evidences along this line. At the very least the authors should discuss why few research exist on this subject. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
336	7	10	1	0	7	No mention of recent work by Funk et al (2008) “Warming of the Indian Ocean threatens eastern and southern African food security but could be mitigated by agricultural development” ; Palm et al (2009)” Identifying potential synergies and trade-offs for meeting food security and climate change objectives in sub-Saharan Africa”. Other recent publications such as “Mwangi, M. 2007. Gender and drought hazards in the rangelands of the Great Horn of Africa: Is gender equity the only solution? Women & Environ. Int. 74, 21-24” are also significant contributions. In addition, there is no mention of pastoralism (livestock) in Africa, yet is a core production system toward food security and in food production in this continent, especially in the vast arid and semi-arid lands/regions. Recent publications include Krätli et al (2013): “Pastoralism: A critical asset for food security under global climate change” Gregory et al (2009): “Integrating pests and pathogens into the climate change/food security debate” ; Hendrix and Salehyan (2012) Climate change, rainfall, and social conflict in Africa; Recha et al (2013) “Empowering a local community to address climate risks and food insecurity in Lower Nyando, Kenya” (Mwangi, Margaret, Pennsylvania State University)
337	7	10	1	10	7	More information required. This section is too biased towards cropping systems and needs greater consideration to livestock production. Any analysis of observed impacts on drought and grassland grazing. Is there any evidence of the impacts this has had on quality of milk from for example goats in Africa? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
338	7	10	1	10	7	Section 7.2.1.3 is too limited compared to 7.2.1.1 and 7.2.1.2. There may be less literature on livestock production, but as also presented in later sections, more can be said about this. With one example on the blue-tongue virus, this section is unbalanced. \n\n (NETHERLANDS)
339	7	10	3	0	7	I am surprised that nothing would have been published on issues of droughts as one aspect of climate change? Even with limited evidence and low agreement? (Vasseur, Liette, Brock University)
340	7	10	3	10	4	May add a simple description of "There have beeen some studies on extreme stormy rainfall and frozen weather 's damage to pig house and caused unexpected death of pigs in even large sized poultry breeding farm(Wang et al., Impact of climate change in livestock production of China. in Pan et al., editor-in-chief.Assessment Report of climate change impacts on agricultural production of China. China Agriculture Press, Beijing China. 2011.pp243-256. in Chinese . (Pan, Genxing, Nanjing Agricultural University)
341	7	10	3	10	7	There is significant research that exists on the effects of climate change on animal production, yet this sites only one study. This subject is dealt with in more depth elsewhere within the chapter. This small section is confusing and it is recommended to either remove this section entirely, or broaden it immensely, to account for the full breadth of studies. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
342	7	10	10	10	42	Section 7.2.2: It is not clear why this section is titled "Food Security." If this section is about Food Security, what happened to the discussion about the three main components of food security as framed in the Figure 7-1? (Estrada, Yuka, IPCC WGII TSU)
343	7	10	12	10	42	We consider that this section is too brief and does not consider the range of climate impacts on food security beyond those on food prices. We suggest balancing this section by considering broader impacts on food production, access to markets, and utilisation of food. For a detailed overview, we recommend referring to the following publication: \n\nUK Met Office Hadley Centre and WFP (2012) Climate impacts on food security and nutrition: A review of exisitng knowledge". Exeter/Rome: Hadley Centre and WFP. (Scaramella, Carlo, World Food Programme)
344	7	10	12	10	42	The discussion of global food prices in Sub- section 7.2.2 should be expanded. Economic issues such as global food price spikes and medium to longer term price (and consumption) trends are likely to be very important determinants of global food security. (AUSTRALIA)
345	7	10	12	10	42	This section is misleading it is entitled "Food Security" (access, availability, utilization, stability) and yet over 75% of the text is about prices (lines 17-31). Should be retitled. (UNITED STATES OF AMERICA)
346	7	10	17	10	18	The statement starting with "Although" needs to be backed by a reference from a robust source (e.g. world bank).\n\n (NETHERLANDS)
347	7	10	17	10	31	City migration has resulted in labour shortages in rural areas, impacting farming and possibly food security. Is there any evidence of this? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
348	7	10	17	10	31	According to the FAO, price volatility has increased dramatically in recent years. There is emerging consensus that the global food system is becoming more vulnerable and susceptible to episodes of extreme price volatility. This should be noted. It is also important to note that low income countries suffer the most during episodes of price volatility. (UNITED STATES OF AMERICA)
349	7	10	17	10	31	This section needs to specify the food stuffs that the prices are for. The figure 7-4 shows FAO food price index reflects the international price and the capital city prices of rice, corn, wheat and soybeans. For the food insecure in many regions, these commodities are not consumed by the food insecure. The most food insecure eat locally grown, coarse grains of low value.. These commodities are rarely traded internationally because of their low value per ton. Thus local weather affects local food prices, but these prices are not affected by the international markets. \nUsing this argument - that the international price affects local food security - is not true in many isolated areas of the developing world, and perpetuates the idea that more corn grown in the US will reduce food insecurity. It may be worth highlighting a few regional (i.e., developed vs developing nation) differences in this respect.\nBrown, M.E., Hinterman, B., & Higgins, N. (2009). Markets, Climate Change, and Food Security in West Africa. Environmental Science and Technology, 43, 8016-8020\nBrown, M.E., Tondel, F., Essam, T., Thorne, J.A., Mann, B.F., Leonard, K., Stabler, B., & Eilerts, G. (2012). Country and regional staple food price indices for improved identification of food insecurity. Global Environmental Change, 22, 784-794 (UNITED STATES OF AMERICA)
350	7	10	19	10	21	The price effect of bioenergy namely biofuels on agricultural commodities should be specified. How evident is the use of agricultural production for energy purposes on global price levels? (GERMANY)
351	7	10	19	10	21	How much effect does the increased biofuel demand following the increase in oil price have on food price compared to the other factors such as increased cost (fertilizer, transportations, etc) of agriculture production in general? (Estrada, Yuka, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
352	7	10	19	10	26	Here biofuels are seen as a primary driver for the increased demand. However the increased wealth and income leveles, that have been increasing rapidly in large developing economies in Asia, in particular e.g. since 200, can be instead be seen as primary basic factors that have made high food and commodity prices possible. Without an increasing number of medium and high income buyers of food very high prices of cereals, for example, sustaining several months at the very high levels as experienced in 2007, and again 2012, would not have been poissible. An important driver of the high prices abd large volatility of food and commodity prices is not only the increased meat consumption which no doubt increases cereals demand, but also the fact that consumers of higher income become sluggish in responding to highher or lower prices. This is possible since the share of food expenditure out of all total expenditure has decreased in many large developing economies during the last few decades. In other words, increased income level and implied decreased price elasticity of demand have been the ultimate drivers of increasing food prices and their increased volatility. Since such income development is likely to continue, even ifm at a reduced rate, that is going to lead to sustained very high food and commodity prices and their volatility also inj the future, partly exacerbated by biofuel demand and various random shocks such as adverse weather conditions, national policies in large economies (export bans/ levies), regional conflicts etc. See e.g. W. Martin et.al. European Review of Agricultural Economics, August 2008 (Lehtonen, Heikki, MTT Agrifood Research Finland)
353	7	10	19	10	31	The entire sentences are problematic. Demand and supply factors in the food system are not clearly defined and non-food factors (such as market speculation) are not even mentioned. This section should be re-written in order to state clearly what are the main element of the market structure (e.g. the role of stocks, the role of financial instruments) and all the relevant factors shaping/influencing the market. Assertions like the one at line 23-24 are not clearly understandable and not supported by any reference. Climate-related studies are not mentioned in opportune quantity, just one study Lobell et al. 2011 based as stated, on data up to 2003. \n\n (NETHERLANDS)
354	7	10	22	0	0	replace "he" with "the" (Gregory, Peter, University of Reading)
355	7	10	22	10	22	Typographic mistake. Replace "he" with "the" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
356	7	10	24	10	24	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
357	7	10	26	10	30	What is the timeframe for these estimated effects? (Mach, Katharine, IPCC WGII TSU)
358	7	10	34	10	42	Authors may wish to explain cereal price index. (Chatterjee, Monalisa, IPCC WGII TSU)
359	7	10	36	0	0	What is a 'big' weather effect? Suggest that the authors find a more robust term. (UNITED STATES OF AMERICA)
360	7	10	39	0	40	The authors attribute increase in food prices to higher crude oil prices driven by increased biofuel demand. However, it may be more than increase demand for biofuel that links higher crude oil prices to increases in food cost, including increased cost for nitrogen fertilizer and other energy intensive agricultural inputs. (CANADA)
361	7	10	39	10	42	“because of increased biofuel demand, food prices are also increasingly linked to the price of crude oil” gives the impression that the increased demand for biofuel is the solo factor in the increased food prices following the change in the price of crude oil. Also, please make it more clear and explicit why the publication of AR4 is used as a timestamp of the food price change. (Estrada, Yuka, IPCC WGII TSU)
362	7	10	45	16	52	In ths section 7.3 Assessing IVR, both in the method sections regarding treatment of impacts and adaptation, many referencnes on recent work are lacking -- in a supporting document (see, above) I have send a selection of those - especially for the parts on treatment and reporting of uncertainties and the process-based crop modelling, importnat recent work progress is not adequately and sufficiently cited. MORE IMPORTANTLY, I find hardly anything on economic modelling, neither for farm level nor for sector level; more generally, the work that has been done on economic modelling or combined bio-economic modellig of climate change impacts and adaption options is completely underpresented in this chapter (Rötter, Reimund, MTT Agrifood Research Finland)

#	Ch	From Page	From Line	To Page	To Line	Comment
363	7	10	47	12	46	Section 7.3.1.1 seems more focused on research methods than on findings. The latter should be emphasized. For example, please explain what we know about key processes and trade-offs (p. 11, section 7.3.1.1, line 49-50). (UNITED STATES OF AMERICA)
364	7	10	49	0	0	Section 7.3.1.1. I found very interesting the information summarized here. However, I think the authors could make some mention on complexity economic models based on agent behabiour which are being increasingly used to analyse the impacts of climate change in land use and food security. For example: Bharwani, S., Bithell, M., Downing, T., New M., Washington R., Ziervogel G. (2005). "Multi-agent modelling of climate outlooks and food security on a community garden scheme in Limpopo, South Africa". Philosophical Transactions, R Soc Lond B Biol Sci. 2005 November 29; 360(1463): 2183–2194. (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)
365	7	10	51	10	51	For the described "more robust statements," is the author team referring to key findings in this chapter or to conclusions of published papers? (Mach, Katharine, IPCC WGII TSU)
366	7	10	52	10	54	This is quite vague. Can this be illustrated by an example for more clarity? (Vanuytrecht, Eline, KU Leuven)
367	7	11	1	11	0	A bias towards cropping models exists, are there any models for fisheries to provide a better overview? Otherwise very good explanations of the methods used to assess impacts. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
368	7	11	3	11	8	Results from FACE experiments in conducted in sub-tropical condition are available. (Chakarborty et al., 2012); OTC experiments (Vanaja et al.) are available (INDIA)
369	7	11	3	11	18	it should also be emphasised that FACE experiments are carried out mostly in the USA and in China, thus limited to specific environmental conditions, which do not reflect tropical or sub-tropical conditions, where CO2 & soil nutrient interactions could lead to large differences in photosynthesis rate, water use and yield. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
370	7	11	3	11	18	Other examples of work using RS and GIS should be included in this discussion. (Chatterjee, Monalisa, IPCC WGII TSU)
371	7	11	4	11	4	The phrase "greater interest" is ambiguous--has it been done or just considered? (Mach, Katharine, IPCC WGII TSU)
372	7	11	6	11	18	How have FACE studies been used for agriculture--can this be described more fully and rigorously? (Mach, Katharine, IPCC WGII TSU)
373	7	11	8	11	11	again this is not exact - see comments above related to Long et al. Science's paper. This is also supported by B.A. Kimball, Lessons from FACE: CO2 Effects and Interactions with Water, Nitrogen and Temperature, in ICP Series on Climate Change Impacts, Adaptation, and Mitigation: Volume 1, Handbook Of Climate Change And Agroecosystems Impacts, Adaptation, and Mitigation, edited by: D. Hillel and C. Rosenzweig, (2010) (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
374	7	11	14	0	0	Last word in sentence is 'levels' -- suggest replacing with an appropriate technical term, such as 'availability' (UNITED STATES OF AMERICA)
375	7	11	14	11	14	Micro climate plays important role (INDIA)
376	7	11	20	11	30	Authors should comment on quality of modeling and data in developing countries. (UNITED STATES OF AMERICA)
377	7	11	24	11	24	……continued to date supported by 2009 ref. ; a latest (2013) reference may be more appropriate. (INDIA)
378	7	11	28	11	28	Humaira et al. 2009 may be corrected as "Sultana et. al 2009" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
379	7	11	32	0	0	delete second "since" (Gregory, Peter, University of Reading)
380	7	11	32	11	34	should also refer to Deryng et al. (global Biogeochemical Change, 2011) (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
381	7	11	34	11	0	Additional reference: Olesen JE, Carter TR, Diaz-Ambrona CH, Fronzek S, Heidmann T, Hickler T, Holt T, Minguez MI, Morales P, Palutikof JP, Quemada M, Ruiz-Ramos M, Rubaek GH, Sau F, Smith B, Sykes MT (2007) Uncertainties in projected impacts of climate change on European agriculture and terrestrial ecosystems based on scenarios from regional climate models. Clim Change 81:123-143 (Vanuytrecht, Eline, KU Leuven)
382	7	11	36	11	38	This comment relates not only to this sentence, but also more in general to the chapter. The judgement is transparent, but it does not give much information. Here it is mentioned that it is increasingly common to assess both biophysical and socio-economic drivers of crop productivity, and this is a novel development. Later, we do not see any results of such studies however. It is useful to mention new developments, but results of these type of studies should also be presented. It would be useful to include a figure in the chapter that shows the relative impact of climate change on crop production and other relevant indicators, compared to other drivers. \n\n (NETHERLANDS)
383	7	11	37	11	38	Additional reference: Audsley E, Pearn KR, Simota C, Cojocaru G, Koutsidou E, Rounsevell MDA, Trnka M, Alexandrov V (2006) What can scenario modelling tell us about future European scale agricultural land use, and what not? Environ Sci Policy 9:148-162 (Vanuytrecht, Eline, KU Leuven)
384	7	11	38	11	41	References in an IPCC report should be as complete as possible. Missing are e.g. Rotter et al. (2012, Field Crops Research 133: 23-36) and Asseng et al. (2013, accepted, is in the refence list), Palosuo et al. (2011, European Journal of Agronomy 35 103- 114). Some of these are mentioned later (p. 12, line 39-45). It would be more logical to include similar references when presnting methods and when presenting results, so it is clear for the reader these refer to the same topic.\n\n (NETHERLANDS)
385	7	11	48	11	50	This comment relates not only to this sentence, but also more in general to the chapter. The judgement is transparent, but it does not give much information. Here it is mentioned that descriptions of uncertainty that present key processes and trade-offs is useful, and this is a novel development. Later, we do not see any results of such studies however. It is useful to mention new developments, but results of these type of studies should also be presented. \n\n (NETHERLANDS)
386	7	11	52	11	54	A statement as to the lack of spatial specificity of agricultural statistics should be mentioned here. Regional, state and county level statistics are lacking in nearly all food insecure nations. Also, information is highly variable - some nations are far better at keeping accurate yield statistic than others - for example, the Democratic Republic of Congo has very little information about yield, but other countries in the region such as Botswana and Malawi have better information. There is also a lack of information in the time domain - this is why many authors use biophysical proxies to estimate interannual variability of yield over the past thirty years. (UNITED STATES OF AMERICA)
387	7	12	1	12	0	There is a strong bias of examples of crop models predicting yields, are there any models predicting crop quality for example? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
388	7	12	7	0	0	Clarify if this is a multi-decadal 'prediction' or projection. (UNITED STATES OF AMERICA)
389	7	12	8	12	8	Comment: This sentence should read "… are not simulated by most statistical models with stationality assumption (a few studies using a recent statistical methods such as the particle filtering (Sakurai et al., 2010) allow to model the time change in climate-crop relationship due to technology)". Reference: Sakurai, G., T. Iizumi, and M. Yokozawa (2011), Varying temporal and spatial effects of climate on maize and soybean affect yield prediction. Climate Research, 49, 143-154. (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
390	7	12	8	12	8	Technological progress and its interaction with climatic variability have been considerated in some studies with production functions of yield response to socio-economic and bio-phisical variables. For example: Quiroga, S., Fernández-Haddad, Z , Iglesias, A. (2011). "Crop yields response to water pressures in the Ebro basin in spain: risk and water policy implications". Hydrology Earth Systems Science, 15, p. 505-518. (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)

#	Ch	From Page	From Line	To Page	To Line	Comment
391	7	12	8	12	8	Technological progress is not simulated by statistical models, but generally also not by process-based models. In general, statistical models are better able to capture technological progress than crop simulation models (e.g. Ewert et al. 2005, AGEE 107:101-116). A trend factor can be included that cannot be included in crop simulation models. Even though crop simulation models can capture some of the technological development, they often use the same cultivars and management for the whole simulation period. As data are difficult to collect, this may result in the use of cultivar data of 30 years ago (e.g. Reidsma et al. 2009, Ag. Sys. 100: 51-60).\n\n (NETHERLANDS)
392	7	12	10	12	10	Crop models can extrapolate based on historically-determined relationships, but they can also be useful for transfer knowledge. There are existing regions or seasons having the climate that other regions or seasons will experience in the future due to climate change. For example, for drought extreme events, the values in the current Mediterranean region could be very useful to understand the potential losses in other regions (Continental or Atlantic regions). (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)
393	7	12	12	12	14	Related to agro-climatic indices, more references can be given: Schaap et al. 2011, Regional Environmental Change 11: 731-741 ; Schaap et al. 2013, European Journal of Agronomy 48: 30-42), Peltonen-Sainio (2009, AGEE, 139: 483–489)\n\n\n (NETHERLANDS)
394	7	12	12	12	14	For clarity: suggest providing examples of 'farmer-relevant metrics' (UNITED STATES OF AMERICA)
395	7	12	17	12	19	The use of local knowledge and stakeholder engagement for model improvement is not mentioned. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
396	7	12	18	12	19	On one side it is said that experiments have uncertainty, than it is said that they are used to measure uncertainty. The period mixes up intrinsic uncertainty which is related to modelling and doing experiments, and another type of uncertainty related to the complexity of the scientific object of study. The period should be re-written in order to increase clarity. \n\n (NETHERLANDS)
397	7	12	29	12	30	The sentence is rather simplistic (obvious advantages/disadvantages of models) and does not help deepening the understanding of uncertainty as following the previous paragraph. The sentence should be re-written or simply deleting it (deletion will leave the comprehension of the following text unchanged). \n\n (NETHERLANDS)
398	7	12	29	12	37	uncertainty caused by the use of multiple crop models is 3 times higher than uncertainty caused by the use of multiple climate change scenarios (Deryng et al., 2013. Disentangling uncertainties in future crop water productivity under climate change. Submitted) (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
399	7	12	31	0	0	Iizumi et al 2011 is not in refs. (UNITED STATES OF AMERICA)
400	7	12	31	12	31	Comment: "…a single model" should read "…a single model with perturbed phenological and biophysical parameters". In addition, Iizumi et al. (2011) does not appear in References. Reference: Iizumi, T., M. Yokozawa, and M. Nishimori (2011), Probabilistic evaluation of climate change impacts on paddy rice productivity in Japan. Climatic Change, 107, 391-415. (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
401	7	12	31	12	31	The reference to Iizumi et. al. 2011 in not right as the article actually speaks about the application of a particular approach (the Bayesian approach, notably the Markov chain Monte Carlo technique). The affirmation in line 12 cannot be traced in the text of the article.\n\n (NETHERLANDS)
402	7	12	31	12	34	This sentence is too long, making it difficult to understand. Suggest re-phrasing. (AUSTRALIA)
403	7	12	39	12	39	The use of multiple crop models in impacts studies is relatively rare. The project CLIMATOR in France could be cited as an example for several crop models were used : Nadine Brisson, Frédéric Levrault, Éditeurs. 2010. Changement climatique, agriculture et forêt en France : simulations d'impacts sur les principales espèces. Le Livre Vert du projet CLIMATOR (2007-2010), ADEME. 336p. (Anne, Blondlot, Ouranos)

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404	7	12	39	12	46	recent effort to compare crop models started with AgMIP (2012-current) (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
405	7	12	39	12	46	Absolute number may be dependent on crop model structure or assumptions, yet, simulated trends are often similar among different models (Olesen JE, Carter TR, Diaz-Ambrona CH, Fronzek S, Heidmann T, Hickler T, Holt T, Minguez MI, Morales P, Palutikof JP, Quemada M, Ruiz-Ramos M, Rubaek GH, Sau F, Smith B, Sykes MT (2007) Uncertainties in projected impacts of climate change on European agriculture and terrestrial ecosystems based on scenarios from regional climate models. Clim Change 81:123-143). (Vanuytrecht, Eline, KU Leuven)
406	7	13	0	24	0	Several studies have been conducted at national level to quantify the sensitivity of food production to weather and climate. We recommend including some of these:\n\nIRI and WFP (2011) Climate risk and food security in Mali. IRI/WFP: New York/Rome.\nWFP, ANACIM, and CCAFS (forthcoming) Climate risk and food security in Senegal: Analysis of climate impacts on food security and livelihoods. ANACIM/WFP: Dakar.\nWFP, DRMFSS, AAU, and CCAFS (forthcoming) Climate risk and food security in Ethiopia: Analysis of climate impacts on food security and livelihoods. DRMFSS/WFP: Addis Ababa. (Scaramella, Carlo, World Food Programme)
407	7	13	3	13	21	Section 7.3.2 focuses entirely on the impact of climate on production. The lens of food security and food systems is dropped for clarity. This preface paragraph should note that the economic and cultural aspects of food production will be additional drivers of how food systems will respond to climate change and the text should reflect this. (UNITED STATES OF AMERICA)
408	7	13	5	13	21	The dot points presented here are particularly vague and add little value to what our improved understanding since AR4 is. Suggest some additional context, such as identifying applicable regions, may be useful. (AUSTRALIA)
409	7	13	7	13	12	Calibrated uncertainty language should be assigned for these statements to communicate the author team's degree of certainty in the conclusions. (Mach, Katharine, IPCC WGII TSU)
410	7	13	7	13	15	Page 13, lines 7-15, section 7.3.2, there is a possible error in: ”Heat stress effects have been better quantified at regional and local scales ..” well, this is, at least doubtful, as most models are not capable to capture impacts of extreme weather events (heat, drought) sufficiently reliable (either relationships are oversimplified /or then results are the outcome of different underlying relationship when more careful analysis is performed; see e.g. Lobell et al 2013 or Boote et al 2013 – for references see supporting file sent to WGII support unit) (Rötter, Reimund, MTT Agrifood Research Finland)
411	7	13	13	13	15	This sentence is difficult to understand, consider replacing ' AR4 confirmation that' with 'discussed in AR4 have been confirmed,' (AUSTRALIA)
412	7	13	15	13	15	Please specify what is meant by moderate warming here. (Mastrandrea, Michael, IPCC WGII TSU)
413	7	13	26	13	26	The title suggests this section will describe 'means and extremes of temperature and precipitation' however there is no reference to extreme rainfall. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
414	7	13	26	14	47	It is mentioned that statistical models and process-based models are used, but results are not separated. As they are based on different methods, they can inform eachother. Crop simulation models simulate potential, water-limited or nutrien-limited yields, while statistical model use actual observed yields. In Reidsma and Ewert (2008, Ecology and Society 13(1):38) for example, it is shown that effects of temperature and precipitation on crop yields largely differs when using a statistical model compared to when using a crop simulation model. \n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
415	7	13	28	13	36	Supplemental examples of impacts of temperature change to crops:\nFavourable: (1)In temperate regions, as climate warming, the growing period or the frost free period will prolong, therefore, long term cultivars could be cultivated or the multi cropping index will increase, as a result, the total yield will increase. (2)Overwinter of winter wheat in the North China becomes safer, farmers could use cultivars with shorter vernalization stage and higher yield. (3)Also raising animals in Inner Mongolia will become safer from winter and early spring cold. (4)If the global warming is 2?, because warming in winter is bigger than that in summer, shortening of the dormancy period of winter wheat in North China is more than the total growth duration, as a result, the effective growth period will prolong and the yield will increase (but the effective duration will shorten in the region without winter dormancy). In the areas with cold winter, as climate warming, the seeding date of spring wheat and rape will shift earlier than the maturity date if there is no water deficit stress, therefore, the total growth duration will prolong too. (5)As climate warming, both summer chill damage in Northeast China and overwinter freezing damage in North China has decreased.\nUnfavourable: (1)In some subtropical regions, reproductive process of some crops like litchi may meet obstacle of reproductive process due to lacking enough vernalization. (2)Store of vegetable and fruit will become more difficult. (3)Potato often degenerates when the daily average temperature is higher than 19?. (Zheng, Dawei, China Agricultural University)
416	7	13	28	13	36	Supplemental examples of impacts of temperature change to crops: Favourable: (1)In temperate regions, as climate warming, the growing period or the frost free period will prolong, therefore, long term cultivars could be cultivated or the multi cropping index will increase, as a result, the total yield will increase. (2)Overwinter of winter wheat in the North China becomes safer, farmers could use cultivars with shorter vernalization stage and higher yield. (3)Also raising animals in Inner Mongolia will become safer from winter and early spring cold. (4)If the global warming is 2?, because warming in winter is bigger than that in summer, shortening of the dormancy period of winter wheat in North China is more than the total growth duration, as a result, the effective growth period will prolong and the yield will increase (but the effective duration will shorten in the region without winter dormancy). In the areas with cold winter, as climate warming, the seeding date of spring wheat and rape will shift earlier than the maturity date if there is no water deficit stress, therefore, the total growth duration will prolong too. (5)As climate warming, both summer chill damage in Northeast China and overwinter freezing damage in North China has decreased.Unfavourable: (1)In some subtropical regions, reproductive process of some crops like litchi may meet obstacle of reproductive process due to lacking enough vernalization. (2)Store of vegetable and fruit will become more difficult. (3)Potato often degenerates when the daily average temperature is higher than 19?. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
417	7	13	28	14	4	maize, which is a very important crop, is missing from this section (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
418	7	13	32	13	33	Unclear what this sentence refers to. Consider inserting 'crop' between 'for' and 'development' (AUSTRALIA)
419	7	13	33	13	36	There is quite a number of studies on high temperatures (e.g. Schlenker and Roberts, 2008; Schlenker and Roberts, 2009; Abrol, Y.P., Bagga, A.K., Chakravorty, N.V.K. and Wattal, P.N. 1991. Impact of rise in temperature on productivity of wheat in India. In: Impact of Global Climatic Change on Photosynthesis and Plant Productivity. Y.P. Abrol et al. (eds.). Oxford & IBH Publishers, New Delhi. pp. 787-798.; Ahrens, M.J. and Ingram, D.L. 1988. Heat tolerance of citrus leaves. Hort Sci. 23: 747-748; Asana, R.D. and Williams, R.F. 1965. The effect of temperature stress on grain development in wheat. Aust. J. Agric. Res. 16: 1-13) (Trapp, Natalie, University of Hamburg and International Max Planck Research School on Earth System Modelling)
420	7	13	40	13	43	rice yields have been found to be negatively correlated with temperature […] due to negative correlation between temperature and water stress. Thus, increased temperatures are correlated with decreased water stress and this would result in lower rice yields? Is this what is meant? (Vanuytrecht, Eline, KU Leuven)

#	Ch	From Page	From Line	To Page	To Line	Comment
421	7	13	41	0	0	Zhang et al., 2010 not in refs. (UNITED STATES OF AMERICA)
422	7	13	41	13	43	Positive correlations between temperutre and yield in many temperate regions often result from chiling stress under low temperaure even without any association with solar radiation. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
423	7	13	43	13	43	Could a simple explanation of spikelet sterility be provided for any non-expert readers. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
424	7	13	43	13	43	Impacts also vary with management (irrigated/rainfed) and depends on the dominant limiting factor (rainfall –low or excess) or temperature as in case rice in India (Naresh Kumar et al., 2013; Naresh Kumar et al., 2011) (INDIA)
425	7	13	43	13	46	When extreme high temperatures (>35 oC) occurred at the critical period, sterility does occur in farmers' fields (Hasegawa et at 2011) but the extent was lower than expected largely due to the gap between air temperature and canoy tempeture. The difference can be as large as 7 oC under dry hot conditions (Matsui et al 2007). On the ohter hand, humid and windless condtions, sterility can occurr even below 35oC in China (Tian et al 2010).\n\nMatsui, T., Kobayasi, K., Yoshimoto, M., and Hasegawa, T. 2007: Stability of rice pollination in the field under hot and dry conditions in the Riverina Region of New South Wales, Australia. Plant Production Science, 10, 57–63. https://www.jstage.jst.go.jp/article/pps/10/1/10_1_57/_pdf\nTian, X., Matsui, T., Li, S., Yoshimoto, M., Kobayasi, K., and Hasegawa, T. 2010: Heat-induced floret sterility of hybrid rice (Oryza sativa L .) cultivars under humid and low wind conditions in the field of Jianghan Basin, China. Plant Production Science, 13, 243–251. https://www.jstage.jst.go.jp/article/pps/13/3/13_3_243/_pdf\nHasegawa, T., Ishimaru, T., Kondo, M., Kuwagata, T., Yoshimoto, M., and Fukuoka, M. 2011: Spikelet sterility of rice observed in the record hot summer of 2007 and the factors associated with its variation. Journal of Agricultural Meteorology, 67, 225–232. https://www.jstage.jst.go.jp/article/agrmet/67/4/67_67.4.3/_pdf (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
426	7	13	48	13	48	Varietal/ crop change may become necessary (INDIA)
427	7	13	52	13	53	Are these percentages average decrease? This could be clarified. (Mach, Katharine, IPCC WGII TSU)
428	7	13	54	0	0	Please explain the units used to report chickpea yields, or convert them to a more commonly used metric. (CANADA)
429	7	13	54	0	0	Suggest replacing q per ha with SI unit (kg)...sentence will then read 300 kg per ha (UNITED STATES OF AMERICA)
430	7	13	54	13	54	Convert q/ha to SI units (I expect that "q" is quintal, but 100 kg or 100 lb?) (Moore, Andrew, CSIRO)
431	7	14	3	14	3	Is it possible to specify the ranges simulated at each temperature? (Mach, Katharine, IPCC WGII TSU)
432	7	14	3	14	4	Evidance of Copper et la should state at what specific stage of development is the statement holding true. Otherwise misleading. In practice, it has not been shown satisfactorily that increased temperature over the years has reduced crop yields. in East Africa, there has been an increase in temperature for about 0.6?C since year 2000 and so far no indication of reduced yeild as a result. (Musoni , Didace, Rwanda Meteorological Agency)
433	7	14	8	0	0	insert "of" after "response" (Gregory, Peter, University of Reading)
434	7	14	8	14	9	Please insert "for" between "Response" and "crop yield" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
435	7	14	9	0	0	…is insensitive to increases in rainfall, since wetter climates … (Vanuytrecht, Eline, KU Leuven)
436	7	14	10	14	26	The trade-off between increase in rainfall offsetting the increase in temperature (at low rainfall zone with projected increase in rainfall) has been available for rice, sorghum and maize in India (Naresh Kumar et al., 2013; Srivastava et al., 2010; Byjesh et al., 2010) (INDIA)

#	Ch	From Page	From Line	To Page	To Line	Comment
437	7	14	11	0	15	The authors could be more explicit in their explanation of the example: Are they trying to say that spikelet damage measured in controlled experiments is offset by other yield enhancing factors at the field level? Or, are they saying that spikelet damage does not happen in the field? (CANADA)
438	7	14	17	14	18	This is an example of a place where some treatment of this material in a risk management framework would be valuable. (UNITED STATES OF AMERICA)
439	7	14	22	14	22	Also concluded in Reidsma et al. (2010, European Journal of Agronomy 32: 91-102)\n\n (NETHERLANDS)
440	7	14	25	14	26	This statement is not supporting "the less imoortance of rainfall" ementioned above. Furthermore, a stronger impact by warming than drought could be only valid few countries. (Pan, Genxing, Nanjing Agricultural University)
441	7	14	26	14	26	Comment: Hawkins et al. (2012) that should be cited in this line is not “Hawkins, Osborne, Ho & Challinor (2013), Calibration and bias correction of climate projections for crop modelling: an idealised case study over Europe, Agricultural and Forest Meteorology, 170, 19, doi: 10.1016/j.agrformet.2012.04.007” but “Hawkins, Fricker, Challinor, Ferro, Ho and Osborne, 2013, Increasing influence of heat stress on French maize yields from the 1960s to the 2030s, Global Change Biology, 19, 937, doi: 10.1111/gcb.12069”. (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
442	7	14	28	14	38	Summarizing simulation results based on different assumptions and comparing them with those in AR4 does not indicate any "change" in the crop response, because the assumptions and sites are different and not comparable. The reason why adaptation in tropical maize makes predicted yields lower is counter-intutive but not explained. Why? I don't see from Figure 7-5 that rice yield starts to decrease above 1-2 oC above the local mean both in temperate and tropical regions. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
443	7	14	28	14	40	Authors may wish to consider revising this paragraph. At present it is not clear if this just applies to wheat yields in temperate regions. Moreover this discussion is just based on two studies. (Chatterjee, Monalisa, IPCC WGII TSU)
444	7	14	30	14	30	instead of referring to Frieler et al, 2013 the author should refer to Rosenzweig et al., 2013. Assessing agricultural risks of climate change in the 21st century in a global gridded crop model intercomparison, under review (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
445	7	14	35	14	35	New analysis since AR4 suggest more yield decreases than increases at all temperatures. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
446	7	14	36	14	38	Hence ... warming. It is unfortunate that the far reaching and important conclusions presented here, are based on two studies that according to the bibliography are still in peer review. Perhaps this issue will have been solved by the final publication of the report, if not it seems better to substantiate these important conclusions with research data that is publicly available. \n\n (NETHERLANDS)
447	7	14	39	24	29	which … meta-analyses. There is no logical reason why yields couldn't be compared in a meta-analysis on the local scale. It could obviously be the case that there is not enough studies to do so, but the current phrasing suggests a methodological impossibility. \n\n (NETHERLANDS)
448	7	15	5	15	6	this statement should be emphasised and cited earlier - see comment No 4. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
449	7	15	5	15	15	An important advance in the FACE studies since AR4 is that the CO2 reponses are genotype-specific. A recent study shows that yield enhancment due to elevated CO2 by 200 ppm ranged from 3 to 36 % among rice cultivars (Hasegawa et al 2013). While this is a source of uncertainty in yield prediction but shows the potential opportunities for adaptation (Throuout the chapter, descriptions on climate change x genotype interaction are very limited, but should be very important for adaptation).This citation is important to support the statement that appears in line 54 in page 39 of Chapter 7. Another importat lesson from the FACE study was CO2 enhancment was limited under both low temperutere (Shimono et al 2008) and under high temperature (Hasegawa et al 2013). These will also have strong implications for the crop production under variable temperauteres and high CO2 concentrations.\nHasegawa, T., Sakai, H., Tokida, T., Nakamura, H., Zhu, C., Usui, Y., Yoshimoto, M., Fukuoka, M., Wakatsuki, H., Katayanagi, N., Matsunami, T., Kaneta, Y., Sato, T., Takakai, F., Sameshima, R., Okada, M., Mae, T., and Makino, A. 2013 :Rice cultivar responses to elevated CO2 at two free-air CO2 enrichment (FACE) sites in Japan. Functional Plant Biology, 40, 148–159 [online] http://www.publish.csiro.au/?act=view_file&file_id=FP12357.pdf .\n Shimono, H., Okada, M., Yamakawa, Y., Nakamura, H., Kobayashi, K., and Hasegawa, T. 2008: Rice yield enhancement by elevated CO2 is reduced in cool weather. Global Change Biol. 14, 276–284. http://doi.wiley.com/10.1111/j.1365-2486.2007.01498.x (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
450	7	15	7	15	8	How should this statement be interpreted with respect to the 2nd bullet of 7.3.2? Further nuance in the bullet could help clarify the potential contrast. (Mach, Katharine, IPCC WGII TSU)
451	7	15	19	15	19	It could be helpful to specify the precursor directly. (Mach, Katharine, IPCC WGII TSU)
452	7	15	33	0	0	The sentence should be more explicit: The global yield losses of soybean, wheat and maize 'caused by surface ozone' in 2000 ranged from 8-15% ... (CANADA)
453	7	15	33	15	36	It could be helpful to clarify if these effects are due to ozone. (Mach, Katharine, IPCC WGII TSU)
454	7	15	34	15	37	The projected ... billion. In the paper cited (Avnery et al. 2011b), the range under scenario A2 is in fact 5.4-25.8%, and the range under scenario B1 4.3-12.1% on a global scale (Tables 3-4). The authors appeared to have chosen the highest estimates when multiple were available, but do not justify or explain this. Please double check these numbers and justify reporting particularly these. \n\n (NETHERLANDS)
455	7	15	35	15	36	It is unclear as to which scenario will suffer from 9-17% yield reduction, B1 or B2? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
456	7	15	37	15	38	Feng et al. 2008 is about broilers hence incorrect reference here. Ref for wheat yields = Feng et al. 2011 (UNITED STATES OF AMERICA)
457	7	15	43	15	45	The sentence beginning "Ozone may have..." discusses a generic effect of ozone and so belongs in the preceding paragraph (that at lines 17-26). (Moore, Andrew, CSIRO)
458	7	16	0	16	0	Section 7.3.2.2: Information on other crops such as coconut (major perennial plantation crop in tropics and sub-tropics) –(Naresh Kumar and Aggarwal, 2013); Cotton (Hebber et al., 2013) may be included. (INDIA)
459	7	16	8	0	0	Section 7.3.2.2 is not very clearly written and would benefit from an editorial review to improve the grammar and sentence structure. (CANADA)
460	7	16	10	0	16	Do the negative signs associated with the values of winter chill indicate a decline of that amount per decade? It is not clear as written. In the last sentence of the paragraph, it is also not clear what is meant by "some 400 h could be assured along the century"? (CANADA)
461	7	16	15	0	0	along the century looks odd (Gregory, Peter, University of Reading)
462	7	16	22	0	0	Lobell and Field 2011 = missing in references (Lobell and Field 2007 is there)... (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
463	7	16	23	16	26	This sentence is difficult to read. Suggest rewording and adding punctuation to make the sentence flow and to clearly explain its contents. (CANADA)
464	7	16	29	16	30	After Australia there should be the parenthesis and the sentence "Jones …" in the same line (line 29).\n\n (NETHERLANDS)
465	7	16	30	16	30	it could be a benefit'; it is not clear to what 'it' refers to\n\n (NETHERLANDS)
466	7	16	30	16	31	the lines are not properly in connection with the above paragraph (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
467	7	16	41	16	41	Cassava it can be added "also known as manioc", as the term "manioc" is very frequent and in some cases better know as closer to the Latin scientific name.\n\n (NETHERLANDS)
468	7	16	41	16	43	This sentence is not logical. If cassave is indeed characterised by higher optimum temperatures and co2 levels, it does no necessarily follow that it could not be significantly affected by future climate. In fact, it could be positively affected in a significant way. Please rephrase this sentence, or present evidence supporting the claim that there is no substantial effect. \n\n (NETHERLANDS)
469	7	16	42	0	0	replace "could" with "should" (Gregory, Peter, University of Reading)
470	7	16	46	16	52	On potato yields in Europe: Schaap et al. (2011, Regional Environmental Change 11: 731-741) and Schaap et al. (2013, European Journal of Agronomy 48: 30-42) showed that extreme events can have relatively large impacts on potato yields in the Netherlands, but that impacts can be largely reduced by adaptation measures.\n\n (NETHERLANDS)
471	7	17	0	17	0	Section 7.3.2.3.1: The information on pests is available (Rao et al.,) (INDIA)
472	7	17	5	17	6	Given that "current" is used but the citation is from 2006, it'd be helpful to specify the relevant time frame. (Mach, Katharine, IPCC WGII TSU)
473	7	17	15	17	17	To better reflect references, suggest changing sentence to read "Changes in temperature can result in geographic shifts through changes in seasonal extremes, and thus, for example, overwintering and summer survival." (UNITED STATES OF AMERICA)
474	7	17	17	17	17	This statement needs to be strengthened. Clarity on why ozone and CO2 can either increase or decrease disease and whether it differs between regions or seasons. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
475	7	17	22	17	22	such' does not refer to anything, omit\n\n (NETHERLANDS)
476	7	17	26	17	28	It could be even clearer to indicate the specific time frames for the described durations of "over 160 years" and "over almost 7 decades." For example, are these measurements that extend nearly to the present? (Mach, Katharine, IPCC WGII TSU)
477	7	17	28	17	30	There is also a more recent contribution: Hannukkala 2012, History and consequenses of migrations, changes in epidemiology and population structure of potato late blight, Phytophtora infestans in Finland from 1845 to 2011. Doctoral dissertation, MTT Science 18, 136 p. available at http://jukuri.mtt.fi/bitstream/handle/10024/438308/mtttiede18.pdf. In these studies the impact of climate to increased use of fungicides is not so evident, but the change is more or les due to profound changes in cropping practices (potato monoculture) and pathogen behaviour (oospores, soil borne primary inoculum) (Hannukkala, Asko, MTT Agrifood Research Finland)
478	7	17	30	17	31	The entire sentence starting with "Up to" is unclear and need to be re-written, highlighting that there are similarities between adaptation to climate change and adaptation to new scenarios (explaining what scenarios).\n\n (NETHERLANDS)
479	7	17	37	0	0	For clarity, suggest inserting 'geographic' before 'range' (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
480	7	17	37	17	45	Some specialised pest species may suffer from a habitat range decrease or from the interactions between changes in other 'non pest' insect species populations. It is important to point out that entire ecosystems are complex and may be disrupted. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
481	7	17	40	17	40	Delete words "are will" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
482	7	17	41	17	45	The generalization may be true, but new methods have been developed to better assess impacts of pests and diseases among other climate factors: Schaap et al. (2011, Regional Environmental Change 11: 731-741) and Schaap et al. (2013, European Journal of Agronomy 48: 30-42). Climate factors affecting crop production have been identified, the damage these climate factors cause, and the frequency in the current and future situation. \n\n (NETHERLANDS)
483	7	17	47	17	53	It is important to consider the potential impact on weed demographics. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
484	7	18	0	18	0	Section 7.3.2.4: Information on livestock, milk production in India are available (INDIA)
485	7	18	9	18	10	Does this northward migration only refer to the Northern Hemisphere? Please clarify. (AUSTRALIA)
486	7	18	10	0	0	Ziska 2011 is not in refs (but Ziska 2011a is). (UNITED STATES OF AMERICA)
487	7	18	10	18	11	The sentence starting with "The projected" is unclear, the concept "preferential selection" needs clarification of this concept to a public with less knowledge of ecology. Such a clarification will probably make the sentence more understandable.\n\n (NETHERLANDS)
488	7	18	15	0	0	It is worth mentioning climate extremes and in particular droughts have played a role in price hikes, particularly the case of Russian wheat that is noted in the food price graph. Perhaps in the beginning of the report there can be a differentiation between climate trends and climate extremes. Drought can be both a product of climate trends (decreasing precipitation and warming temperatures) and extremes. (UNITED STATES OF AMERICA)
489	7	18	18	18	20	The "Canada thistle" appears to be introduced here with little additional context. Suggest elaborating/explaining further if possible. (CANADA)
490	7	18	26	18	28	The following reference is also relevant in this context: J. JUNK, M. EICKERMANN, K. GÖRGEN, M. BEYER and L. HOFFMANN (2012). Ensemble-based analysis of regional climate change effects on the cabbage stem weevil (Ceutorhynchus pallidactylus (Mrsh.)) in winter oilseed rape (Brassica napus L.). The Journal of Agricultural Science, 150, pp 191-202. doi:10.1017/S0021859611000529. (Ferrone, Andrew, Public Research Centre - Gabriel Lippmann)
491	7	18	28	18	29	To better reflect source, suggest changing sentence beginning "Increased generations..." to read: "Infestations of coffee nematode (Meloidogyne incognita) and leaf miner (Leucoptera coffeella) are predicted to increase with climate change primarily due to an increase in the number of generations (Ghini et al, 2008)." (UNITED STATES OF AMERICA)
492	7	18	30	18	32	The sentence on potato late blight should specify the locations and scenarios to make this sentence meaningful. (AUSTRALIA)
493	7	18	32	18	32	I propose to add this sentence before ".Luck (2011)" : The pressure of European corn borer in sweet corn crops and of Colorado potato beetle in potato crops are predicted to increase in southern Quebec under climate change scenarios in connexion with an earlier arrival of the adults or increased numbers of generations per year (Gagnon et al., 2013). Refernce : Gagnon A.E. et al. 2013. Études de cas pour faciliter une gestion efficace des ennemis\ndes cultures dans le contexte de l'augmentation des risques phytosanitaires liés aux changements climatiques. Rapport final pour Ouranos.\nhttp://www.ouranos.ca/media/publication/166_RapportRoyM2013.pdf (Anne, Blondlot, Ouranos)
494	7	18	34	18	35	The Deutsch 2008 paper does not consider the effect of climate change on insect damage to plants, and is thus inappropriate as a reference to this statement. \n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
495	7	18	35	18	38	It probably should be emphazized that increasing trade of propagation material will increase pest risks. There are many recent examples like rapid spread of new potato blackleg and soft rot bacteria, Dickeya spp. and many destructive Phytophthora (e.g. P. ramorum) species (e.g. Toth et al. 2011. Dickeya species: an emerging problem for potato production in Europe. Plant Pathology 60:385-399; Lilja et al. 2011. Introduced pathogens found on ornamentals, strawberry and trees in Finland over the past 20 years. Agricultural and Food Science 20:74-85) (Hannukkala, Asko, MTT Agrifood Research Finland)
496	7	18	39	18	40	Mycotoxins and pesticide residues in food are of great concern for food safety. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
497	7	18	43	0	0	May be pertinent to describe differences between pastures in tropical and temperate climates, especially because the bulk of pasture expansion is found in the tropics. The loss of moisture from tropical deforestation can locally lead to drying trends as well as increase CO2 emissions. (UNITED STATES OF AMERICA)
498	7	18	43	0	53	No mention of arid and semi-arid lands/regions of Africa; yet these land/regions contribute the highest proportion of socioeconomically productive and/or inhabited landmass in this continent (Mwangi, Margaret, Pennsylvania State University)
499	7	18	43	20	34	The climate change impacts on livestock listed in this section should be summarized here as likely vast and varied impacts to animals' health and welfare (Nardone A, Ronchi B, Lacetera N, Ranieri MS, and Bernabucci U. 2010. Effects of climate changes on animal production and sustainability of livestock systems. Livestock Science 130:57-69). (Evans, Geoffrey, Humane Society International)
500	7	18	47	18	47	The sentence should start with "For example" as it refers to a specific case in the USA.\n\n (NETHERLANDS)
501	7	18	47	18	49	Referencing is needed for this relevant sentence.\n\n (NETHERLANDS)
502	7	18	47	18	49	The sentence beginning "Projected increases..." discusses a regionally-specific impact that is out of place in a paragraph that otherwise covers generic, world-wide considerations. I would suggest that it is better placed in the paragraph that begined at page 19 line 8 (with some attention paid to reconciling it with the conclusions of Craine et al 2011). I presume that the assertion in this sentence is justified by Izaurralde et al 2001? (Moore, Andrew, CSIRO)
503	7	18	49	18	49	I propose to add this sentence before "".In addition.." : Under predicted future climate, risks of winter injury to perennial forage crops in eastern Canada will likely increase because of less cold hardening during fall and reduced protective snow cover during the cold period, which will increase exposure of plants to killing frosts, soil heaving, and ice encasement (Belanger et al., 2002). Reference : Gilles Bélanger, Philippe Rochette, Yves Castonguay, Andrew Bootsma, Danielle Mongrain and Daniel A.J. Ryan (2002). Climate change and winter survival of perennial forage crops in eastern Canada, Agronomy Journal 94:1120–1130 . (Anne, Blondlot, Ouranos)
504	7	19	0	19	0	Section 7.3.2.4: Reference (Rajkumar et al., 2011) may be looked into (INDIA)
505	7	19	2	19	2	Reference can be made to: Kroes, J. G., & Supit, I. (2011). Impact analysis of drought, water excess and salinity on grass production in The Netherlands using historical and future climate data. Agriculture, Ecosystems & Environment, 144(1), 370-381. \n\n (NETHERLANDS)
506	7	19	3	19	5	It would be helpful to specify the relevant scenarios of climate change for this expected outcome--across a range of feasible scenarios? (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
507	7	19	14	19	14	I propose to add these two sentences before ".Also in French…" : The forecasted increase in air temperature in eastern Canada over the next 100 years will result in lower yields and nutritive value of timothy (Bertrand et al., 2008). Reference : Bertrand, A., G. F. Tremblay, S. Pelletier, Y. Castonguay et G. Bélanger. 2008. Yield and nutritive value of timothy as affected by temperature, photoperiod and time of harvest. Grass Forage Sci. 63 :421-432. (Bertrand and al., 2007) found that it is possible to identify rhizobial strains to improve plant performance under predicted future CO2 concentrations with no negative effect on nutritive value of perennial alfalfa..\nRefernec : Bertrand, A., D. Prévost, F.J. Bigras, R. Lalande, G.F. Tremblay, Y. Castonguay et G. Bélanger. 2007. Alfalfa response to elevated atmospheric CO2 varies with the symbiotic rhizobial strain. Plant and Soil 301: 173-187.\n (Anne, Blondlot, Ouranos)
508	7	19	19	19	20	Water availability will also constrain temperature effects. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
509	7	19	30	19	30	Moore and Ghahramani 2013: in the reference list for chapter 7, the conference paper by these authors is given, which is correct for the reference at line 5. Here, however, the paper by the same authors in Global Change Biology should probably be cited (doi:10.1111/gcb.12150) (Moore, Andrew, CSIRO)
510	7	19	33	19	33	Presumably the SRES scenarios are meant here? It could be helpful to specify this. (Mach, Katharine, IPCC WGII TSU)
511	7	19	41	19	50	This section would benefit from greater discussion of homogeneity/heterogeneity of livestock -- what the situation is today and what future situations could offer regarding resilience. (UNITED STATES OF AMERICA)
512	7	19	48	19	54	Milk yields will be reduced and mortality increased due to heat stress in dairy cows. Breeding goals often focus on production traits which tend to reduce heat tolerance. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
513	7	20	5	20	5	Host and pathogen systems it should be added "in livestock" to increase clarity.\n\n (NETHERLANDS)
514	7	20	6	20	8	Make sure this sentence is in line with the remaining report. Could it be removed from this chapter? (Lunde, Torleif Markussen, University of Bergen)
515	7	20	10	20	12	Suggest deleting 'such as African horse sickness and bluetongue' from the sentence beginning "Vector-borne diseases..." as Cutler et al. 2010 mentions neither illness. Alternatively, find the appropriate reference. (UNITED STATES OF AMERICA)
516	7	20	11	20	11	Does this northward migration only refer to the Northern Hemisphere? Please clarify (AUSTRALIA)
517	7	20	13	20	13	Specify or provide examples for the 'new areas' refered to in this sentence. (AUSTRALIA)
518	7	20	18	20	19	A line should be added here to indicate that there will likely be vast impacts to the welfare of animals used in agriculture (Nardone A, Ronchi B, Lacetera N, Ranieri MS, and Bernabucci U. 2010. Effects of climate changes on animal production and sustainability of livestock systems. Livestock Science 130:57-69). (Evans, Geoffrey, Humane Society International)
519	7	20	21	0	0	Cross reference should be made to the fresh wtater chapter (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
520	7	20	25	20	29	The source cited (Masike and Urich, 2008) does not contain the information in the two sentences "In Kgatleng District..." and "At the same time...". There is nothing in the source about 'an annual increase in cattle water demand of more than 20%..' or 'contribution of surface pan water to cattle water supply' etc...perhaps authors intended to cite Masike's PhD thesis as it appears to contain this information, but was unable to access it on line to see if it is the source of these two sentences. It seems a bit speculative to project annual increases of 20% in cattle water demand demand to 2050 and recommend removing unless references can be found. (UNITED STATES OF AMERICA)
521	7	20	31	20	34	Water must be effectively managed to sufficiently provide for global food demands. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
522	7	20	31	20	34	Two things should also be noted here. First, farm animal production has a large relative impact on our water footprint (Mekonnen MM and Hoekstra AY. 2012. A global assessment of the water footprint of farm animal products. Ecosystems 15:401-415). Second, any attempts at improving productivity should be evaluated for a range of sustainability impacts, including on animal welfare (De Boer IJM, Cederberg C, and Eady S et al. 2011. Greenhouse gas mitigation in animal production: towards an integrated life cycle sustainability assessment. Current Opinion in Environmental Sustainability 3:423-31). (Evans, Geoffrey, Humane Society International)
523	7	20	39	20	39	adapt to: Climate change will have some adverse impacts on food quality\n\n (NETHERLANDS)
524	7	20	39	20	47	7.3.2.5. Food and Fodder Quality and Human Health\nI propose that following sentences are inserted after this section:\nChanges in the taste and textural attributes of fruit have been observed in apple (Sugiura, et al, 2013, submited).\n\nReference \nSugiura, T., H. Ogawa, N. Fukuda, and T. Moriguchi, 2013, In review: Changes in the taste and textural attributesof apples in response to climate change. Scientific Reports.\n\nAbstract of the reference:\nThe effects of climate change on the taste and textural attributes of foods remain largely unknown, however, despite much public interest. On the basis of a 30–40-year records, we provide evidence that the taste and textural attributes of apples have changed as a result of recent warming. Decreases in acid concentration, fruit firmness and watercore development were observed regardless of the maturity index used for harvest date (e.g., calendar date, number of days after full bloom, peel colour and starch concentration), whereas in some cases, the soluble-solids concentration increased; all such changes may have resulted from earlier blooming and higher temperatures during the maturation period. These results suggest that the qualities of apples in the market are undergoing long-term changes. (Sugiura, Toshihiko, National Agriculture and Food Research Organization, Institute of Fruit Tree Science)
525	7	20	39	20	47	The studies of Schaap et al. (2011, Regional Environmental Change 11: 731-741) and Schaap et al. (2013, European Journal of Agronomy 48: 30-42) focus on crop production including both yield and quality, not only production. Examples include second growth of potatoes during heat waves. With second growth yield may still be high, but the higher number of small tubers cannot be sold on the market.\n\n (NETHERLANDS)
526	7	20	39	20	47	This paragraph reads oddly to me; surely the term "food quality" should be defined before it is used? (Moore, Andrew, CSIRO)
527	7	20	39	22	15	Section 7.3.2.5 is said to present effects of climate change on food quality and human health, but the focus is on CO2 impacts on food quality only. Most impacts are also negative. There may however also be positive impacts of changes in temperature and/or precipitation on food quality. For example, wheat in the Netherlands is currently mainly used for feed, but may be more used for food when temperatures increase. Grape quality in colder regions may also increase. We don't have references for this, but including such information would make the section more balanced.\n\n (NETHERLANDS)
528	7	20	41	20	41	plant instead of "grain", is much more ad-hoc word.\n\n (NETHERLANDS)
529	7	20	49	21	2	In this paragraph it is not clear how experiments measuring changes in N concentrations were set up. Was N supply kept the same is in the current situation, or was N supply adapted based on changes in (expected) crop yield? When yields increase with increasing CO2 concentrations, N uptake also increases, so more N is required. If this is not applied, it is logical that N concentration reduces.\n\n (NETHERLANDS)
530	7	21	2	0	0	Erda et al 2010 is not in refs ...Erda et al 2005 is. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
531	7	21	2	21	2	I don't see Erda et al 2010 in the reference list. For rice, three FACE studies showed reduction in grain protein content due to elevated [CO2] (Liefferint et al 2004; Yang et al 2007; Zhang et al 2013).\n\nLieffering, M., Kim, H.-Y., Kobayashi, K., and Okada, M. 2004: The impact of elevated CO2 on the elemental concentrations of field-grown rice grains. Field Crops Research 88, 279–286. http://linkinghub.elsevier.com/retrieve/pii/S0378429004000164 \n\nYang, L., Wang, Y., Dong, G., Gu, H., Huang, J., Zhu, J., Yang, H., Liu, G., and Han, Y. 2007: The impact of free-air CO2 enrichment (FACE) and nitrogen supply on grain quality of rice. Field Crops Research 102, 128–140. http://www.sciencedirect.com/science/article/pii/S0378429007000354.\n\nZhang, G., Sakai, H., Tokida, T., Usui, Y., Nakamura, H., Yoshimoto, M., Fukuoka, M., Kobayashi, K., and Hasegawa, T. 2013: The effects of free-air CO2 enrichment (FACE) on carbon and nitrogen accumulation in grains of rice (Oryza sativa L.). J. Exp. Bot. in press. doi:10.1093/jxb/ert154. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
532	7	21	5	21	6	The two sentences beginning "Although there are numerous.."\nlacks a citation and needs to be clarified. (UNITED STATES OF AMERICA)
533	7	21	12	21	12	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
534	7	21	17	21	20	Referencing is needed for this relevant sentence.\n\n (NETHERLANDS)
535	7	21	20	21	24	The citated papers both cover food crops. I note that in a P-limited grassland Niklaus and Korner (2004; doi:10.1890/03-4047) found dilution only for both N and P under high CO2, i.e. total plant N & P did not change (Moore, Andrew, CSIRO)
536	7	21	23	21	24	This sentence is incomplete, please revise. (AUSTRALIA)
537	7	21	23	21	24	sentence is not finished\n\n (NETHERLANDS)
538	7	21	31	21	31	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
539	7	21	38	21	39	Referencing is needed for this relevant sentence.\n\n (NETHERLANDS)
540	7	21	44	21	46	High night temperautre also decreases grain setting (increases sterility) (Cheng et al 2009, Mohammaed and Tarpley (2009).\n\nCheng, W., Sakai, H., Yagi, K., and Hasegawa, T. 2009: Interactions of elevated [CO2] and night temperature on rice growth and yield. Agricultural and Forest Meteorology 149, 51–58. http://linkinghub.elsevier.com/retrieve/pii/S0168192308002037 \n\nMohammed, a. R., and Tarpley, L. 2009: High nighttime temperatures affect rice productivity through altered pollen germination and spikelet fertility. Agricultural and Forest Meteorology 149, 999–1008. http://linkinghub.elsevier.com/retrieve/pii/S0168192308003523. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
541	7	21	48	21	48	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
542	7	21	48	21	50	It would be preferable to present these summary terms for evidence and agreement parenthetically at the end of the respective sentences, using italics font. (Mach, Katharine, IPCC WGII TSU)
543	7	21	50	21	51	For rice, three FACE studies showed reduction in grain protein content due to elevated [CO2] (Liefferint et al 2004; Yang et al 2007; Zhang et al 2013).\n\nLieffering, M., Kim, H.-Y., Kobayashi, K., and Okada, M. 2004: The impact of elevated CO2 on the elemental concentrations of field-grown rice grains. Field Crops Research 88, 279–286. http://linkinghub.elsevier.com/retrieve/pii/S0378429004000164 \n\nYang, L., Wang, Y., Dong, G., Gu, H., Huang, J., Zhu, J., Yang, H., Liu, G., and Han, Y. 2007: The impact of free-air CO2 enrichment (FACE) and nitrogen supply on grain quality of rice. Field Crops Research 102, 128–140. http://www.sciencedirect.com/science/article/pii/S0378429007000354.\n\nZhang, G., Sakai, H., Tokida, T., Usui, Y., Nakamura, H., Yoshimoto, M., Fukuoka, M., Kobayashi, K., and Hasegawa, T. 2013: The effects of free-air CO2 enrichment (FACE) on carbon and nitrogen accumulation in grains of rice (Oryza sativa L.). J. Exp. Bot. in press. doi:10.1093/jxb/ert154. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
544	7	22	0	22	0	Section 7.3.2.6: References from south Asia may be looked into (INDIA)

#	Ch	From Page	From Line	To Page	To Line	Comment
545	7	22	1	22	4	This conclusion is possible based on the sentence prior to it, but evidence is provided for it. \n\n (NETHERLANDS)
546	7	22	3	22	5	Can this statement be justified? What evidence is available? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
547	7	22	12	22	12	In place of "little to no confidence," is it possible to assign a level of confidence following the guidance for authors? (Mach, Katharine, IPCC WGII TSU)
548	7	22	12	22	15	Question if this statement should refer to: little to no 'evidence' rather than 'confidence' regarding the effects of climate change on human health through changes in nutrient composition. Otherwise one of the five defined qualifiers for confidence should be used eg very low or low. Further suggest that a 'complete understanding' is unlikely to ever be achieved and this sentence should refer to a 'focused research effort' instead. (AUSTRALIA)
549	7	22	12	22	15	Links between impacts of climate change on human migration and consumption habits and the impacts on human health are not mentioned. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
550	7	22	18	0	0	This section was done rapidly it seems. There are several papers for exmaple on American, European and Australian lobsters and issues of cliamte change (including temperature and ocean acidification). If this is because it is covered in another chapter, this should be mentioned instead to being so superficial. (Vasseur, Liette, Brock University)
551	7	22	18	0	0	Section 7.3.2.6. The chapter team should very carefully consider the key findings of chapter 6 and 30, cross-referencing them here and ensuring consistency. It seems this chapter should focus on aquaculture and freshwater fisheries, leaving ocean fisheries to chapter 6 and 30. Additionally, further attention to subsistence versus commercial fisheries could be given. (Mach, Katharine, IPCC WGII TSU)
552	7	22	18	22	34	Recruitment of individual fish population is very sensitive to climate variability (e.g., anchovy vs. sardine) Weather can influence working conditions of fishermen, aggravating fishing efficiency. Sever storms and other extreme weather events can damage greatly aquaculture facilities and cause mass mortality of fish and invertebrate in the facilities. For example, unusually-low salinity water from river discharges can cause mass mortality of oysters and other invertebrates in cage culture. (Jung, Sukgeun, Jeju National University)
553	7	22	25	22	26	7.3.2.6. this reads odd, why is this in addition? (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
554	7	22	28	22	28	What other environmental impacts exist? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
555	7	22	29	22	29	It would be more accurate to say "and/or seasonality." (Mach, Katharine, IPCC WGII TSU)
556	7	22	29	22	30	A number of points made here are not elaborated on later in this section. Changes in sea level rise, glacier melt, groundwater and river flows. Perhaps a reason should be provided as to why no further detail is provided. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
557	7	22	31	22	32	7.3.2.6. to be balanced with ch. 5 and 6, a reference to chapter 6 could be added here. (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
558	7	22	37	0	0	Section 7.3.2.6.1. The chapter team should very carefully consider the key findings of chapter 6 and 30, cross-referencing them here and ensuring consistency, for example especially on lines 46-49 of this page. (Mach, Katharine, IPCC WGII TSU)
559	7	22	37	23	10	This paragraph does not provide much work on the impacts of mean and extremes of precipitation although it is in the title. Research on freshwater fisheries or of ecosystems such as mangroves are not included in this explanation of the sensitivity to weather and climate. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
560	7	22	39	22	54	Either here or on page 23, 29 – some mention should be made of (i) the possible effects of mis-matches between seasonal production cycles and reproduction in fish leading to recruitment failure (work by Beaugrand et al., 2008). (ii) How climate change will affect up welling systems, (iii) How climate variability drives shifts between pelagic fish (e.g. English Channel herring in cold periods and Sardines in warm periods – known back to the 12th Century – work by Southward et al., 1980, 1988, 1995, 2005; Hawkins et al., 2003) recently linked to the Atlantic Multidecadal Oscillation (Edwards et al., 2013). These changes are likely to be amplified and accelerated by climate change. \nBeaugrand, G., Edwards, M., Brander, K., Luczak, C., Ibanez, F. 2008. Causes and projections of abrupt climate-driven ecosystem shifts in the North Atlantic. ECOLOGY LETTERS, 11: 1157-1168.\nEdwards M, Beaugrand G, Helaouët P, Alheit J, Coombs S (2013) Marine Ecosystem Response to the Atlantic Multidecadal Oscillation. PLoS ONE 8(2): e57212. doi:10.1371/journal.pone.0057212.\nSOUTHWARD, AJ. 1980. THE WESTERN ENGLISH-CHANNEL - AN INCONSTANT ECOSYSTEM. NATURE, 285: 361-366 \nSOUTHWARD, AJ; BOALCH, GT; MADDOCK, L. 1988. FLUCTUATIONS IN THE HERRING AND PILCHARD FISHERIES OF DEVON AND CORNWALL LINKED TO CHANGE IN CLIMATE SINCE THE 16TH-CENTURY. JOURNAL OF THE MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM, 68: 423-445. \nSOUTHWARD, AJ., HAWKINS, SJ., BURROWS, MT . 2005. 70 YEARS OBSERVATIONS OF CHANGES IN DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON AND INTERTIDAL ORGANISMS IN THE WESTERN ENGLISH-CHANNEL IN RELATION TO RISING SEA TEMPERATURE. JOURNAL OF THERMAL BIOLOGY, 20: 127-155. \nHawkins, S.J., Southward, A.J., Genner, M.J., 2003. Detection of environmental change in a marine ecosystem – evidence from the western English Channel. Science of the Total Environment, 310: 245-246.\n (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
561	7	22	40	22	40	Worth citing some references here? (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
562	7	22	41	22	41	Insert “Genner et al., 2004” \nGenner, MJ., Sims, DW., Wearmouth, VJ., Southall, EJ., Southward, AJ., Henderson, PA., Hawkins, SJ 2004. Regional climatic warming drives long-term community changes of British marine fish PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES, 271: 655-661.\n (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
563	7	22	42	22	42	this sentence is a comment and need to be deleted (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
564	7	22	42	22	42	There is still a comment of JP included.\n\n (NETHERLANDS)
565	7	22	42	22	43	The comment here seems to imply need for more coordination with chapter 6. I raised questions above concerning the evidence and confidence for statements about large changes in yield and the information cited later in this paragraph (lines 46-52) seem to diverge substantially, as summed up at the end of the paragraph. (Brander, Keith, Technical University of Denmark)
566	7	22	42	22	43	the note (perhaps from one of the contributors) :JP: I have…this vaolume" need sto be deleted. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
567	7	22	42	22	43	This is a comment from the authors to each other and should be removed from the text. \n\n (NETHERLANDS)
568	7	22	42	22	43	This note should be deleted. (Mach, Katharine, IPCC WGII TSU)
569	7	22	48	22	48	40% decrease in fish yields by 2055 (over-estimated the impacts?), better to add (low confidence) after this (INDIA)
570	7	22	48	22	48	It would be preferable here to provide the full range instead of "up to 40%." (Mach, Katharine, IPCC WGII TSU)
571	7	22	51	22	52	This statement needs to be strengthened. It is too vague as it stands 'managed sustainably'. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
572	7	23	1	23	6	Fulton (2011) study, here quoted, instead writes in the mentioned article ">90% in the relative value of their operations" (page 1336 in Fulton 2011).\n\n (NETHERLANDS)
573	7	23	2	23	2	Please spell out the acronym EEZ (Exculsive Economic Zone) (AUSTRALIA)
574	7	23	2	23	2	for what "EEZ" stands for? (Goheer, Arif, Global Change Impact Studies Centre (GCISC))

#	Ch	From Page	From Line	To Page	To Line	Comment
575	7	23	4	23	4	The introduced term "economic returns" (which are hypothetical - should be written "alleged profits/returns"), but seems not very relevant for the purpose of this section. Moreover the economic projections presented seems to be contrasting with Brown et al 2010, quoted at page 29 line 39-42.\n\n (NETHERLANDS)
576	7	23	18	23	28	Studies from South Asia may be considered (INDIA)
577	7	23	28	23	28	Reference to Box 5-3 is incorrect, perhaps refer to Box CC-OA or section 5.4.2.4? (AUSTRALIA)
578	7	23	28	23	28	7.3.2.6.1. reference to Box 5-3 to be checked, there is now a cross-chapter box on coral reefs. (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
579	7	23	30	23	30	Clarify what kind of projections these are (i.e. projections of what?) (AUSTRALIA)
580	7	23	30	23	31	The entire sentence is very generic and the two concept "minimizing risks" and "new opportunities" are extremely vague in this context: they reduce the already the questinable significance of the sentence which should be therefore rewritten providing substantial explanations.\n\n (NETHERLANDS)
581	7	23	34	0	0	Section 7.3.2.6.2. The chapter team should very carefully consider the key findings of chapter 6 and 30, cross-referencing them here and ensuring consistency. (Mach, Katharine, IPCC WGII TSU)
582	7	23	36	23	41	It is difficult to believe, that the economic cost of ocean-acidification-induced coral reef loss by 2100 will be 500-870 billion USD annually and the global cost of loss of production of mollusks could be over 100 billion USD. (GERMANY)
583	7	23	38	23	38	WG2 may be replaced with "WGII" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
584	7	23	38	23	38	The proper format for cross-referencing cross-chapter boxes should be used here. (Mach, Katharine, IPCC WGII TSU)
585	7	23	44	24	5	As climate warming, the productive period of fish pond in temperate regions will prolong but the danger of death by suffocation in the hot night in summer will increase. In north China, many fish pond had been closed due to precipitation decreased. In East China Sea, the number of typhoon has not increased but its intensity increased obviously, as a result, fishing for seafood has become more dangerous. As water temperature increases, algal reproduction becomes stronger, water pollution becomes more serious, inland fish ponds have been affected, and the red tide often affects sea-farming along the coast such as kelp and pearl shell. (Zheng, Dawei, China Agricultural University)
586	7	23	44	24	5	As climate warming, the productive period of fish pond in temperate regions will prolong but the danger of death by suffocation in the hot night in summer will increase. In north China, many fish pond had been closed due to precipitation decreased. In East China Sea, the number of typhoon has not increased but its intensity increased obviously, as a result, fishing for seafood has become more dangerous. As water temperature increases, algal reproduction becomes stronger, water pollution becomes more serious, inland fish ponds have been affected, and the red tide often affects sea-farming along the coast such as kelp and pearl shell. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
587	7	23	46	23	50	This text highly overlaps with the text above and could be deleted or at least very substantially reduced. (Mach, Katharine, IPCC WGII TSU)
588	7	24	0	26	0	Several studies have been conducted at national level to quantify the sensitivity of food consumption, access to markets, and other food security indicators to weather and climate. We recommend including some of these:\n\nIRI and WFP (2011) Climate risk and food security in Mali. IRI/WFP: New York/Rome.\nWFP, ANACIM, and CCAFS (forthcoming) Climate risk and food security in Senegal: Analysis of climate impacts on food security and livelihoods. ANACIM/WFP: Dakar.\nWFP, DRMFSS, AAU, and CCAFS (forthcoming) Climate risk and food security in Ethiopia: Analysis of climate impacts on food security and livelihoods. DRMFSS/WFP: Addis Ababa. (Scaramella, Carlo, World Food Programme)
589	7	24	17	24	17	Is it possible to specify what is meant by "major implications"? (Mach, Katharine, IPCC WGII TSU)
590	7	24	18	24	18	It would be more accurate to say "frequency and/or severity." (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
591	7	24	22	26	10	Section 7.3.3.2. This section is an relevant and well written of some of the economic consequences of and behavioural responses to climate-change induced changes in global food production. It is unfortunate that this section is not covered in the TS, and hardly in the SPM. It would advisable to cover some of the main conclusions of this paragraph in the TS at least, and ideally also in the SPM. Currently the coverage of chapter 7 in the SPM and TS seems to focus almost exclusively on the 'food production systems' aspect of the chapter, rather than on the 'food security' aspect. \n\n (NETHERLANDS)
592	7	24	26	24	30	Another important element of food access is household access to markets. We recommend expanding this section to include this. Some suggested references to highlight this relationship include:\n\nUK Met Office Hadley Centre and WFP (2012) Climate impacts on food security and nutrition: A review of exisitng knowledge". Exeter/Rome: Hadley Centre and WFP.\nIRI and WFP (2011) Climate risk and food security in Mali. IRI/WFP: New York/Rome. \nNational Planning Commission, Central Bureau of Statistics, World Food Programme, World Bank, AusAid, and UNICEF (2013) Nepal Thematic Report on Food Security and Nutrition 2013. Kathmandu: NPC. (Pages 76-80). Downloadable from: http://wfp.nepasoft.com.np/nefoodsec/publications/Nepal%20Thematic%20Report%20Food%20Security%20%20Nutrition%20Mar%2019_Final.pdf (Scaramella, Carlo, World Food Programme)
593	7	24	45	0	0	For clarity, suggest replacing 'nutritional levels' with 'nutritional status' (UNITED STATES OF AMERICA)
594	7	24	50	25	3	It is important to note that extreme weather events and disasters disrupt food access. If events become more frequent, food access will be greatly disrupted. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
595	7	25	4	0	0	Add a paragraph after line 4 "Small holders, whose livelihoods depends, totally or mainly, are extremely vulnerable to food insecurity when agricultural production is impacted (HLPE 2012). Dryland agriculture in arid and semi-arid regions of Asia, Africa and Latin America (Cline 2007, Swaminathan and Kesavan, 2012, Nienaber and Hahn, 2007; Thornton et al., 2008) is particularly vulnerable to the risks of climate change and variability (particularly drought). Most vulnerable in dry areas are pastoralists and smallholder farmers (Hassan, 2010; Dinar et al., 2008) with extensive systems whose vulnerability is expected to worsen with climate change (HLPE 2012)." The refs are: Cline, W. R. (2007). Global Warming and Agriculture: Impact Estimates by Country. Washington, D.C.: Center for Global Development. http://www.cgdev.org/content/publications/detail/14090.\nDinar, A., Somé, L., Hassan, R., Mendelsohn, R. and Benhin, J. (2008). Climate change and\nagriculture in Africa: impact assessment and adaptation strategies. Earthscan/James & James.\nNienaber, J. A., and Hahn, G. L. (2007). Livestock production system management responses to\nthermal challenges. 52: International Journal of Biometeorology: 149-57.\nHassan, R. M. (2010). Implications of Climate Change for Agricultural Sector Performance in Africa:\nPolicy Challenges and Research Agenda. Journal of African Economies 19 (Supplement 2) (July\n21): ii77-ii105. http://jae.oxfordjournals.org/cgi/content/abstract/19/suppl_2/ii77.\nSwaminathan, M. S., and Kesavan, P. C. (2012). Agricultural Research in an Era of Climate Change.\nAgricultural Research 1 (1) (January 31): 3-11. doi:10.1007/s40003-011-0009-z.\nhttp://www.springerlink.com/content/l04630341j00u524/.\nThornton, P. K., Jones, P. G., Owiyo, T., Kruska, R. L., Herrero, M., Orindi, V., Bhadwal, S.,\nKristjanson, P., Notenbaert, A., Bekele, N. and Omolo, A. (2008). Climate change and poverty in\nAfrica: Mapping hotspots of vulnerability. African Journal of Agricultural and Resource Economics\n2 (1): 24-44. http://purl.umn.edu/56966.\nHLPE, 2012. Social protection for food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2012. http://www.fao.org/cfs/cfs-hlpe/reports/en/ (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))

#	Ch	From Page	From Line	To Page	To Line	Comment
596	7	25	11	25	16	The example of the Pakistan flood survey is not linked well to the issue of food. Many findings stated are not relevant to this chapter. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
597	7	25	15	0	0	replace "heavier" with "larger" (Gregory, Peter, University of Reading)
598	7	25	19	25	19	negative effect on poverty is ambiguous - negative outcome, or less poverty? (Moore, Andrew, CSIRO)
599	7	25	21	25	29	This paragraph does not fully reflect the situation in tropical regions such as South Asia (INDIA)
600	7	25	26	0	0	Delete the reference to Kassie et al. 2008 as it is not about 'lower likelihood of applying purchased inputs such as fertilizer...' but rather about the impact of stone bunds on crop yields. (UNITED STATES OF AMERICA)
601	7	25	35	25	37	The sentence that begins with "Currently...." contains a reference to two sources Fafchamps, 1999 and Frankenberg, 1999 -- "1999" is not "current".\n Two sources cited are not in refs: McPeak, 2004 and Frankenberg, 1999. (UNITED STATES OF AMERICA)
602	7	25	42	0	0	Hoddinott and Malucio, 2002 is not in refs. (UNITED STATES OF AMERICA)
603	7	25	50	25	51	What written here is in contrast with the content of page 22 line 12-15. The contradiction should be solved.\n\n (NETHERLANDS)
604	7	26	4	0	0	HLPE 2012 not in refs...2011 is. (UNITED STATES OF AMERICA)
605	7	26	5	26	6	It would be preferable to provide summary terms for agreement and evidence in place of "good agreement," or alternatively, "there is good agreement" could be deleted. (Mach, Katharine, IPCC WGII TSU)
606	7	26	13	0	0	Section 7.3.4. It is not necessarily the case that resources will be directed towards activities that are less affected by climate change. This depends upon trade and prices. If local prices of strongly affected commodities rise by more than the climate impact, farmers may "adapt" by planting more of the highly affected crops rather than less. \nArndt, C., P. Chinowsky, S. Robinson, K. Strzepek, F. Tarp and J. Thurlow. "Economic Development Under Climate Change." Review of Development Economics. 16(3)(2012): 369–377. (Arndt, Channing, University of Copenhagen)
607	7	26	13	27	15	In section 7.3.4 a lot more can be said about crop choice adaptation compared to crop level management adaptation. For example, crop yields of wheat may decline, and instead of adopting adaptation measures increasing wheat yields, it may be more profitable to switch to other crops. Such type of adaptations are included in Ricardian analyses following Mendelsohn et al. (1994, American Economic Review 84: 753-771). Currently, bio-economic models are also coupled to crop models to simulate both types of adaptation measures.\n\n (NETHERLANDS)
608	7	26	16	0	17	The sentence "studies since…" needs to be revised (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
609	7	26	16	26	16	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
610	7	26	16	26	17	Incomplete or poorly drafted sentence, please revise. (AUSTRALIA)
611	7	26	16	26	17	Sentence appears to be incomplete, not clear what is meant by 'total time regions.' (AUSTRALIA)
612	7	26	16	26	17	Sentence that begins " Studies since..." is unclear. Please clarify. (UNITED STATES OF AMERICA)
613	7	26	19	26	19	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
614	7	26	20	26	21	The studies of Schaap et al. (2011, Regional Environmental Change 11: 731-741) and Schaap et al. (2013, European Journal of Agronomy 48: 30-42) have assessed the impacts of extreme climate events including pests and diseases. Specifically studies using agroclimatic indices instead of crop simulation models can include pests and diseases in their assessments.\n\n (NETHERLANDS)
615	7	26	27	26	27	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
616	7	26	29	0	0	Burke et al. 2009 is not in refs. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
617	7	26	29	26	29	The Burke (2009) reference is about reefs according to the bibliography, while the sentence discusses changes in crop areas. Please check this. \n\n (NETHERLANDS)
618	7	26	35	26	35	The authors should consider including a brief discussion of (or reference to) agroecological approaches or landscape approaches to manage water. (UNITED STATES OF AMERICA)
619	7	26	35	26	35	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
620	7	26	36	26	37	There was a case study that water supply alleviate or recovered loss of maize yiled under rain-fed conditions, reported for poor soil in rain-fed loess plateau, China. Chu et al., 2009. Impact of spring drought on winter wheat yield and the mitigation by fertilization and irrigation: An example of survey and field experiment in 2003 and 2009 in Yuanqu County, Shanxi Porovicne, China. Journal of Agro-environment Science, 30(9):1772-1776,2011 (Pan, Genxing, Nanjing Agricultural University)
621	7	26	38	26	40	At this point it is important to consider that a proper management in the use of water is critical for climate change adaptation. Since Chile is highly vulnerable to climate change, the National Irrigation Commission considers that is necessary the well-planned construction of irrigation infrastructure, for adapting to climate change. The planning of this infrastructure must necessarily consider the impacts that may arise, and then anticipate and mitigate the impacts . (CHILE)
622	7	26	42	26	42	It would be preferable to indicate more precisely what is meant by "seriously impacted." (Mach, Katharine, IPCC WGII TSU)
623	7	26	51	26	54	It appears that the reference given for these statements on Australian cropping and grazing is incorrect (Nidumolu 2011 - relates to heat stress in diary cattle). The correct reference may be Nidumolu UB, Hayman PT, Howden SM, Alexander BM (2012) Re-evaluating the margin of the South Australian grain belt in a changing climate. Clim Res 51:249-260? (AUSTRALIA)
624	7	27	0	0	0	Here we could cite Roudier et al. (2011) who have done a meta-analysis on the impact of climate change on crop yields in Africa. The exact reference is "Roudier P., Sultan B., Quirion P., Berg A. (2011) The impact of future climate change on West African agriculture: what does the recent literature say? Global Environmental Change, doi:10.1016/j.gloenvcha.2011.04.007." (Sultan, benjamin, IRD)
625	7	27	0	0	0	In this section, we could mention the work of Sultan et al. (2013) who simulated the effects of both temperatures and rainfall changes on crop yields in West Africa. The exact reference is "Sultan B., Roudier P., Baron C., Quirion P., Muller B., Alhassane A., Ciais P., Guimberteau M., Traoré S.B. and M. Dingkuhn (2013) Assessing climate change impacts on sorghum and millet yields in the Sudanian and Sahelian savannas of West Africa, Environ. Res. Lett. 8 014040 doi:10.1088/1748-9326/8/1/014040." (Sultan, benjamin, IRD)
626	7	27	0	27	0	Section 7.4: This section intends to provide information from the studies conducted using integrated assessments. However, the literature provided is not justifying the intention. Studies on cropping systems (ex. Naresh Kumar et al., 2011), integrated impacts need to be looked into. I also agree that the information this aspect is relatively scarce. Just linking climate and crop models may not qualify for this section. (INDIA)
627	7	27	0	27	0	Section 7.4: There can be a section in model ensemble (climate and crop models) studies. (INDIA)
628	7	27	0	28	0	General comment: It should be stressed that it is difficult to study the impacts of 3 or 4°C temperature increases, because there are hardly regions where such an increase in the average temperature can be observed. Cross-sectional analyses can give only an indication for such temperature increases, but what is needed is a two-world experiment. One world in which the temperature is increases and one in which it remains constant. This allows an accurate assessment of climate impacts. The study of Burke and Emerick (2012). (Marshall Burke and Emerick Kyle (2012): "Adaptation to climate change: Evidence from US agriculture". (Trapp, Natalie, University of Hamburg and International Max Planck Research School on Earth System Modelling)

#	Ch	From Page	From Line	To Page	To Line	Comment
629	7	27	2	27	15	Biofuels are discussed but other monocrops such as soya and the impact of such land use change is not. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
630	7	27	2	27	15	this section on the role of biofuel production incentives needs to be expanded and fully referenced. Complex links between crop use for biofuel production, food prices and food security need to be better described. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
631	7	27	2	27	15	Information on by-products of bioenergy production is missing. For example 1 ha rape oil production delivers expeller and husks for feeding and substitutes 1,3 ha of soy production. Additionally here should be mentioned, that the main source for bioenergy is wood, which is not competing with food security. (GERMANY)
632	7	27	5	27	6	Brazil, Malaysia, Peru, Argentina and Thailand should not be specified directly in the text as many other developing nations are also relatively food secure and have high demand for fossil-based fuels. It is more appropriate to just refer to "a number of developing countries" in the sentence. (MALAYSIA)
633	7	27	13	27	14	Targets of biofuel production will cause an additional 140 - 150 million people to be at risk of hunger by 2020. What is the reference for this? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
634	7	27	17	27	25	This statement will hold good provided food-crop land is diverted to biofuel crops, which is unlikely situation at least in south Asia. (INDIA)
635	7	27	18	31	53	Section 7.4: WGI AR5 Ch12 has to be cited for the discussion of climate targets instead of providing your own assessment. Please cross-reference to the WGI/SREX report wherever applicable. The section does not refer to any of the WGI Chapters 11, 12, or 14 dealing with climate change projections in WGI AR5. Encourage authors to make use of, and carefully cross-reference the relevant information from these WGI AR5 chapters. Please revise accordingly. (Plattner, Gian-Kasper, IPCC WGI TSU)
636	7	27	18	32	2	This section does not include a sub-section on the projected impacts on livestock or pasture. If it is to follow the structure of the chapter it would be expected after the cropping system and before fisheries. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
637	7	27	20	0	0	Section 7.4.1 After three decades of sugar cane ethanol production, Brazil has many studies about interaction among climate change, sugar cane and food production. Please contact University of Viçosa, professor Dr. Justino; www.ufv.br. Also the University of Sao Paulo, department of economic studies. Instituto de Estudos do Comércio e Negociações Internacionais; www.iconebrasil.org.br (Nogueira da Silva, Milton, Climate Change Forum of Minas Gerais, Brazil)
638	7	27	23	27	26	all areas are projected to have negative yield impactspast 3 degrees of local warming'. More explanation is needed, as this study is not published yet.\n\n (NETHERLANDS)
639	7	27	26	27	26	Please include reference for these 'more recent studies'. (AUSTRALIA)
640	7	27	29	27	29	A description of which crops are included in this study would be beneficial. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
641	7	27	29	27	29	Are 20-year bins the best approach? Wouldn't it be preferable to be able to see how yield is expected to change over different levels of climate change? Recognizing that many variables are important in determining yields, would degrees Celsius bins nonetheless be preferable? (Mach, Katharine, IPCC WGII TSU)
642	7	27	29	28	18	The relationship of the impacts with the assumption made on GHG emissions (SRES ou RCPs) should more clearly presented (Petit, Michel , CGIET rue de Bercy)
643	7	27	32	27	32	reductions of more than 5% are more likely than not beyond 2050'. This is a very small impact compared to the technological development in many parts of the world in the past decades. It would be good to put numbers into context.\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
644	7	27	33	27	33	The chapter team here asserts that regional differences are masked in the figure, but what about differences across scenarios of climate change, which are also masked? (Mach, Katharine, IPCC WGII TSU)
645	7	27	34	27	34	yield reductions in the tropics are very likely'. This may be true, but also here yield changes should be put into context. Actual yields in the tropics are often much lower than potential yields, and yield gaps can still be largely reduced (Van Ittersum et al., 2013, Field Crops Research 143: 1-3). Yields are often not limited by climatic conditions, but by nutrients and other management factors (e.g., Tittonell et al., 2008, Plant Soil 313:19–37), and may therefore respond less to climatic conditions as projected by the general crop models.\n\n (NETHERLANDS)
646	7	27	34	27	34	suggesting... time. This reasoning is dubious. Positive yield changes in temperate regions do not logically imply that yield reductions at the same time in the tropics are very likely. This may be factually true, and the paper by Knox cited in the succeeding sentence supports the assertion, but the current sentence makes a logical connectiont that feels unwarranted. Re-writing the sentence should help clarity and comprehension.\n\n (NETHERLANDS)
647	7	27	43	27	48	See also: (1) Iglesias A, Garrote L, Quiroga S and Moneo M. (2012) A regional comparison of the effects of climate change on agricultural crops in Europe. Climatic Change,112 (1), 29-46. (2) Ciscar, J.C., Iglesias, A., Feyen, L. Szabo, L., van Regemorter, D., Amelung, B., Nicholls, R., Watkiss, P., Christensen, O.B., Dankers, R., Garrote, L., Goodess, C.M., Hunt, A., Moreno, A., Richards, J., Soria, A. (2011). Physical and economic consequences of climate change in Europe. Proceedings of the National Academy of Sciences 108 (7): 2678-2683. (3) González-Zeas D., Quiroga, S., Iglesias, A., Garrote, L. (2013). "Looking beyond the average agricultural impacts in defining adaptation needs in Europe". Regional Environmental Change, In press. (DOI: DOI 10.1007/s10113-012-0388-0) (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)
648	7	27	45	27	45	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
649	7	27	46	27	48	It is more informative and accurate to report an average yield decrease, with an associated measure of range indicating outliers, rather than just mentioning the outlier value (up to 50%), as in the current text. Additionally, Knox et al. 2012 report large reductions in yield of up to 50% for some scenarios in other regions than Sub-Saharan Africa and South Asia as well. Why are only these two regions considered here? \n\n (NETHERLANDS)
650	7	27	50	27	50	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
651	7	27	51	27	52	CV (coefficient of variation) should be defined in the text. (AUSTRALIA)
652	7	27	54	28	8	Comment: The following text can appear here: "Iizumi et al. (2011) find that the paddy rice yield loss in Japan induced by hot days (>33°C) during the flowering period in the 2050s will exceed the severest yield loss induced by cool-summer damage in the 1990s with the probability of up to 15%." Reference: Iizumi, T., M. Yokozawa, and M. Nishimori (2011), Probabilistic evaluation of climate change impacts on paddy rice productivity in Japan. Climatic Change, 107, 391-415. (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
653	7	28	4	28	4	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. If being used as a likelihood term, it should be italicized. (Mach, Katharine, IPCC WGII TSU)
654	7	28	7	28	7	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. If being used as a likelihood term, it should be italicized. (Mach, Katharine, IPCC WGII TSU)
655	7	28	7	28	8	Overall ... regions. This is an important and very policy-relevant conclusion. It is currently not discussed in the TS or SPM. It would be advisable to reconsider this choice. \n\n (NETHERLANDS)
656	7	28	7	28	8	It would be preferable to place "medium confidence" within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
657	7	28	12	0	0	It is "Berg et al. 2013" and not "Berg et al. 2012". It should also be corrected in the reference (Sultan, benjamin, IRD)
658	7	28	13	0	0	It is "Berg et al. 2013" and not "Berg et al. 2012". It should also be corrected in the reference (Sultan, benjamin, IRD)
659	7	28	20	0	0	New et al., 2011 not in refs. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
660	7	28	20	28	20	There is no reference to New et al. 2011 to be found in the bibliography. This is an important assertion, so make sure it is properly referenced. \n\n (NETHERLANDS)
661	7	28	22	28	25	It would be preferable to place the summary terms for evidence and agreement within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
662	7	28	24	28	24	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. If a likelihood term, it should be italicized. (Mach, Katharine, IPCC WGII TSU)
663	7	28	25	28	27	It is unclear how the two percentages reported here are calculated. We could not identify them in the original paper, and it is unclear how they are calculated based on the data presented there.\n\n (NETHERLANDS)
664	7	28	25	28	27	Is this an outcome expected at 4°C average temperature increase? (Mach, Katharine, IPCC WGII TSU)
665	7	28	26	28	26	decumbens, not "descumbens" (Moore, Andrew, CSIRO)
666	7	28	29	0	31	This sentence does not seem to be consistent with comments about weeds on page 17 (Gregory, Peter, University of Reading)
667	7	28	30	0	0	Ziska et al. 2011 not in refs (2011a is) (UNITED STATES OF AMERICA)
668	7	28	34	0	36	I can find no evidence to support this statement in this document. What is the evidence? (Gregory, Peter, University of Reading)
669	7	28	34	28	36	No explanation is provided as to why chemical control of weeds may become less effective. Examples of findings from the past could be drawn upon regarding weed adaptations. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
670	7	28	40	28	40	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. If being used as a likelihood term, it should be italicized. (Mach, Katharine, IPCC WGII TSU)
671	7	28	40	28	46	All summary terms for evidence and agreement on these lines should be italicized. (Mach, Katharine, IPCC WGII TSU)
672	7	28	51	28	51	Other effects: (1)As climate warming, the soil organic matter, fertilizer and pesticide will speed degradation and loss. (2)As sea level raises, part cultivated field low land along coast will be submerged or often invaded by sea water. (Zheng, Dawei, China Agricultural University)
673	7	28	51	28	51	Other effects: (1)As climate warming, the soil organic matter, fertilizer and pesticide will speed degradation and loss. (2)As sea level raises, part cultivated field low land along coast will be submerged or often invaded by sea water. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
674	7	29	0	0	0	General Comments: Changes in upwelling regimes should be mentioned as major fisheries are linked to these. (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
675	7	29	0	29	0	Section 7.4.2.: Mention about sea surface temperature while dealing with marine fisheries becomes important. Some of the references from south Asia may be considered (marine and fresh water fisheries). (INDIA)
676	7	29	1	0	0	Section 7.4.2. The chapter team should ensure consistency of all statements in this section with the final key findings of chapter 6 and 30, providing cross-references to the specific relevant sections of those chapters. (Mach, Katharine, IPCC WGII TSU)
677	7	29	13	29	21	The main point here needs to be changed to 'fisheries production' rather than the range shifts of fish. (Jung, Sukgeun, Jeju National University)
678	7	29	18	0	0	Lehodey, 2011 not in refs (2010 is...) (UNITED STATES OF AMERICA)
679	7	29	21	29	21	7.4.2.1. this is now in 30.6.2.1.1., mere mentioning of that tuna fisheres is discussed there, seems superfluous, do assessments agree? (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)

#	Ch	From Page	From Line	To Page	To Line	Comment
680	7	29	31	29	34	The timeframe for all of these statements should be clarified. Does the 1st sentence here pertain to 2035? (Mach, Katharine, IPCC WGII TSU)
681	7	29	32	29	32	Reasoning could be provided as to why differences exist in coastal fisheries vulnerability between the west and east of the PICTs, as this is not known to the reader. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
682	7	29	39	29	42	7.4.2.1. DELETE "broad-based"from sentence on modelling study as the region covered is rather small.... (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
683	7	29	39	29	44	I think this kind of bottom-up control on fisheries production can be highligted in this section (7.4.2.1) to avoid overlaps with chapters 6 and 30. (Jung, Sukgeun, Jeju National University)
684	7	29	47	30	14	7.4.2.2. The treatment of aquaculture is only covering the North American Pacific and the tropical Pacific. This seems selective rather than comprehensive. (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
685	7	29	49	30	4	7.4.2.2. Aquaculture' Aquaculture production is highest in China, and I wonder why there is no mention of China. (Jung, Sukgeun, Jeju National University)
686	7	29	49	30	14	Very local examples (Washington State, French Caledonia) which do not underline the general findings under 7.4.2.3. (GERMANY)
687	7	30	0	31	0	7.4.3 It is unfortunate that elements of this paragraph are hardly found back in the TS or in the SPM. This is one of the most important paragraphs of the chapter, if not the most important one, and it deserves a more prominent position in both summaries. \n\n (NETHERLANDS)
688	7	30	8	30	8	French Polynesia (Pecheux, Martin, Institut des Foraminifères Symbiotiques)
689	7	30	22	30	23	7.4.2.3. chapter 6 structure has changed so this reference should be adjusted (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
690	7	30	33	0	0	For clarity, the section on page 10 regarding price volatility should be combined with section 7.4.3. Projected Impacts on Food Prices and Food Security. (UNITED STATES OF AMERICA)
691	7	30	33	31	53	Recommend section 7.4.3 clearly articulate that there is a high level of uncertainty about the 'projected impacts on food prices and food security' because much is dependent on domestic policy responses. This impact of domestic policies, such as export bans, are noted earlier in the chapter but should also be highlighted in the context of this section. (AUSTRALIA)
692	7	30	33	31	53	This section reads very much like the concept of food security being used is really the old 'food balance' approach at the national scale. The studies cited use the idea that if global yields go down, population goes up, then food prices will by necessity go up and food security will worsen. This kind of tautology is extremely misleading, since the causes of food security are as varied as the causes of poverty, ill health or any social ill. Increased prices may actual decrease food insecurity if a region develops its agriculture, has a growing economy, or otherwise can harness the increased income from these prices. The reality is far more diverse and diffuse, since food security is a complex idea that is not linearly related to food availability. Recommend that the authors take this section out and use the 'food security' phrase much more carefully, referring to overall food availability and the likely pressures on supply and demand of broader food availability on the nationals scale. Much more care on defining these terms is critical. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
693	7	30	35	30	49	This section must refer to which prices where - prices are not like CO2 in the atmosphere that is an immutable fact no matter where you are on the planet. Which food prices are we referring to? Cereals - maize, wheat, rice? If so, they are not very relevant to the world's food insecure who cannot afford to eat these very western, commoditized grains. Most very poor people eat locally grown small, coarse grains like millet, sorghum, and tubers of cassava and yams. They can't hope to afford to eat bread from imported wheat from cold climes - so how relevant are these trade studies to the really food insecure? Who exactly are being referred to here? Which countries and urban dwellers or rural? Many of the studies being used are global trade studies for the taxed and clearly visible grain movements, not the informal economies with grain moved on the back of men or animals with barter. In many regions of the world, the formal trade is dwarfed by the informal trade. Recommend that the authors much more carefully define. (UNITED STATES OF AMERICA)
694	7	30	43	30	44	Combined effect of global warming and rising CO2 leads to prices by 2050 which are - 30 - +45 % less/higher than today: There is no evidence and no clear finding in these figures! Possibly it can be said, that rising CO2 content in the atmosphere compensates negative effects of climate warming? (GERMANY)
695	7	30	43	30	46	This paragraph could also be classied as C4 and C1. The entire paragraph is undersupported by evidence and it is in over contradiction to what said in the Chapter about the difficulty to disentangle climate components in the price formation. Moreover an estimate increase with a range "3-84%" is not very informative: it would be much more informative to not only show the range of estimates but also report a measure of central tendency for these estimates like mean or medians. It is unclear where these percentages orginate from. \n\n (NETHERLANDS)
696	7	30	47	30	47	Nelson et al. 2013 is not yet available and its content not verifiable.\n\n (NETHERLANDS)
697	7	30	51	30	51	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. If being used as a likelihood term, it should be italicized. (Mach, Katharine, IPCC WGII TSU)
698	7	31	1	31	2	Accelerated investment in planned adaptations is crucial and this statement needs to be emphasised more throughout this section. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
699	7	31	5	31	8	This statement does not make logical sense: please clarify these numbers (as currently stated, climate change would lead to a net reduction in the global malnourished population by 17 million)? (UNITED STATES OF AMERICA)
700	7	31	6	30	8	Combined effect of climate change and CO2 results in yield increases and reduces the number of malnourished population by 15 %: If this is fact no adaptation strategy would be necessary. It would be helpful to have an estimation of confidence on this. (GERMANY)
701	7	31	6	31	6	Please spell out SSA (sub-saharan Africa ?) (AUSTRALIA)
702	7	31	6	31	8	Sentence is unclear, consider replacing 'number' (line 8) with 'global malnourished population' to make clearer. (AUSTRALIA)
703	7	31	7	31	7	It is not clear what the baseline is for this statement of an increase of 11%. Is it 11% from present levels of malnutrition? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
704	7	31	10	31	10	It would be preferable to place all uncertainty language within parentheses at the end of the sentence, to maximize directness of wording. (Mach, Katharine, IPCC WGII TSU)
705	7	31	13	31	16	It would be informative, and very relevant if the relative contribution of climate change to food security issues, compared to other factors could be discussed more explicitly, and ideally quantitatively. Determining the relative contribution of climate change compared to other factors is a core question of this chapter. \n\n (NETHERLANDS)
706	7	31	14	31	14	'growth and development' of what? People? Crops? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
707	7	31	21	31	54	The discussions of the positive impacts of food prices in exporting countries (p. 31 line 22-24, also p. 24 line 36) and conflict (p. 31, line 28) seem under examined. The lack of discussion of conflict in particular seems out of balance relative to the importance of the topic and work done on this.\nNote repeated paragraph starting line 44. (UNITED STATES OF AMERICA)
708	7	31	28	31	30	There is a whole chapter on conflict, which is a bit more nuanced than Hsiang. (Tol, Richard S.J., Vrije Universiteit Amsterdam)
709	7	31	32	0	53	The same paragraph is repeated twice but referring to different figures (Figure7-7 and Figure 7-6). I don't think either figures support the argument "Extremes contribute to variability in productivity". Reference should to figure 7-7 or 7-6 should be removed. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
710	7	31	32	31	53	The text was copied and pasted twice in 32-42 and 44-54 and not spotted by revision.\n\n (NETHERLANDS)
711	7	31	33	31	33	This description of changes in extreme events must be further qualified. As is, it is an overgeneralization. Not all types of extreme events are expected to become more frequent. (Mach, Katharine, IPCC WGII TSU)
712	7	31	40	31	42	Effective monitoring and predictions of extreme events and building resilience into food systems is crucial to avoid negative impacts. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
713	7	31	41	31	41	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
714	7	31	44	0	54	Suggest deleting - these lines repeat the previous paragraph (CANADA)
715	7	31	44	31	53	Comment: This paragraph is the same as Chapter 7, Page 31, Line 32-42. (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
716	7	31	44	31	53	This paragraph repeats the previous one, omit.\n\n (NETHERLANDS)
717	7	31	44	31	53	This paragraph repeats the preceding one (Moore, Andrew, CSIRO)
718	7	31	44	31	53	Same paragraph as the previous one (NOTE: Pasted here for your reference) I propose to add these two sentences before ".Also in French…" : The forecasted increase in air temperature in eastern Canada over the next 100 years will result in lower yields and nutritive value of timothy (Bertrand et al., 2008). Reference : Bertrand, A., G. F. Tremblay, S. Pelletier, Y. Castonguay et G. Bélanger. 2008. Yield and nutritive value of timothy as affected by temperature, photoperiod and time of harvest. Grass Forage Sci. 63 :421-432. (Bertrand and al., 2007) found that it is possible to identify rhizobial strains to improve plant performance under predicted future CO2 concentrations with no negative effect on nutritive value of perennial alfalfa..\nRefernec : Bertrand, A., D. Prévost, F.J. Bigras, R. Lalande, G.F. Tremblay, Y. Castonguay et G. Bélanger. 2007. Alfalfa response to elevated atmospheric CO2 varies with the symbiotic rhizobial strain. Plant and Soil 301: 173-187. (Anne, Blondlot, Ouranos)
719	7	31	44	31	53	This paragraph repeats the previous paragraph and should be deleted. (Mach, Katharine, IPCC WGII TSU)
720	7	31	52	31	52	Casual usage of "likely" should be avoided, as it is a reserved likelihood term. (Mach, Katharine, IPCC WGII TSU)
721	7	32	0	32	0	Section 7.5.1.1.1.:Recent literature from south Asia may be considered. (many references provided along with these comments also deal with the adaptation strategies - for your reference and appropriate integration with the draft). (INDIA)

#	Ch	From Page	From Line	To Page	To Line	Comment
722	7	32	4	0	0	Section 7.5.1. Potential adaptation improvements that have been evaluated for building adaptive capacity by decision-makers are the economic value of improved meteorological forecasts, in order to know if increasing support to weather forecast systems is important. (See Katz and Ehrendorfer, 2006, Cerdá and Quiroga, 2011). References: (1) Katz, R.W., Ehrendorfer, M. (2006). "Bayesian Approach to Decision Making Using Ensemble Weather Forecasts". Weather and Forecasting, 21, 220-231 (2) Cerdá, E. Quiroga, S. (2010). Economic value of weather forecasting: the role of risk aversion. TOP: An Official Journal of the Spanish Society of Statistics and Operations Research, 19(1), 130-149. (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)
723	7	32	4	38	29	I suggest considering the following adaptation measure: Reducing food wastes\n\nSome adaptation strategies should aim at reducing the gap between food production and food waste. Reducing wastes can become a powerful adaptation tool to increase food security since roughly 30% to 40% of food is lost as waste, both in developed and developing countries (Godfray et al, 2010). In most developing countries, losses are mainly explained by the lack of transport infrastructure, technical knowledge and storage technology (Stuart, 2009). In developed countries, farm-level losses are much lower, but wastes grow dramatically on other steps of the food chain, e.g., retail, food service, home consumption and municipal residues disposal (WRAP, 2008). Unfortunately, too much unwanted food goes to the landfill. Different strategies can be used to tackle the two types of waste: in developing countries food-chain infrastructure, education, financial mechanisms to avoid farmers selling in the wrong time and best-practice guidelines are necessary to improve post-harvest management and storage. In developed countries, a decrease of the volume of waste produced can be achieved by alerting consumers about the importance of the issue and by spreading strategies (accompanied by legislation) to reduce domestic food losses (Parfitt et al., 2010). Legislation such as that on sell-by-date that has increased food waste should be re-examined (Godfray et al., 2010). \n\nGodfray et al. (2010). Food security: The challenge of feeding 9 million people. Review. Science 327: 812-818.\nParfitt J, Barthel M, Macnaughton S (2010). Food waste within food supply chains: quantification and potential for change to 2050. Phil. Trans. R. Soc. (B) 365:3065-3081.\nStuart, T (2009). Uncovering the Global Food Scandal (Penguin, London, 2009).\nWRAP (2008). (2008), The Food We Waste. Waste and Resources Action Programme (WRAP), Banbury, UK. (Viglizzo, Ernesto, INTA/CONICET)

#	Ch	From Page	From Line	To Page	To Line	Comment
724	7	32	4	38	29	I suggest considering the following adaptation measure: Increasing water-use efficiency\n\nDue to population growth, the potential water availability decreased from 12900 m3 per capita per year in 1970 to less than 7800 m3 in 2000 (CA, 2007). Food production consumes more than two-thirds of the world extracted water, and food demand is expected to rise by 70 % by 2050 due to population growth. Consequently, the increasing requirement of water for food production is inevitable. Agriculture consumes around 70 % of global extracted water. Animal husbandry is the most water-intensive consumer, is cause of the great water-use disparity between developed and developing countries. The result of this is that world leaders and policy makers must balance the demand from agriculture and industry with the need for sustainable sources of clean water (Gilbert, 2012). \nGiven the declining stocks of freshwater many scientists state that worldwide food security can be achieved by improving the water-use efficiency for food production, or in other terms, by getting more crops per drop, particularly in areas where water could become increasingly scarce due to climate change (Vince, 2010). A number of strategies to improve water use efficiency can be applied according to IAASTD (2009): (i) improve timing and increase the reliability of water supplies, (ii) improve land preparation and fertilizer application to maximize returns per unit of water, (iii) reduce evaporative losses from fallow land, streams and water bodies, (iv) reduce transpiration losses from non-productive vegetation, (v) reduce deep percolation and surface runoff, (vi) avoid losses from salinization and contamination of water bodies, (vii) reallocate water resources to efficient users, (viii) develop storage facilities, (ix) improve irrigation techniques to avoid water waste and deliver drips directly to plant roots, (v) in rainfed farming, improve harvest, storage and temporal transfer of rainfall water through best agronomic practices (Fernandez et al., 2008).\n\nCA (2007). Water for food, water for life: A comprehensive assessment of water management in agriculture (CA). Summary. Earthscan, London.\nFernandez, R.; Quiroga, A.; Noellemeyer, E.; Funaro, D.; Montoya, J.; Hitzmann, B.; Peinemann, N. (2008). A study of the effect of the interaction between site-specific conditions, residue cover and weed control on water storage during fallow. Agricultural Water Management 95: 1028-1040.\nGilbert, N (2012). Water under pressure. Nature 483: 256-257.\nIAASTD, 2009. Agriculture at the Crossroad: Global Summary for Decision Makers, IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development). Island Press, Washington, D.C., www.agassessment.org. www.islandpress.org/iaastd.\nVince G (2010). Getting more drops to the crops. Science 327: 800. (Viglizzo, Ernesto, INTA/CONICET)
725	7	32	4	38	29	I suggest considering the following adaptation measure: Dealing with non linear, abrupt transitions\n\nThe analysis was mainly focused on increasing warming and increasing GHG concentration in atmosphere and their impact on agricultural production and food security. However, in its current state, this chapter tends to set aside important phenomena connoting abrupt ecosystem transitions like drought, floods and some other extreme climate events that threat food security. I believe that a paragraph considering non-linear episodes in food production in vulnerable ecosystems is quite pertinent. The food security of large arid, semiarid and sub-humid areas across the world is frequently threatened by the occurrence of non-linear events that lead to irreversible degradation (e.g., desertification, salinization). The threat of reaching dangerous “tipping points” is higher in many dry and humid environments setting a risk on food security. (Viglizzo, Ernesto, INTA/CONICET)
726	7	32	6	32	34	Section 7.5.5.1 and Chapter in general: References to WGI AR5 Chapters and/or SREX currently are rather unspecific (sometimes not even providing the Chapter number or section, e.g., Section 7.2.1) or completely missing. Specific cross-references to the WGI AR5 contribution are essential, please revise accordingly. (Plattner, Gian-Kasper, IPCC WGI TSU)
727	7	32	8	32	11	Reference here could be made to the eras of climate responsibility and climate options. Please also note that much of the commitment to future climate change is due more to technological/policy lock-in as compared to past greenhouse gas emissions. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
728	7	32	9	32	10	Cross-references should be provided ideally to specific relevant sections of the working group 1 chapters. (Mach, Katharine, IPCC WGII TSU)
729	7	32	24	32	24	Please note autonomous adaptation is not in the glossary anymore. (Mach, Katharine, IPCC WGII TSU)
730	7	32	26	32	26	This sentence references Howden et al 2010 - there is no such reference currently listed in the chapter references. Reference used again at p 38, line 7 and line 13; p 39 line 36. (AUSTRALIA)
731	7	32	26	32	30	It is unclear what sort of changes in institutional arrangements and policies are suggested here. It would be worthwhile for readers to expand on this and give some examples of institutional arrangements and policies that can be changed to strengthen adaptation to climate change. \n\n (NETHERLANDS)
732	7	32	27	32	32	Not only are new technologies and infrastructure required for effective adaptation but also information and advice delivery at local scales. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
733	7	32	32	31	53	These two paragraphs are repeated with the only apparent difference being a reference to figure 7-4. Once should be deleted. (AUSTRALIA)
734	7	32	37	0	0	Section 7.5.1.1.1- In tropical regions, such as in Brazil, sugar cane can be planted using inter-cropping techniques in agricuture. Unlike corn, sugar cane takes one year to grow, therefore can be planted at the same time (intercropping) as short-term vegetables, fruits and grains, thus increasing food production, through agro management. There should be no competition of food versus ethanol. (Nogueira da Silva, Milton, Climate Change Forum of Minas Gerais, Brazil)
735	7	32	47	32	51	This sentence is too focussed on northern-temperate regions. In the many parts of the world where crops are grown in the cooler months, higher temperatures will accelerate crop development and possibly also the onset of summer drought, so shortening the growing season. Changing planting date is still a frequently identified option (Moore, Andrew, CSIRO)
736	7	32	47	32	54	bias references - Deryng et al., 2011, which shows adapting planting dates and crop cultivars to climate change could trim crop yield losses by 18-7% globally. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
737	7	32	47	33	17	Here may add some notion that risks with extreme weather on crop damage would incraese in the marginal climate region where extended cropping area expected. For examplew by a cold or frozen event in high latitude area exeriencing warming for more cropping lands. (Pan, Genxing, Nanjing Agricultural University)
738	7	32	47	33	17	Changing planting dates is indeed an often identified option, but usually based on crop simulation models. As crop simulation models are most often used for climate change impact studies on agriculture, and changing planting dates is one of the few adaptation options that can be simulated, it is often studied. However, also for the past models may simulate higher yields with earlier planting dates, but despite this, planting dates have not been adapted yet. In an unplublished study related to Reidsma et al. (2009, Ag. Sys. 100: 51-60), simulations with WOFOST in Europe showed that the effect of earlier planting was similar for 1975, 2000 and 2050. Most studies only show the effect for the future, mentioning that it is an dapatation to climate change, but it can be argued it is not an adaptation to climate change, but an adaptation to climate and other assumed conditions in the model in general. Van Oort et al. (2012, Europ. J. Agronomy 40: 102– 111) showed that farmers may not be able to adjust sowing dates because of climatic and other conditions not accounted for in models.\n\n (NETHERLANDS)
739	7	32	50	32	51	Van de Giesen et al. 2008 not in refs (2010 is..)\nTingem and Rivington 2010 not in refs (2009 is...) (UNITED STATES OF AMERICA)
740	7	32	53	32	53	Passioura and Angus 2010 (Moore, Andrew, CSIRO)

#	Ch	From Page	From Line	To Page	To Line	Comment
741	7	33	1	0	0	The section of the sentence stating ....."and to avoid late season frosts" This sentence and the follow-up sentence focus on early sowing whichis questionable. Are the authors talking about "late in the (planting season) frosts" or are they talking about "late (spring) frost"? Recommend the authors make the language more articulate. (UNITED STATES OF AMERICA)
742	7	33	1	33	17	Elevated CO2 may cause necessity of higher fertilizer inputs, particularly in low management/ input situations for reaping the benefits of CO2 fertilization. (INDIA)
743	7	33	7	33	7	In supplying this cross-reference, the chapter team should ideally reference the specific relevant chapter sections within the working group 1 report. (Mach, Katharine, IPCC WGII TSU)
744	7	33	10	33	11	To maximize directness of wording, all uncertainty language could be placed within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
745	7	33	14	33	17	It is not clear what is meant by "…care is needed to ensure that the provision of forecast does not increase existing inequities in farming or fishing communities." What is the relation between forecast and inequity? (GERMANY)
746	7	33	15	0	0	Here we could cite Roudier et al. (2012) and Sultan et al. (2010) as two studies showing the benefits of integrating climate forecast for agriculture in the Sahel. The references are: "Roudier P., Sultan B., Quirion P., Baron C., Alhassane A., Traoré S. and B. Muller (2012) An ex-ante evaluation of seasonal forecasting for millet growers in SW Niger, International Journal of Climatology, doi: 10.1002/joc.2308." and "Sultan B., B. Barbier, J. Fortilus, S.M. Mbaye and G. Leclerc (2010) Estimating the potential economic value of the seasonal forecasts in West Africa: a long-term ex-ante assessment in Senegal, Weather, Climate and Society, 2, 69–87." (Sultan, benjamin, IRD)
747	7	33	15	0	0	Cooper et al. 2008 not in refs (2009 is.. (UNITED STATES OF AMERICA)
748	7	33	19	0	0	Figure 7-8 On which studies is this figure based? (Vanuytrecht, Eline, KU Leuven)
749	7	33	19	33	22	This figure 7-8 is only based on crop simulation models, and therefore includes only a selected number of adaptation options. Although it may be difficult to estimate yield impacts of many other adaptation measures, it is still relevant to include them in a figure, to get a good overview. Studies like Iglesiaset al. (2012, \nClimatic Change 112: 143–168), Olesen et al., (2011, European Journal of Agronomy 34: 96–112), Schaap et al. (2013, European Journal of Agronomy 48: 30-42) and many earlier studies can be used as a basis.\n\n (NETHERLANDS)
750	7	33	24	0	31	The authors could also consider how substrate could limit a poleward expansion of cropping activities. For example, the substrate in much of northern Canada is based on preCambrian shield rocks and is not arable. (CANADA)
751	7	33	24	33	31	Replacing cultivars of shorter term with cultivars with longer term. Sowing and transplanting earlier in the spring as climate warming. Cropping area expands to further north and higher region. Multicropping index could be increased. Using varieties with less demand of vernalization and weaker cold hardiness as winter warming. (Zheng, Dawei, China Agricultural University)
752	7	33	24	33	31	Replacing cultivars of shorter term with cultivars with longer term. Sowing and transplanting earlier in the spring as climate warming. Cropping area expands to further north and higher region. Multicropping index could be increased. Using varieties with less demand of vernalization and weaker cold hardiness as winter warming. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
753	7	33	33	33	41	Increased number of low-temperature days due to increased climatic variability also may cause problem for crop production in some regions of South Asia. (INDIA)
754	7	33	36	33	38	It is important to emphasise the necessity of securing a large variety of genes to ensure food security in an unpredictable future. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
755	7	33	38	0	0	Wassman et al. 2008 not in refs..only 2009 (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
756	7	33	40	33	41	This reference is not complete and therefore inaccessible. \n\n (NETHERLANDS)
757	7	33	43	33	54	I strongly recommend to add a notion that increasing soil organic carbon helps to increase stability of crop yield against climate fluctuations, for example of China. Pan G, Smith P, Pan W. 2009. The role of soil organic matter in maintaining the productivity and yield stability of cereals in China. Agriculture, Ecosystems and Environment,129, 344-348. (Pan, Genxing, Nanjing Agricultural University)
758	7	33	43	34	3	In the section on climate change adaptation regarding soil/cropping systems it is extremely important to give more emphasis on carbon addition on degraded soils. IPCC should make the point that carbon/organic matter ammendments to soil is the key action to restore soil functions such as biomass production, carbon sequestration, water transformation and filtration and below ground biodiversity and thus prepare regions for climate change adaptation. There is a huge list of literature on this subject epitomized by the UNEP 2012 Year Book chapter on "The Benefits of Soil Carbon" (chapter 2, pages 19-33). Other literature on the subject is the published work og the EU FP7 SoilTrec project listed below (Banwart, 2011; Banwart et al., 2011 and 2012; Stamati et al., 2013; Nikolaidis 2011). Part of the action that would require major adaptation is closing the nutrient gap between urban and peri-urban areas. This means that we need to redirect society towards complete recycling of organic matter and returning it back to the soil. 1. Banwart S., 2011. Save our soils, NATURE Comment, 474, 151-152. 18. 2. Banwart S., S. Bernasconi, J. Bloem, W. Blum, M. Brandao, S. Brantley, F. Chabaux, C. Duffy, L. Lundin, P. Kram, N.P.Nikolaidis, M. Novak, P. Panagos, K. V. Ragnarsdottir, B. Reynolds, S. Rousseva, P. de Ruiter, P. van Gaans, W. van Riemsdijk, T. White, B. Zhang, 2011. Assessing Soil Processes and Function across an International Network of Critical Zone Observatories: Research hypotheses and experimental design, Vadose Zone Journal, 10, 978-987. 3. Banwart SA, Bernasconi S, Bloem J, Blum W, de Souza DM, Chabaux F, Duffy C, Lundin L, Kram P, Nikolaidis N, Novak M, Panagos P, Ragnarsdottir KV, Reynolds B, Robinson D, Rousseva S, de Ruiter P, van Gaans P, Weng L, White T, Zhang B. (2012) Soil Processes and functions across an International Network of Critical Zone Observatories: introduction to experimental methods and initial results. Comptes Rendu Geosciences, 344, 758-772. 4. Stamati F., N.P. Nikolaidis, J.L. Schnoor. 2013. The role of soil texture on carbon and nitrogen sequestration in agricultural soils of different climates. Agriculture, Ecosystems and Environment, 165, 190-200. 5. Nikolaidis, N.P, 2011. Human Impacts on Soil: Tipping Points and Knowledge gaps, Applied Geochemistry, 26, S230-S233. 6. Nikolaidis, N.P. and G. Bidoglio, 2013. Soil Organic Matter Dynamics and Structure, Sustainable Agriculture Reviews, 12, 175-200. (Nikolaos Nikolaidis, Environmental Engineering, Technical University of Crete, Greece) (GREECE)

#	Ch	From Page	From Line	To Page	To Line	Comment
759	7	33	49	33	51	The claim that "Increasing soil organic carbon levels plays an important role for improved water retention and absorption capacity of soils" needs to be critically evaluated before it is included in this Report. There is no doubt that higher soil organic matter levels increase the water-holding capacity of soil; but it is debatable whether the claim that this is *important* is well-justified by the literature. \nEl-Hage et al 2010 assert "In organic systems, the water retention and drainage capacity of the ecosystem is enhanced" - without citation - and "Soil organic matter has positive effects on the water-capturing capacity of the soil" - again, without citation. Smith and Oleson (2010) write "...improving soil water holding capacities through adding crop residues and manure to arable soils or by adding diversity to the crop rotations", citing Ma?der et al (2002, doi:10.1126/science.1071148). I can find nothing about soil water retention in the Ma?der et al paper. \nA modelling study that I have done (presented as a poster at the 2010 European Society of Agronomy meeting) strongly suggested that for cropping systems across Australia, the effects of increased soil carbon on the soil water holding capacity had only minor effects on crop yield. Essentially, the depth to which SOC change could affect water retention was so small that even 50% increase in SOM had insignificant impacts on PAWC - and further, the increase in water storage was near the surface, where it was vulnerable to evaporative losses. In high-runoff environments, increased infiltration capacity might play a role but it was not apparent in my work. Effects of higher SOM on the N cycle were, of course, large and important. (Moore, Andrew, CSIRO)
760	7	33	51	33	0	There must be a brief discussion on agronomic effects of enhancing soil organic carbon pool in the root zone on increase in crop yields (kg/ha/Mg of soil organic carbon). The yield response would depend on the threshold level of soil organic matter in relation to soil quality. Establishing the link with agronomic productivity through improvements in water retention, nutrient availability etc is important. There should be supporting references provided. (UNITED STATES OF AMERICA)
761	7	33	52	33	52	To be added "compost, farm yard manure and digested residues" (GERMANY)
762	7	33	54	33	54	It would be preferable to more specifically cross-reference the relevant chapters of the working group 3 contribution. (Mach, Katharine, IPCC WGII TSU)
763	7	33	54	34	3	To maximize directness of wording, all calibrated uncertainty language could be placed within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
764	7	34	1	34	3	Results from studies from South Asia may be included. (INDIA)
765	7	34	2	34	3	It seems misleading to speak about irrigation optimisation increasing yields by only about 4% without mentioning that optimising irrigation (conserving water) has benefits food security by contributing to the sustainability of the resource base, which in turn contributes to food security in the long term. (UNITED STATES OF AMERICA)
766	7	34	4	0	0	A paragraph should be added to explain the role of ecological engineering and agroforestry as adaptive means for crop production. There are a good series of papers of this. (Vasseur, Liette, Brock University)
767	7	34	5	34	5	As farms can diversify into on or off farm activities it should be made clear as to what type of other activities are being referred to. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
768	7	34	5	34	14	However in Europe specialisation seems to continue in livestock production especially in eastern Europe (e.g. Poland) where small or medium mixed farms are replaced by large farms, partially with the help of Eum structural aids, in order to increase competitiveness. In old EU member countries such Denmark, large farms have been enlarging even further for decades, leading to highly specialised production areas. Policy and market developments such as milk quota abolition will most likely lead to even larger and more specialised farms tha before, and especially in areas where farms are already large (Kempen et.al.2011, Journal of Policy Modelling). Hence one should remember that large specialised farms often in intensive production areas are still typical trends in Europe and developed countries, and major conventional means of maintaining economic viability. (Lehtonen, Heikki, MTT Agrifood Research Finland)

#	Ch	From Page	From Line	To Page	To Line	Comment
769	7	34	6	34	6	reference should be Reidsma and Ewert (2008), and is missing from reference list\n\n (NETHERLANDS)
770	7	34	9	34	13	The study of Seo (2010) is cited to say something about changes in revenues of different farm types. This study was criticized however by Rufino et al. (2011, Food Policy 36(3): 452-454), arguing that it cannot be assumed that smallholder farmers in Africa are profit maximizers. Studies may be peer reviewed, but their quality should still be checked.\n\n (NETHERLANDS)
771	7	34	20	34	20	The recommended citation format should be used for this cross-reference to the 4th assessment report. (Mach, Katharine, IPCC WGII TSU)
772	7	34	34	34	34	To maximize directness of wording, all uncertainty language could be placed within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
773	7	34	42	40	44	a considerable opportunity cost may arise. It is unclear what opportunity costs this refers to and how the incremental nature of current research would logically imply considerable opportunity cost. Please clarify this reasoning and provide an explanation of the trade-off involved. \n\n (NETHERLANDS)
774	7	34	43	34	44	Starting from "Consequently" is not very clear and reference Challinor et al. is not yet published, therefore, the article remains unverifiable.\n\n (NETHERLANDS)
775	7	34	49	35	16	As an adaptaption strategy and in order to overcome the adverse impacts of livestock grazing to grassland and prairie ecosystems it is important to promote the combined agriculture-livestock raising under controlled conditions where the recycling of organic matter would be conducted in a strategic way to account for the fertilization of the fields without the adverse effects of livestock grazing. 1. Stamati F., N.P. ?ikolaidis, D. Venieri, E. Psillakis, and N. Kalogerakis, 2011. Dissolved organic nitrogen as an indicator of livestock impacts on soil biochemical quality. Applied Geochemistry, 26, S340-S343. (Nikolaos Nikolaidis, Environmental Engineering, Technical University of Crete, Greece) (GREECE)
776	7	34	50	34	50	Referencing is needed for this relevant sentence.\n\n (NETHERLANDS)
777	7	34	51	34	51	To maximize directness of wording, "high confidence" could also be placed within parentheses at the end of the sentence. (Mach, Katharine, IPCC WGII TSU)
778	7	35	4	35	4	The reference to Moore and Ghahramani (2013) here is not to the conference paper given in teh reference list, nor to the paper that should be cited at page 19 line 30, but to a 3rd paper that is now in press:\nMoore AD, Ghahramani A (in press) Climate change and broadacre livestock production across southern Australia. 3. Adaptation options via livestock genetic improvement. Animal Production Science (Moore, Andrew, CSIRO)
779	7	35	4	35	4	The paper cited as Ghahramani and Moore (2013) was rejected by Crop and Pasture Science. A revised version will very shortly be re-submitted. Some of the material in it will be also covered in an oral paper to the International Grassland Congress. (Moore, Andrew, CSIRO)
780	7	35	18	35	24	For indoor livestock, shading, spraying and ventilation to avoid heat stress. (Zheng, Dawei, China Agricultural University)
781	7	35	18	35	24	For indoor livestock, shading, spraying and ventilation to avoid heat stress. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
782	7	35	20	0	0	Seo et al 2008 not in refs. (UNITED STATES OF AMERICA)
783	7	35	20	35	22	The sentence here is too limited. There are a wide range of synergies and tradeoffs, such as animal welfare, that go far beyond productivity alone (Nardone A, Ronchi B, Lacetera N, Ranieri MS, and Bernabucci U. 2010. Effects of climate changes on animal production and sustainability of livestock systems. Livestock Science 130:57-69. De Boer IJM, Cederberg C, and Eady S et al. 2011. Greenhouse gas mitigation in animal production: towards an integrated life cycle sustainability assessment. Current Opinion in Environmental Sustainability 3:423-31). (Evans, Geoffrey, Humane Society International)

#	Ch	From Page	From Line	To Page	To Line	Comment
784	7	35	24	35	24	The mentioning of housing and feed stocks has no relevance. There should be an explanation as to how it is relevant if it is. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
785	7	35	27	0	0	7.5.1.13: this section should have included some setences about storm surges. In many cases they are the most challenging issues for both capture fisheries and aquaculture. (Vasseur, Liette, Brock University)
786	7	35	27	0	0	Section 7.5.1.1.3. The chapter team should ensure consistency of all material here with the final key findings in chapter 6 and 30. (Mach, Katharine, IPCC WGII TSU)
787	7	35	29	35	30	7.5.1.1.3. How does this statement match the earlier ones that mostly indicate increases in fisheries with climate change? These sections need to be balanced and also with the assessments of stocks as in chapters 6 or 30 or FAQ 7.3. (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
788	7	35	29	36	7	For fish pond, using aerator to avoid suffocation of fish caused by hot night, decreasing density of fish and quantity of bait input. As water temperature increases, fish krill could be put into pond earlier in the spring and close later in the autumn. (Zheng, Dawei, China Agricultural University)
789	7	35	29	36	7	For fish pond, using aerator to avoid suffocation of fish caused by hot night, decreasing density of fish and quantity of bait input. As water temperature increases, fish krill could be put into pond earlier in the spring and close later in the autumn. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
790	7	35	36	0	0	Welcomme et al. 2010 not in refs (UNITED STATES OF AMERICA)
791	7	35	41	35	46	Listing of adaptive responses to climate change for fisheries. Bring through to TS and or SPM (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
792	7	35	46	35	46	7.5.1.1.3. chapter 6 reference correct? (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
793	7	36	0	0	0	General Comments: In adapting to climate change, fisheries management should take into consideration whether species are retreating or advancing poleward when setting up quotas and other management interventions. A more precautionary approach needs to be adopted in species which are at equatorward range edges (i.e. Cod in North Sea) than those that are expanding poleward (e.g. Sardine and Anchovies in English Channel and North Sea). Reduction in spawning biomass renders species more likely to be at risk of mis-match with seasonal production cycles in cold-temperate regions (older work by Cushing, 1976, recent work by Beaugrand et al 2003.)\nCushing DH, Dickson RR. 1976. The biological response in the sea to climatic changes. Advances in Marine Biology 14: 1-122.\n\nBeaugrand G, Brander KM, Lindley JA, Souissi S, Reid PC. 2003. Plankton effect on cod recruitment in the North Sea. Nature 426: 661-664.\n (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
794	7	36	3	36	6	Missing in refs: FAO 2009a; Daw et al. 2009 (UNITED STATES OF AMERICA)
795	7	36	7	36	7	7.5.1.1.3. this is now in 30.6.2.1.1 (Menzel, Lena, Alfred Wegener Institute for Polar and Marine Research)
796	7	36	9	36	10	The message is misleading. Aquaculture is a very small subsector in the food economy; relate its rate of growth to the one of global population is conceptually weak and can pass the false message that its aquaculture will feed the world. Simply skipping the connection with global population will avoid misunderstanding.\n\n (NETHERLANDS)
797	7	36	9	36	31	For capture fisheries on the sea, in order to avoid over capture, closed fishing season should be set up and input of krill is necessary. In the typhoon season, early warning is need. (Zheng, Dawei, China Agricultural University)
798	7	36	9	36	31	For capture fisheries on the sea, in order to avoid over capture, closed fishing season should be set up and input of krill is necessary. In the typhoon season, early warning is need. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))

#	Ch	From Page	From Line	To Page	To Line	Comment
799	7	36	34	37	5	Suggest including Altieri, M et al.(in press) "The Adaptationa nd Mitigation Potential of Traditional Agriculture in a changing Climate" In Journal of Climatic Change Special Issue on Climate Change Mitigation and Adaptation with Local Communities and Indigenous Peoples (Ramos Castillo, Ameyali, United Nations University - Institute of Advanced Studies)
800	7	36	36	36	51	Using indigenous knowledge: In north China, farmers choose different sowing technique depending on soil moisture and drought situation e.g. earlier sowing, sowing after pressing, furrow sowing, deep furrow sowing, sowing after little irrigation in the hole and so on.\nGUO Hong, ZHANG Limin, WEI Lijun et al., Study on the improvement of water-saving and ant-i drought seed-sowing machine. Journal of Changchun University of Technology (Natural Science Edition), 2005, 26(4):289-292\nZheng Dawei, Anti Drought Based on Scientific Principles---A Case Study on Combating Drought and Protecting Wheat in 2009. JOURNAL OF CATASTROPHOLOGY. 2010,25(1):7-12 (Zheng, Dawei, China Agricultural University)
801	7	36	36	36	51	In hilly areas of Sichuan Province, farmers have changed the cropping system from rice pad relying collected winter rain into dryland rotation of winter wheat, spring maize and summer sweet potato since early 1980s to cope with drier winter and hotter summer. The annual yield is much more than the old cropping system. (Zheng, Dawei, China Agricultural University)
802	7	36	36	36	51	Using indigenous knowledge: In north China, farmers choose different sowing technique depending on soil moisture and drought situation e.g. earlier sowing, sowing after pressing, furrow sowing, deep furrow sowing, sowing after little irrigation in the hole and so on. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
803	7	36	36	36	51	In hilly areas of Sichuan Province, farmers have changed the cropping system from rice pad relying collected winter rain into dryland rotation of winter wheat, spring maize and summer sweet potato since early 1980s to cope with drier winter and hotter summer. The annual yield is much more than the old cropping system. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
804	7	36	36	37	5	AR5 should emphasize that agro-ecological practices in agriculture is the ticket to restore degraded land, increase soil functions and increase food production especially in areas where the climate change impacts would be most adverse. (Nikolaos Nikolaidis, Environmental Engineering, Technical University of Crete, Greece) (GREECE)
805	7	36	36	37	5	The focus is on indigenous knowledge in developing countries, but also in developed countries stakeholder knowledge can contribute to estimate impacts and design adaptation measures (e.g. Schaap et al. 2013, European Journal of Agronomy 48: 30-42). \n\n (NETHERLANDS)
806	7	36	38	0	0	Ford 2009 missing in refs (UNITED STATES OF AMERICA)
807	7	36	53	37	2	Consider revising - the way this phrase is currently written suggests that it is desireable to reduce the reliance on TK when the pragraph above (and the pragraph on pg 40, line 20-23) suggests that TK has been successful in helping IPs adapt to climate change. (Ramos Castillo, Ameyali, United Nations University - Institute of Advanced Studies)
808	7	36	54	36	54	medium confidence should be italicized, and it could be placed within parentheses at the end of the sentence to maximize directness of wording. (Mach, Katharine, IPCC WGII TSU)
809	7	37	2	37	5	medium confidence could be placed within parentheses at the end of the sentence to maximize directness of wording. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
810	7	37	13	37	14	Battaglini et. al 2009 article specifically deals with winegrowers in France, Germany and Italy: the results from the questionnaire distributed to winegrowers only a "majority of German growers said they would consider changing varieties to adapt to warming\ntemperatures, while only a minority of the Italian and French growers said they would consider such changes" (Battaglini et al. page 62). It is recommended to find more substantial bibliography otherwise the sentence would remain a generalization or just a refence valuable for wine lovers of the three mentioned. On this regard at page 39 lines 33 -43 it is also mentioned the case of Australia winegrowers and the possibility to move to cooler regions (refence Park et al. 2012).\n\n (NETHERLANDS)
811	7	37	15	0	0	*Observation: Many more examples of adaptation exist than seems to be implied here. Suggest adding Galloway McLean (2010) and Nakashima et al (2012) to this list of references.\n\n*References: Galloway McLean, K (2010). Advance Guard: Climate Change Impacts, Adaptation, Mitigation and Indigenous\nPeoples – A Compendium of Case Studies. United Nations University – Traditional Knowledge Initiative, Darwin,\nAustralia, pp. 124. | Nakashima, D.J., K. Galloway McLean, H.D. Thulstrup, A. Ramos Castillo, and J.T. Rubis (2012). Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation. UNESCO and UNU, Paris and Darwin, 120pp. (Galloway McLean, Kirsty, United Nations University - Institute of Advanced Studies)
812	7	37	22	37	43	It is worth mentioning here that farmers are not often likely to adopt cultivars with higher temperature requirements (which have a longer growing period, thus more radiation interception, thus a higher potential for biomass production) and/or shift sowing dates. Even if the adoption of these measures have been shown to be beneficial and have been adopted already in some regions, farmers behave risk-adverse when they fear early/late frosts or extreme events in longer/altered growing seasons. (Vanuytrecht, Eline, KU Leuven)
813	7	37	38	37	39	high confidence could be placed within parentheses at the end of the sentence to maximize directness of wording. (Mach, Katharine, IPCC WGII TSU)
814	7	37	48	38	3	this section is missing risk of increasing N2O emissions due to additional N fertiliser use (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
815	7	38	2	0	0	Phosphorus is immobile in most soils, hence leaching of P is rare -- more likely to be lost through erosion. Suggest changing sentence to read " ...reduce soil erosion (and loss of nutrients, such as phosphorus) and reduce leaching of mobile nutrients such as nitrogen...." (UNITED STATES OF AMERICA)
816	7	38	5	38	16	For the Netherlands, a study on farm structural change was performed, showing that climate change has relatively small impacts on farm structural change (Mandryk et al. 2012, Landscape Ecology 27: 509-527). \n\n (NETHERLANDS)
817	7	38	5	38	19	In order to reduce volatilization loss of fertilizer, slow release fertilizer and combining organic fertilizer is extended now. Dressing should avoid hot time. (Xu, Yinlong, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS))
818	7	38	6	38	6	medium confidence could be placed within parentheses at the end of the sentence to maximize directness of wording. (Mach, Katharine, IPCC WGII TSU)
819	7	38	7	38	7	Howden et al (2012) is missing from the reference list\n\n (NETHERLANDS)
820	7	38	14	38	14	I suggest taking advice from the authors of the relevant papers as to whether the peanut industry is a good example here. As I understand it, the business that was attempting to re-locate has abandoned the attempt. (Moore, Andrew, CSIRO)
821	7	38	20	38	22	Also in Schaap et al. (2013, European Journal of Agronomy 48: 30-42) a cost-benefit analysis was performed together with engagement with farmers to design adaptation strategies. \n\n (NETHERLANDS)
822	7	38	23	38	23	It would be preferable to provide specific cross-reference to the relevant chapters of the working group 3 contribution. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
823	7	38	32	0	0	Section 7.5.2 Food cases. The University of Vicosa, Brazil, has analysed several cases of interaction between food systems, climate change, land use, and water. Please contact Professor Justino. (Nogueira da Silva, Milton, Climate Change Forum of Minas Gerais, Brazil)
824	7	38	32	39	44	Most of this section on Food Case studies is weak; it is anecdotal and lacking in peer--reviewed sources. Case 1 and Case 4 are acceptable, but strongly suggest deleting Case 2 (one source) and Case 3 (one CARE public relations source). (UNITED STATES OF AMERICA)
825	7	38	32	39	44	This section is quite weak and is much better reviewed in Ch 9, Rural Areas. Perhaps remove and point to Ch 9 for the overview (UNITED STATES OF AMERICA)
826	7	38	34	39	44	We recommend making a reference to MERET, a successful food security project with and adaptation component in Ethiopia. Suggested text includes: "A joint venture between the Ethiopian government and WFP, the MERET programme gets chronically food-insecure communities involved in environmental rehabilitation and sustainable income- generating activities that improve livelihoods. Under MERET, chronically food-insecure communities participate in environmental rehabilitation and income generating activities designed to improve livelihoods through the sustainable use of natural resources to support adaptation to climate impacts. Its primary objective is to build resilience to climate-related shocks and food price volatility.\n\n"In the past 5 years alone, MERET has reached 1.7 million beneficiaries in over 500 communities.\nAccording to a mid-term evaluation conducted in 2009, MERET has contributed to the rehabilitation of\nover 400,000 hectares of degraded lands. A cost-benefit analysis made in 2005 showed that economic\nand financial rates of return exceeded 12% from the assets created and soil fertility restored, with\nevident impacts in food production, rural income generation and livelihoods. Food security in the\ntargeted areas was reduced by 40%, while 80% of interviewees reported being better able to cope with\nshocks and stress. Increased resilience will gradually allow communities to phase out from food\nassistance."\n\nReferences: WFP and SDC (2011) Building Resilience: Bridging Food Security, Climate Change Adaptation and Disaster Risk Reduction. Rome: WFP/SDC. (Scaramella, Carlo, World Food Programme)
827	7	38	38	38	54	This example is very interesting but if land scarcity and new market opportunities are the primary factors rather than climate is it the best example to give? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
828	7	39	8	39	12	Migration of people is not a strategy, but rather a necessity more likely determined by serious condition that by cold calculation. The entire period has to be re-phrased in a way not to mix up determinants and consequences.\n\n (NETHERLANDS)
829	7	39	33	39	44	This section on transformational adaptation may be a good example, but it should be noted that farming systems constantly change, also in respons to other factors like markets, technological development and policy. Although it differs per region, it can be argued that in general other drivers are stronger than climate change (e.g. Hermans et al. 2010, Ecological Modelling 221: 2177-2187; Mandryk et al. 2012. Landscape Ecology 27: 509-527)\n\n (NETHERLANDS)
830	7	39	38	39	39	I suggest taking advice from the authors of the relevant papers as to whether the peanut industry is a good example here. As I understand it, the business that was attempting to re-locate has abandoned the attempt. (Moore, Andrew, CSIRO)
831	7	39	47	0	0	Descriptions of Sections 7.5.3 and 7.6 are both too conceptual to understand. Please involve a few of example with referring as same as Chap.24. (Nishimori, Motoki, National Institute for Agro-Environmental Sciences)
832	7	39	49	39	54	The authors state that some adaptations are more effective than others. Please summarize here which adaptation measures are expected to be most important or characterize our understanding in more detail. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
833	7	39	51	39	52	Stating that irrigation optimisation is less beneficial than cultivar adaptation is not helpful and soemwhat misleading. Optimising water use to times of critical crop growth stages makes for more efficient use of water resources -- and contributes to conserving the resource base for other livelihood and food security needs. (UNITED STATES OF AMERICA)
834	7	39	54	39	54	All calibrated uncertainty language could be placed within parentheses at the end of the statement to maximize the directness of wording. (Mach, Katharine, IPCC WGII TSU)
835	7	39	54	40	2	The limit to incremental adaptation that is here described to occur beyond 2°C temperature rise, is not apparent from the data presented in chapter 7.5. The decreasing effectiveness of incremental adaptation is not explicitly discussed or mentioned in the actual paragraph 7.5. In fact, figure 7-9, which to our understanding presents data mostly from incremental adapatations, shows highest effectiveness of adaptation at 3C temperature increase, and now decrease up until 5°C. Please reconsider this sentence and carefully consider the consistency of the paragraph. \n\n (NETHERLANDS)
836	7	40	0	40	0	Section 7.6: Mention about 1) crop-pest interactions in future climates 2) Weather forecast-base crop management 3) Integrated assessments and use of model ensembles is needed (INDIA)
837	7	40	1	40	7	Soil moisture conservation, drip irrigation, raised bed planting, etc. are important management practices (INDIA)
838	7	40	9	40	18	See earlier comments on taking a more precautionary approach for stocks at risk from climate change (e.g. due to recruitment failures). (HAWKINS, STEPHEN, UNIVERSITY OF SOUTHAMPTON)
839	7	40	9	49	12	It is stated that there is no adequate information to aggregate the possible value of adaptations, however there is high confidence and medium evidence that they will bring benefit. This is not a convincing statement. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
840	7	40	10	40	12	All calibrated uncertainty language could be placed within parentheses at the end of the statement to maximize the directness of wording. The level of confidence in the 1st half of the statement would have to be clarified as well. (Mach, Katharine, IPCC WGII TSU)
841	7	40	17	40	18	Existing fishery management tools and strategies are not sufficient for adaptation. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
842	7	40	21	40	23	All calibrated uncertainty language could be placed within parentheses at the end of the statement to maximize the directness of wording. (Mach, Katharine, IPCC WGII TSU)
843	7	40	26	40	27	All calibrated uncertainty language could be placed within parentheses at the end of the statement to maximize the directness of wording. Formulation of the sentence would have to be adjusted slightly. (Mach, Katharine, IPCC WGII TSU)
844	7	40	32	0	0	This section could mention the research need in Ecosystem based adaptation. (Vasseur, Liette, Brock University)
845	7	40	32	41	7	Section 7.6, Research and Data Gaps, pages 40 (lines 32 ff) and 41 (lines 1-7): here there is a possible error or omission, especially lines 39-40, page 40: ”Other areas of neglect include..... the need to update and revise food production impact models... ” – many of the research gaps mentioned have been (during past 2-3 years) actively tackled by several international research networks (such as AgMIP; CCAFS, Facce-MACSUR; ISI-MIP, etc) – see, e.g. my additional references compiled in supporting file such as Rosenzweig et al., 2013; Soussana et al., 2012, etc.: IPCC_AR5_WGII_chapter 7_addREFs_(RP-Rotter); it should be mentioned at least, that research gaps have been recognized and promising approaches have already let to good interim reslts (e.g. such as documented by Asseng et al., 2013 and in those relevant other additional referecnes I provided). (Rötter, Reimund, MTT Agrifood Research Finland)
846	7	40	34	41	7	For gaps, I think in future more studies will be needed on intercation of temperature, moisture and nutrient regime, of crop-weed-pest and pathogens as well as intercation of soil food web system of agro-ecosystem, for addressing a holistic or integrated understanding of long term systematic impacts by climate change. (Pan, Genxing, Nanjing Agricultural University)
847	7	40	36	40	36	Food processing in fact is age old science…. (INDIA)

#	Ch	From Page	From Line	To Page	To Line	Comment
848	7	40	36	40	36	There is scanty of information on the impact of climate change on Cropping systems (although much information is there on particular crops but how and to what extent a partcular croping system is projected to affected biophysically or economically is less known). Secondly by climate change pest-host associations will also change which ultimately will effect crop production and subsequently food security, this may also be the research part of future efforts. (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
849	7	40	43	40	43	There is no mention of genopyte x climate (and possibly x management) interaction. This is the very source of adaptation strategy which should not be overlooked here. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
850	7	40	50	40	54	In González-Zeas et al. (2013) the role of variability of yields on impact assesments is analysed. See: González-Zeas D., Quiroga, S., Iglesias, A., Garrote, L. (2013). "Looking beyond the average agricultural impacts in defining adaptation needs in Europe". Regional Environmental Change, In press. (DOI: DOI 10.1007/s10113-012-0388-0) (QUIROGA, SONIA, UNIVERSIDAD DE ALCALA)
851	7	40	50	41	7	many studies haven't addressed yield variability - scaling issues (both spatial and temporal) should be mentioned here. technical difficulties of assessing year to year yield variability in global scale analyses, which are designed to detect trends in impacts (typically average over 30 years). (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
852	7	41	4	41	5	Comment: The following text can appear hear: "The recently developed global dataset of historical yields (Iizumi et al., 2013) that offers statistics-satellite-aligned yield estimates of major crops for the period 1982-2006 over the global croplands will likely be a fundamental database for impacts assessments over the coming years." Reference: Iizumi,, T. M. Yokozawa,G. Sakurai,M. I. Travasso, V. Romanernkov, P. Oettli, T. Newby, Y. Ishigooka, and J. Furuya (2013), Historical changes in global yields: Major cereal and legume crops from 1982 to 2006, Global Ecology and Biogeography (in review). (Iizumi, Toshichika, National Institute for Agro-Environmental Sciences)
853	7	41	4	42	2	Question 7.1 is not answered in this section. Does low food production necessarily lead to food security? is answered to some extent, but What factors determine food security? is not answered\n\n (NETHERLANDS)
854	7	41	9	41	16	Page 48, line 9-16, References – Asseng et al paper is in press and received a DOI: 10.1038/NCLIMATE1916; also its title has slightly changed: Uncertainty in simulating wheat yields under climate change (Rötter, Reimund, MTT Agrifood Research Finland)
855	7	41	15	41	15	An explanation as to why the contribution of inland fisheries is 'probably frequently under-estimated' should be provided. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
856	7	41	29	41	30	Why should agronomic and breeding adaptation be limited to +5°? The range of adaptation possibilities depend on the baseline, as lower the average temperature is now, the higher the adaptation range would be. (GERMANY)
857	7	41	30	41	30	change: but the relative\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
858	7	41	30	41	32	…the actual range of adaptations open to farmers… does not depend only on agronomic practices made available by crop science etc. Often the appropriate tools are existing already, but they are often not applied effectively, or are even not known because the overall set-up of policies and markets are not encouraging or do not provide incentives, or do not require good farming practices that would make adaptations really open for farmers. For example, CAP payments in Europe are paid in full regardless if soil structure, drainage or other issues important for productivity are neglected. In other words, good farming practices are not ensured in reality, while subsidies paid per hectare may imply cost minimising behaviour on less productive areas. It also depends on the other institutional factors, such land tenure legislation and land owbership structure what is the willingness of farmers in investments and actions that would promote productivity and hence also adaptations (Myyra, Sami & Pietola, Kyosti & Yli-Halla, Markku, 2007. "Exploring long-term land improvements under land tenure insecurity," Agricultural Systems, Elsevier, vol. 92(1-3), pages 63-75, January.). In other words, socio-economic drivers of the so-called yield gaps are not at all fully understood and their role on productivity development and adaptations have not been properly studies even in develooped countries. This is surprising, since it is otherwise widely understood that developing agriculture is a long-term issue but not too much is discussed on the possibility that the current de-motivating or limiting factors may have long-lasting impacts on food system resilience. For example , neglected soil fertility, e.g. soil compaction, or drainage investments in large scale are medium to long-term issues to be solved and they may be retardation factors form many years. What is neglected or is limited today may have long shadows into the future. However one needs to remember that markets and price signals should eventually tell farmers should they increase production - but markets can work properly and lead to efficient work division if major retardation factors and limitations have been solved. (Lehtonen, Heikki, MTT Agrifood Research Finland)
859	7	41	42	42	2	FAQ 7.1 seems to be a wrong question judging from the anwers, for climate change is only a part of food security. The answer does not at all touch upon other factors than climate change, which is strange. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
860	7	41	42	42	27	If possible, we suggest adding references to support the material in the FAQs. (Scaramella, Carlo, World Food Programme)
861	7	41	44	0	0	FAQ 7-1 It is important to explain what factors affect food insecurity and then move to describing what aspects of food insecurity is affected by climate change. At present it seems that aspects affected by climate change are the only factors causing food insecurty. (Chatterjee, Monalisa, IPCC WGII TSU)
862	7	42	4	0	0	FAQ 7-2 It seems adaptation actions here refer to changes to tolerant crops, adjusting planting, harvesting seasons, using technology to increase crop production. Another set of adaptation actions would be improving irrigation systems, ensuring access to latest technologies, Options of diversifying livelihoods are also important. Perhaps the answer could reflect that or clarify the type of adaptation actions meant here in the question. (Chatterjee, Monalisa, IPCC WGII TSU)
863	7	42	4	42	6	I don't deny the imporatnce of water, but 100 % of the crop needs to produced under elevated [CO2] and non-negligivel proportion of crop has to be produced under high temperature. The anwer seems a bit biased to precipitation. (Toshihiro, Hasegawa, National Institute for Agro-Environmental Sciences)
864	7	42	4	42	17	The title of FAQ 7.2 suggests this section will describe 'security and nutrition' however nutrition is not mentioned. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
865	7	42	6	42	8	adaptation outcomes ... could have the most direct benefits on livelihoods'. It can also be argued that other factors than climate change and adaptation to this will have more impacts on livelihoods (e.g. Van Ittersum et al., 2013, Field Crops Research 143: 1-3). Adaptation is needed indeed, but not only to climate chnage/ \n\n (NETHERLANDS)
866	7	42	12	42	13	The formulation of this sentence is prescriptive and should be revised accordingly. (Mach, Katharine, IPCC WGII TSU)

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867	7	42	19	0	0	FAQ 7-3 The FAQ could focus on impact on fish stock and may drop ocean acidification. Other chapters have FAQs on ocean acidifcation. Moreover, the current answer only briefly touches on it so OA doesn't have to be highlighted in the question. (Chatterjee, Monalisa, IPCC WGII TSU)
868	7	43	17	43	17	Any literature regarding beneficial algae? (INDIA)
869	7	44	0	0	0	Please be more specific than "substantial" and explain what this actually means. (GERMANY)
870	7	44	11	44	14	See comment on page 23, 36-41. (GERMANY)
871	7	44	13	44	13	Starting from "Consequently" the semantic construction of the sentence leads to very unclear message which as written might constitute a generalization. The sentence could be: Although this number is small compared to global GDP, for some regions or small islands relying on coral reef, it can represents a very large GDP loss in their economies.\n\n (NETHERLANDS)
872	7	44	19	44	21	See the comment to (Chapter 5, Page 50, Lines 26-28) (Ryaboshapko, Alexey, Institute of Global Climate and Ecology)
873	7	44	49	45	24	the "CC-OA References" can be incorporated under ordinary References List (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
874	7	45	38	45	38	After "food production," the parenthetical "(particularly of animal products)" should be added so that the line reads, "While food production (particularly of animal products) and transport…" (Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options. Food and Agriculture Organization of the United Nations; Pelletier N and Tyedmers P. 2010. Forecasting potential global environmental costs of livestock production 2000-2050. Proceedings of the National Academy of Sciences of the United States of America 107(43):18371-18374). (Evans, Geoffrey, Humane Society International)
875	7	46	27	47	11	the "CC-WE References" can be incorporated in the ordinary References list (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
876	7	48	53	0	0	It is "Berg et al. 2013" and not "Berg et al. 2012". The rest of the reference is ok. (Sultan, benjamin, IRD)
877	7	54	35	54	37	In that case, include the reference: Hannesson, R., 2007: Geographical distribution of fish catches and temperature variations on the northeast Atlantic since 1945. Marine Policy, 31, 32-39. (Garza-Gil, M. Dolores, University of Vigo)
878	7	55	28	55	29	The reference "Humaira. S. N. Ali…." may be corrected as "Sultana, H. N. Ali …" (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
879	7	57	49	0	0	Full reference of Lobell et al (2011) is References is incomplete. Please, add Science 333: 616-620. (Viglizzo, Ernesto, INTA/CONICET)
880	7	69	0	0	0	Table 7.1 Final sentence in 'Urban Consumers' box incomplete, there are missing words. (AUSTRALIA)
881	7	69	0	0	0	Table 7-1. Citation should be provided for all entries in this table. Additionally, the instance of "limited evidence" should be italicized for clarity. (Mach, Katharine, IPCC WGII TSU)
882	7	69	0	69	0	Table 7.1: Include Peri-urban cultivators, they do protected cultivation or high value crop cultivation, require high energy for crop growth, high process of produced food. (INDIA)
883	7	69	1	69	0	Table7.1. urban consumers impacts of food price increase on food access box: final sentence is incomplete. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
884	7	70	0	0	0	Fig 7.1- Two factors are missing from the figure: (1) the enormous food waste due to bad eating habits in industrialized countries; (2) market imperfections in the distribution, where a lot of food is lost and wasted. (Nogueira da Silva, Milton, Climate Change Forum of Minas Gerais, Brazil)

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885	7	70	0	0	0	References for this figure are not complete. A summary for an IPCC report chapter should include all relevant literature, not just some selected ones. Following Mendelsohn et al. (1994, American Economic Review 84: 753-771) many studies have used statistical models to estimate climate impacts on yields and other indicators related to food production. For Europe, Reidsma et al. (2009, Regional Environmental Change 9: 25-40) provides information.\n\n (NETHERLANDS)
886	7	70	0	0	0	The statistical technique used to produce figure 7-2 is unclear and is probably less appropriate for the aim of this report. It seems, based on the figure subscript, that an unweighed approach where each studies weighs equally heavy to calculate an average effect size and distribution of effect sizes. More appropriate would be to take into account study size and variability and weigh studies according to this. This information is typically available in the original article. Unweighed meta-analyses, i.e. just counting the number of studies finding a particular effect size, are notoriously prone to small outlier studies and have a big danger of producing biased overall estimates. It seems unwise to base such a core figure on an inappropriate statistical technique when better ones are readily available. \n\n (NETHERLANDS)
887	7	70	0	0	0	Figure 7-1: For clarity, suggest inserting 'temperature' before 'means' in GEC bubble. (UNITED STATES OF AMERICA)
888	7	70	0	0	0	Figure 7-2 (a) can be removed. I don't think aggregating all crops at all locations by all different models adds value to the argument. Figure 7-2 (b) is good. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
889	7	70	0	0	0	y-axis labels are not aligned with the bars (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
890	7	70	0	0	0	Figure 7-1: It would be helpful (and probably important as the first figure of the chapter) that this figure explicitly illustrates the concept of “Climate change”. It is implied but not obvious. (Estrada, Yuka, IPCC WGII TSU)
891	7	70	0	0	0	Figure 7-2: X-axis label “Yield impact of climate trend (% decade)” (or “(% yield per decade)” in caption) is not very intuitive. Please explain. Please also clarify 1) what colors of bars and boxes in the both charts mean, and 2) what solid black lines (median or mean?) in the boxes are illustrating. The non-expert reader cannot be expected to look up the literature (Estrada, Yuka, IPCC WGII TSU)
892	7	70	0	0	0	Figure 7-1. As an addition to this figure, is it possible to provide additional figures that illustrate how these interactions work--more specifically--for major crop types? Such a graphic could provide an effective summary figure for mechanisms assessed in the chapter. (Mach, Katharine, IPCC WGII TSU)
893	7	70	0	0	0	Figure 7-1. As 2 broad points for this figure, it would be helpful to clarify the reasoning behind the colors used. Additionally, refined approaches for depicting the differing components could be considered. (Mach, Katharine, IPCC WGII TSU)
894	7	70	0	0	0	Figure 7-1. As a series of smaller points for this figure: 1) Should environmental feedbacks also feed back onto socio-economic drivers? 2) Should energy be depicted in the graphic? 3) Should the socioeconomic drivers bubble also refer to markets (and energy)? 4) Within the caption, it would be helpful to indicate how social welfare and environmental welfare are being defined. Does social welfare include economics, and does environmental welfare include environmental/ecosystem services, and sustainability? 5) Why aren't the circles for food utilization, food access, and food availability overlapping? Don't they interact? 6) Should the food system activities rectangle refer to the food chain and also include disposal of food? 7) For food system outcomes, which seem more local as compared to other components that are more global or national, is it possible to depict an element of scale within the figure? For example could global to local be depicted within the food chain? 8) It is a bit ambiguous to refer to "circles" within the caption, as the relevant shape is really an oval. (Mach, Katharine, IPCC WGII TSU)

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895	7	70	0	0	0	Figure 7-2. The start of caption refers to recent climate trends--which variables are considered in addition to temperature? In addition to median length of 29 years, is it also possible to indicate some measure of when these studies occurred on average? For the plot on the left, would it make more sense to specify the full range for greater than 0? For the plot on the right, the type of average and ranges shown should be defined within the caption for the boxplots. (Mach, Katharine, IPCC WGII TSU)
896	7	70	0	70	0	Figure 7-1 The author team may wish to use one crop to show interactions between all these components. (Chatterjee, Monalisa, IPCC WGII TSU)
897	7	70	0	70	0	Figure 7-1 global to local scale may be added in this description. It is not clear where the impact of climate change comes in. It is not clear if colors add another dimension. (Chatterjee, Monalisa, IPCC WGII TSU)
898	7	70	1	70	0	figure 7.2 (b): there is only 2 studies that included CO2 fertilisation effect, hence most studies of the impact reported did not include the CO2 fertilisation effect, hence supporting the conclusion of the general decrease in yield. There is an evident bias in the analysis and should be highlighted in the executive summary (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
899	7	71	0	0	0	Figure 7-3. is quite interested but relatively understandable at a glance, therefore it is strongly recommended the area and kinds of crops are disposed not only figure caption but also the figure itself. (Nishimori, Motoki, National Institute for Agro-Environmental Sciences)
900	7	71	0	0	0	Units are not clear\n\n (NETHERLANDS)
901	7	71	0	0	0	Figure 7-3: Both the way this figure was generated, as well as the message it is trying to convey are unclear. What data sources was the figure based on? How positive and/or negative are the yield impacts found? Are they substantial? With what variability? Without this type of information, it its current the message does not really convey any clear point (particulary not compared to 7-2, which is much more informative), and would be better left out. Perhaps consequently, there is hardly any discussion of the figure in the main text. \n\n (NETHERLANDS)
902	7	71	0	0	0	Figure 7-3: Please specifiy scale of x and y axes and source of data. (UNITED STATES OF AMERICA)
903	7	71	0	0	0	Figure 7-3. Is y-axis supposed to be "attribution" only? (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
904	7	71	0	0	0	Suggest removing Figure 7-3. The graph does not add value to the discussion. The estimate of confidence levels is by expert judgement, which is questionable. The dots are aligned on a linear line too neatly. I wonder if the expert judgement is arbitrary. The IPCC reviews should provide objective evidences to the extent possible (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
905	7	71	0	0	0	Figure 7-3. The chapter team is strongly encouraged to provide an accompanying table to emphasize, with more nuance, what is being depicted--examples within chapters 3 and 6 could be considered. (Mach, Katharine, IPCC WGII TSU)
906	7	71	0	71	0	The Reference of the Figure 7.3 needs to be given (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
907	7	72	0	0	0	reversed the historical downward trend\n\n (NETHERLANDS)

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908	7	72	0	0	0	Figure 7-4: This caption needs to point out that the figure refers NOT to the food that the food insecure eat but food that is valuable for international trade. The FAO Cereal price index, which is correlated to the FAO Food price index, does not capture the price of the foods that the food insecure eat. There is significant evidence that the international price reflected in these FAO indices are not linearly adopted by the most isolated and food insecure markets in the developing world. This is because of the lack of infrastructure, the lack of demand, poorly functioning markets, high transaction costs, and the low value of the locally produced food stuffs. \nAn alternate figure might be the food price indices produced by FEWS NET by region, that show the foods the food insecure actually eat in non-capital cities where the food insecure live. See the Price Watch bulletin at http://v4.fews.net/Pages/markettrade.aspx?loc=3&l=en (UNITED STATES OF AMERICA)
909	7	72	0	0	0	Figure 7-4: Please include citations. (UNITED STATES OF AMERICA)
910	7	72	0	0	0	Figure 7-4: The figure legend does not explain the added arrows for Australian wheat, U.S. maize, etc. (UNITED STATES OF AMERICA)
911	7	72	0	0	0	Figure 7-4: It seems to be more effective and informative to provide additional plots of the actual yield data for the major crops from selected countries instead of showing some “events” in this figure. (You could still highlight those specific events in the price index plot.) It also may be more helpful to show the yield data to make points about the effect of the biofuel demands. (Estrada, Yuka, IPCC WGII TSU)
912	7	72	0	72	0	The reference of the Figure 7.4 needs to be given (Goheer, Arif, Global Change Impact Studies Centre (GCISC))
913	7	73	0	0	0	It should be made clearer what adaptation is. If these are simple measures, as mentioned in section 7.3.2.1, then we may assume that they will be adapted. If more complex adaptation measures are not included, the possible benefits of adaptation may be underestimated.\n\n (NETHERLANDS)
914	7	73	0	0	0	Fig 7.5 also shows that crop yields are likely to decrease with increase in temperature (Musoni , Didace, Rwanda Meteorological Agency)
915	7	73	0	0	0	Figure 7-5: Please provide citations for this figure. (UNITED STATES OF AMERICA)
916	7	73	0	0	0	What is the source of Figure 7.5? If this is the original of the IPCC review authors, the methodology for creating the figure needs to be discussed more (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
917	7	73	0	0	0	Figure 7-5: The figure caption needs to be rewritten to explain all elements of the figure. A more careful explanation of what is being plotted with “95% confidence” is required. In other words, explain, albeit briefly, how these results are obtained from the data. Please clarify what “500 bootstrap samples” mean. (Estrada, Yuka, IPCC WGII TSU)
918	7	73	0	0	0	Figure 7-5. For tropical maize, why are outcomes are worse with adaptation? For temperate maize and wheat and tropical rice, it could be helpful to specify why adaptation becomes more effective over time. Also within the caption, it would be helpful to indicate the baseline for the simulated yield changes. If this figure has been published in the literature, the relevant source should be cross-referenced. Otherwise, it should be more directly indicated that the figure originates from the chapter's assessment. (Mach, Katharine, IPCC WGII TSU)
919	7	73	0	0	0	Figure 7-5: Is it accurate that yield decreases are less without adaptation than with in the upper right panel of the figure (maize, tropical)? If so, please explain this seemingly counterintuitive relationship. (Mastrandrea, Michael, IPCC WGII TSU)
920	7	73	0	73	0	Figure7-5: In Maize-Tropical regions figure (upper right one), blue band (presence of adaptation) goes below red band (absence of adaptation). While there is no definition given for "adaptation", to our understanding, blue band goes above red band because of presence of adaptation. The causes should be examined and if there is no reasonable explanation, this figure and any text based on this figure should be deleted. (JAPAN)
921	7	73	0	73	0	Figure 7-5 It may be useful to explain how this analysis was done in the text or caption. Is this from a paper or was this meta analysis done for the chapter. (Chatterjee, Monalisa, IPCC WGII TSU)

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922	7	74	0	0	0	It is "Berg et al. 2013" and not "Berg et al. 2012". It should also be corrected in the reference (Sultan, benjamin, IRD)
923	7	74	0	0	0	Figure 7-6: This figure is difficult to understand. The caption indicates that the y-axis indicates consensus, but it is unclear how this is measured (percentage of studies agreeing on a certain projection), and how these estimates of consensus relate to the various yield bins. Are estimates equally confident for all of these? Is this an overall confidence estimate for each time period as a whole. Please clarify this figure and make it easier to interpret. \n\n (NETHERLANDS)
924	7	74	0	0	0	Figure 7-6. This figure is really just a description of the available research, not an analysis of it. Is it possible to go more in the direction of figure 7-2 within this figure? Additionally, how much is gained from the vertical orientation of the bars, given the usage of color and the fact that they all stack to 100%? Are time intervals the best way to depict the data--what about mean Celsius temperature increase instead? It would at least be beneficial to specify how many scenarios of climate change are being binned. Is adaptation versus no adaptation being grouped, and what other variables are being binned within the time intervals? It could be helpful to specify these
925	7	74	0	0	0	Figure 7-7. Given that the studies reflect a range of scenarios of climate change, is it possible to depict the results by level of temperature increase instead of year? (Mach, Katharine, IPCC WGII TSU)
926	7	74	0	0	0	Figure 7-6: I like the potential of this figure, but find it needs further refinement to be clear. First, it is not immediately obvious that each bar spans 100% on the y-axis, and the choice of y-axis makes it somewhat difficult to deduce how large each bin is in each case. Second, it is not clear to what extent differences reflect different sources of variation, in particular adaptation vs. no adaptation and magnitude of climate change. Are there ways to communicate further information about the factors underlying the spread in results displayed? (Mastrandrea, Michael, IPCC WGII TSU)
927	7	74	0	74	0	Figure 7-7 This figure doesn't explain factors mentioned in the ES (page 3 line 23-24) (Chatterjee, Monalisa, IPCC WGII TSU)
928	7	75	0	0	0	Figure 7-9. It is unclear how this figure and the very similar figure 7-5 relate to each other. Does 7-9 include all crops from 7-5 combined in one figure? Clarify please. \n\n (NETHERLANDS)
929	7	75	0	0	0	Figure 7-8: Suggest deleting this graphic as it is misleading -- e.g., irrigation optimisation contains an adaptive feature with benefits (resource conservation) that is not evidenced by this graphic. (UNITED STATES OF AMERICA)
930	7	75	0	0	0	What is the source of Figure 7.8? Which papers were used in the analysis for Figure 7.8? (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
931	7	75	0	0	0	Suggest removing Figure 7-9. It appears to be an aggregation of graphs in Figure 7-5. Figure 7-9 does not add value to the discussion. At least give the source to the figure and explain in detail how the graph was produced. (Yao, Xiangjun, Food and Agriculture Organization of the United Nations (FAO))
932	7	75	0	0	0	Figure 7-8 and Figure 7-9: Please specify the source of data. (Estrada, Yuka, IPCC WGII TSU)
933	7	75	0	0	0	Figure 7-8. What is the source of this figure? Are results being binned across levels/scenarios of climate change? (Mach, Katharine, IPCC WGII TSU)
934	7	75	0	0	0	Figure 7-9. Where "baseline" is mentioned, what baseline is being used--current yield? What is the source of this figure? (Mach, Katharine, IPCC WGII TSU)
935	7	76	0	0	0	Fig OA-1- figure with 3 graphs is confusing and could be split into 3 figures. Graph ´a´ mentions ´geoengineering´ as a valid option, despite all the controversies. Is it really an option? (Nogueira da Silva, Milton, Climate Change Forum of Minas Gerais, Brazil)
936	7	77	0	0	0	Figure WE-1: The nexus concept is very important.However, the nexus must also include" waste" and its reuse and recycling for water,energy,and climate change.The waste in agroecosystems consists of plant residues, and animal residue(manure etc). (UNITED STATES OF AMERICA)