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

***Government and Expert Review of Second Order Draft***

**Specific Comments**

# GOVERNMENT REVIEW COMMENTS

## Chapter 3

**August 2006**

**(Includes late comments at the end)**

## Discussion of Government review comments and record keeping

IT IS RECOMMENDED THAT:

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

Substantive comments

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

Non-substantive comments

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

General

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

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| G-3-1 | A | 0 | | | | We have looked through the part describing the freshwater resources, Chapter 3 - Freshwater Resources and compared to Norwegian results. This comment will focus on observed and projected changes in Norway, versus the changes described in the report and are given as general comments rather than as propositions for changes of specific parts of the text. Generally we find that the direction of most of the trends and projections agree for Norway as described for Northern Europe, but we will point out some differences caused by the more small scale regional differences in Norway. Norway is characterised with high regional variability in rainfall and runoff. The distribution is strongly dependent on the dominant atmospheric circulation because of long mountain ranges parallell with the coast with pronounced orographic reinforcement of the precipitation on the windward side and rain shadows on the lee side of the mountain ranges. We see that the difference between West Norway and the rest of the boreal zone is mentioned in Chaper 12. This regional variability introduces differences in trends in the observed series which may differ from the overall coarser picture. The runoff regime in Norway as well as in Sweden and Finland is much related to changes in the accumulation and melting of snow in the winter season. The observed changes in Norway are more pronounced in the seasonal data than in the annual values, and are more related to the temperature signal than changes in the precipitation. We agree therefore that the climate-driven changes are attributed to increase in the temperature as mentioned in Chapter 1. There are no obvious increase in the flood magnitude based on long term flood series as well as information of floods prior to the instrumental period. We find however that floods of different causes tend to cluster depending on the climatic conditions. There are evidence for huge floods prior to or at the end of the most severe spells of the Little Ice Age of magnitudes not observed afterwards. These floods are caused by intensive rainfall often in combination with snowmelt, and seem to occur during brief warm spells. The atmospheric circulation causing some of these events are fairly rare, but is known to have caused extreme floods on the European mainland. Summer and early autumn floods caused by intensive rainfall are dominant in warm decades, while large combined snowmelt rainfall floods are dominating the cooler decades. We see however a shift towards earlier spring floods and later start of the winter season. Many of the changes are related to urbanisation and other land use changes, which are mostly not climate-driven. Hydropower reservoirs and diversions can easily have a larger effect on the magnitude and seasonality of the extremes than the climate-driven changes. Afforestation is increasing in parts of Norway, mostly as a consequence of the termination of grazing by farm animals, but also to some extent | Interesting material but of little direct use to Chapter 3, dealing with future projections rather than past observations. Page limits does not allow us to go down to a country level even if Norway is, no doubt, interesting. |

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| | | | | | | as a consequence of a gradual increase in the tree-limit in mountainous areas. This is likely to have some consequences for the water balance, but has so far not been included in our model runs.<br>(Government of Norway) | |
| G-3-2 | A | 0 | | | | The chapter could incorporate/improve the information in chapter 4.4.8 (move from chapter 4) to avoid overlap (and rather little information in chapter 4.4.8)<br>(Government of Norway) | We have to shrink rather than expand (critical page limit) |
| G-3-3 | A | 0 | | | | Recognizing that net effect of climate change on freshwater systems will likely be largely negative, lack of acknowledgement of any potential benefits to climate change undermines the credibility of the document by giving the reader the impression that only the studies suggesting dire consequences where selected for inclusion. One quick example is the suggestion that rising water tables are always problematic. The chapter will be less persuasive and helpful if it's not seen as credible or balanced.<br>(Government of USA) | A few benefits mentioned, yet the balance is likely to be negative. |
| G-3-4 | A | 0 | | | | I have no specific remarks concerning Chapter 3 and 12. There is only one general comment concerning inserting a list of acronyms in the end of the report. It would improve understanding of the report, which is written clearly and concisely, taking into account all issues comprehensively. A number of existing figures and charts facilitate understanding of the text and illustrate mentioned problems summing them up in clear way. A lot of references reflect comprehensive recognition of problems taking into consideration in Chapters 3 and 12. The comprehensive presentation of problems concerning impact of climate change and its variability to water environment in global as well as regional and local scale emphasizes broad scope of application of the report.<br>(Government of Poland) | We understand that a list of acronyms will be common for the whole report. |
| G-3-5 | A | 0 | | | | Each chapter that mentions the SRES scenarios should include a reference to the description in the TS.<br>(Government of USA) | We struggle to stay within page limits. SRES will be explained (hopefully with references) in the list of acronyms |
| G-3-6 | A | 0 | | | | Chapter 3 represents an impressive job of pulling together many salient points related to the observed and potential future impacts of climate change and variability on water resources. Given the centrality of the water cycle to people's livelihoods, it is important that this chapter's message be conveyed effectively. However, the themes of the chapter may be lost on many readers because the chapter is poorly written and organized. There is much repetitiveness and bits and pieces of information are listed with no overarching summaries or conclusions to pull them together. The writing in this chapter is less well developed and crisp-thus | Considerable effort was made to render the draft more readable and coherent. |

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| | | | | | | less helpful to a policymaker-than other chapters. One has much more of sense of reading an annotated bibliography than a coherent discussion.<br>(Government of USA) | |
| G-3-7 | A | 0 | | | | 1. The style of the in-text reference is inconsistent<br>- The references should be arranged chronologically and if published in the same year, the items in the references should be arranged in alphabetical order of author's surnames<br>2. Other items that need to be corrected<br>(Government of Korea) | Yes, done. |
| G-3-8 | A | 3 | 3 | 4 | 14 | Exec summary should have all major points bolded; chapter authors are inconsistent and do not follow language regarding uncertainty provided in the introduction (eg. Virtually Certain, Very Likely, etc.), and instead use “will” (or similar wording) that suggest a higher level of certainty than the information provided in the chapter. Therefore, the authors do not use the appropriate terminology when referring to the “degree of confidence” AND “likelihood of occurrence/outcome” in all of the bullet points in the Exec. Summary for this chapter.<br>(Government of USA) | Done |
| G-3-9 | A | 3 | 7 | | 9 | Sentence structure needs revision<br>(Government of Ireland) | Revised |
| G-3-10 | A | 3 | 12 | 3 | 17 | As this is the first issue listed, it gives the reader the impression that the only 2 regions where freshwater may become an issue are snow-melt fed river systems and coastal areas. The body of the chapter identifies some other key regions of concern.<br>(Government of Canada) | Revised |
| G-3-11 | A | 3 | 12 | | 17 | It is recommended that changes in evaporation be included in this point.<br>(Government of Ireland) | Changes in evaporation are mentioned in 3.4.1. Now ES bullet refers to irrigation water demand. |
| G-3-12 | A | 3 | 15 | | 17 | It is unclear what the confidence applies to. Throughout section if confidence statement applies to everything within each paragraph, then confidence statement should be at the beginning or end. If not, the confidence statement should follow each specific point.<br>(Government of USA) | Revised |
| G-3-13 | A | 3 | 16 | 3 | 17 | The sentence beginning "Sea level rise…." should be a separate dot point, or at least have a separate confidence reading.<br>(Government of Australia) | Revised |
| G-3-14 | A | 3 | 20 | | 20 | Is it accurate to use “pristine” here? Is it necessary? | Deleted |

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| | | | | | | (Government of USA) | |
| G-3-15 | A | 3 | 22 | 3 | 24 | For clarity and accuracy, the sentence concerning Australia should read "A large decrease in precipitation during the last decades has led to an adaptive response, including significant investment, in key regions of Australia, in water management".<br>(Government of Australia) | Issue removed from ES |
| G-3-16 | A | 3 | 23 | | 23 | Decrease in precip. didn't cause large investments. better term would be "resulted in" or "required"<br>(Government of USA) | Revised |
| G-3-17 | A | 3 | 26 | 3 | 28 | Providing more geographic specifics would be helpful<br>(Government of Canada) | Examples are in bullet 2 now |
| G-3-18 | A | 3 | 33 | 3 | 33 | It is proposed to substitute "largely" by a different word, e.g. "highly". It is noted that the use of more than one or two models might produce more robust results.<br>(Government of Austria) | Reworded |
| G-3-19 | A | 3 | 35 | 3 | 36 | It is proposed to delete "imperfect" and to add in line 36 the following wording: that may only have medium to low confidence.<br>(Government of Austria) | Revised |
| G-3-20 | A | 3 | 36 | 3 | 37 | Not clear what this sentence is adding to the previous sentence - and it is hard to understand.<br>(Government of Australia) | Revised |
| G-3-21 | A | 3 | 39 | 3 | 39 | Replace 'different types' with 'some forms'.<br>(Government of Australia) | Revised |
| G-3-22 | A | 4 | 4 | | 4 | California is not a country.<br>(Government of USA) | Corrected |
| G-3-23 | A | 4 | 4 | | | Bavaria might be added to the list. This German state decided in year 2004 to add a climate change factor of 15 % to its flood protection measures.<br>(Government of Germany) | Germany is there |
| G-3-24 | A | 4 | 6 | | 7 | Use of terms "will" inappropriate. Authors need to reconcile this statement with sec 3.5.1, sub-section on "Water Demand", because section on Water Demand does not explicitly state that "water demand will grow due to climate change".<br>(Government of USA) | There is supporting material in 3.5..1 now. |
| G-3-25 | A | 4 | 11 | | | Statement currently used is not clear. Based on 3.4.1 it might be stated that physiological effect of rising CO2 has a positive impact on runoff.<br>(Government of Germany) | Bullet deleted |
| G-3-26 | A | 5 | 3 | | 6 | Delete lines 3-6. The para is factually incorrect and unnecessary. The chapter does not need to highlight water's importance. In 2nd sentence, "large volumes" is not defined and sentence is factually incorrect. In 3rd sentence, issue of whether there | Disagree<br><br>Many information, resolution lead to |

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| | | | | | | should be a human right to water has never been discussed formally in recognized intergovernmental forum (e.g., UN).<br>(Government of USA) | recognized water as a human right<br><br>References should be added [see revision] |
| G-3-27 | A | 5 | 10 | | 13 | Delete example of Nile basin. Sentence adds confusion because it is not explained. It is not clear how example relates to water in gaseous or solid forms discussed in preceding text.<br>(Government of USA) | Delete text |
| G-3-28 | A | 5 | 22 | | 49 | Figure 3.1 is a good start, but it needs additional revision. Most important, the figure needs to include the key processes that the chapter articulates, such as the impact of climate change on supply and demand. Terms also need to be clearly defined—especially water stress.<br>(Government of USA) | Oki is reviewed the figure [DONE]<br><br>Figure should be redraw in order to also include other factors (climate affects land use, include technology) [DONE] |
| G-3-29 | A | 5 | 22 | | 49 | Delete para and figure. The paragraph and schematic are not helpful. Their purpose and key point is unclear and inaccurate. The diagram is confusing. Terms are not defined (e.g., “water stress”), some of which are politically loaded (e.g., “consumptive life style”) . The diagram also assumes movement in only one direction and doesn’t account for impact of factors such as new technology. It would be better for the authors to simply note the various connections.<br>(Government of USA) | Disagrre<br><br>But, figure could be reviewed. |
| G-3-30 | A | 6 | 13 | | 14 | Fewer low flows, meaning more water? or decrease in volume of low flows?<br>(Government of USA) | Perhaps, it need some explanation |
| G-3-31 | A | 6 | 15 | | 15 | Is demand increasing “globally” or in some regions?<br>(Government of USA) | Globally. But we do not want to change the sentence in the TAR |
| G-3-32 | A | 6 | 24 | 6 | 26 | The preceding paragraph outlines the major findings related to water from the TAR, but there is no segue into some of the changes or what is different or how the general understanding has advanced in this assessment in this paragraph - it seems out of place.<br>(Government of Canada) | Disagree. There are. |
| G-3-33 | A | 6 | 29 | 10 | 31 | This section needs to mention navigation and recreation as water uses.<br>(Government of USA) | Disagree. No relevant reference was found. |
| G-3-34 | A | 6 | 31 | | | Section 3.2.1 is rambling, poorly organized, and key points are unclear.<br>(Government of USA) | It needs to be reviewed. Perhaps, we can use sub-headings. [Tried to be done] |
| G-3-35 | A | 6 | 35 | 6 | 36 | It's not clear if the reference to the changes in agriculture and forestry are related to water or would have implications for water<br>(Government of Canada) | Agree, deleted. |
| G-3-36 | A | 6 | 35 | | | What is meaning of “unprecedented” here? Language is not accurate.<br>(Government of USA) | A. Deleted. |

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| G-3-37 | A | 6 | 42 | | | The term "aquatic ecosystems" seems too narrow.<br>(Government of USA) | A. modified. |
| G-3-38 | A | 7 | 3 | | 6 | What about basins in Africa, which are also water stressed?<br>(Government of USA) | A = Addressed = Done |
| G-3-39 | A | 7 | 7 | | 8 | (Oki et al. 2003; Alcamo et al. 2003;…).<br>(Vörösmarty et al. 2000; Alcamo et al. 2003; Oki et al. 2003; Arnell 2004).<br>(Government of Korea) | Ad = Addresses=Done |
| G-3-40 | A | 7 | 8 | | 10 | Per capita consumption increases will likely outpace population growth in many or most instances as well.<br>(Government of USA) | Agree<br>Compare last paragraph on page 32 (study of Alcamo et al. 2005, submitted): reformulated as " Due to demographic and economic growth in most of….) –Petra<br>Section 3.2.2 needs discussion in Cape Town<br>Also Figure 3.2 |
| G-3-41 | A | 7 | 21 | | | The word "part" might be enriched by adding information on the magnitude of the impact of increased vulnerability on increased flood damage. In this context it might be useful to harmonise with section 3.5.2.<br>(Government of Germany) | Agree |
| G-3-42 | A | 7 | 23 | 7 | 24 | Do we have this type of information available for Canada or North America?<br>(Government of Canada) | Do we? [There are some for Japan.] |
| G-3-43 | A | 7 | 31 | 7 | 42 | There is no reference to changing water levels in either rivers or lakes and consequent effects on water quality, coastal wetlands etc<br>(Government of Canada) | Agree but no relevant references on it. |
| G-3-44 | A | 7 | 31 | | 33 | This notes that the main climate change effect on lakes and reservoirs is due to temperature change. Does this mean that changes in precip are not having an effect yet? Do the authors roll timing/form of precip into "temperature change?"<br>(Government of USA) | Agree. Rewarded. |
| G-3-45 | A | 7 | 38 | | 40 | Relationships between nitrogen fluxes and precipitation are far more complex than implied here. Nitrogen and other contaminants tend to reside on the land surface until flushed by rainfall. Long dry periods that span fertilizer application are often followed by a spike in loading to receiving waters during the first rain. Subsequent rainfall events show less of a spike (i.e., subsequent rainall events can't transport nitrogen that isn't there).<br>(Government of USA) | S<br>NEED TO ASK BLANCA to revise this part. |
| G-3-46 | A | 7 | 39 | | 42 | If possible, it would be useful to extrapolate the specific results outlined here to the larger regional scale, rather than refer to specific results for an individual area. | S<br>NEED TO ASK BLANCA to revise this part. |

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| | | | | | | Results for particular catchments tend to be highly dependent on catchment characteristics and specific pressures, and lack generality.<br>(Government of Ireland) | |
| G-3-47 | A | 7 | 44 | 7 | 50 | It might be considered to add a sentence on possible mental health impacts of water stress caused by climate change, e.g. flood disasters might also have psychological consequences for parts of the affected population.<br>(Government of Germany) | Agree, but no relevant reference on it. |
| G-3-48 | A | 7 | 46 | | 47 | (Curriero et al. 2001; Cox et al. 2003;...).<br>(Yarza and Chase 1999; Curriero et al. 2001; Faver et al. 2002; Cox et al. 2003; Hunter 2003).<br>(Government of Korea) | Addressed = Done |
| G-3-49 | A | 8 | 5 | | 6 | (Klein and Nicholls 1999; Sherif and Singh 1999;…).<br>(Klein and Nicholls 1999; Sherif and Singh 1999; Essink 2001; Peirson et al. 2001; Beach 2002; Beuhler 2003).<br>(Government of Korea) | Addressed = Done |
| G-3-50 | A | 8 | 12 | 8 | 14 | For the most part, developed countries do catch waterborne diseases, however this is not always the case. There are still vulnerabilities in developed countries. Might be more accurate to say "For the most part"<br>(Government of Canada) | Addressed = Done |
| G-3-51 | A | 8 | 12 | | 12 | (Jimenez 2003 and Lipp et al. 2001).<br>(Lipp et al. 2001; Jimenez 2003)<br>(Government of Korea) | Addressed = Done |
| G-3-52 | A | 8 | 16 | | 17 | (Scott et al. 2004; Cox et al. 2003;…).<br>(Yarze and Chase 1999; Yamamoto et al. 2000; Rose et al. 2001; Cox et al. 2003; Fayer et al. 2003; Scott et al. 2004).<br>(Government of Korea) | Addressed = Done |
| G-3-53 | A | 8 | 17 | 8 | 19 | This line appears to be out of place, not explained or supported here<br>(Government of Canada) | Addressed = Done |
| G-3-54 | A | 8 | 18 | | 20 | Sentence on intermittent water supply during drought and water quality problems needs more info on the nature of the water quality problem. Is it a concentration of contaminants due to less dilution, is it stagnation in an intermittently functioning system, etc.<br>(Government of USA) | Addressed = Done |
| 3-55 | LATE | 17 | 30 | | 49 | There must be included in the paragraph a phrase emphasizing the lack of basic information in developing countries and the need to improve their hydrometeorological data base.<br>(Government of Argentina) | Addressed. |

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| 3-56 | LATE | 17 | 30 | 17 | 49 | Regarding this paragraph there would be a few things to clarify. First, we are already withdrawing water from underground aquifers at a faster rate than it can be replenished; however, the scarcity of measurements of the underground water levels and the lack of isotopic studies to determine the recharge time as well as the effective characterization of aquifers, does not permit the appropriate underground water management. It is now the opportunity to promote such type of measurements, including that of underground water quality, so to obviate the brutal failure of underground water projects, as it has happened in India and Bangladesh. Therefore, it is not merely the lack of research, in many areas, particularly in developing regions, it is the lack of basic information. In this regard, the two first sentences need redrafting to bring to the attention of decision makers the need to improve the hydrometeorological data base.<br>Under lines37 and 38, it is necessary to add, between brackets,: edaphological conditions . Finally, it should be noted that there is repetition of same statements, as shown in page 18.<br>(Government of Argentina) | Partially addressed and "edaphological conditions" is included in the brackets. |
| 3-57 | LATE | 17 | 30 | 18 | 38 | In addition to the comment above, on repetitions, the polishing of this paragraph should include some comments on underground water management, in spite of the fact that they could be expanded later.<br>It is crucial that decision making begin to understand that underground water sources are also finite and that good management, including the analyses of underground water quality, is a must.. A cross-reference with Chapter 13, regarding the joint management of the Guaraní aquifer, between Argentina, Brazil, Paraguay and Uruguay, could be useful. A reference on aquifers´ with ice/snowmelt feeding would be important due account taken of glaciers retreat, the increasing snowfalls in some regions and the fact that it is uncertain the time horizon for their disappearance.<br>(Government of Argentina) | Management aspects are better explained in this new version |
| G-3-58 | A | 8 | 34 | 8 | 39 | Assume the list of management tasks includes water treatment and the list of off stream uses should include drinking water<br>(Government of Canada) | Addressed = Done |
| G-3-59 | A | 8 | 46 | | 47 | Decisions should also reflect possible changes in mean conditions. Climate change often results not in simply changing likelihood of extreme events, but in changing the mean conditions.<br>(Government of USA) | NA but modified as “only focusing on..” |
| G-3-60 | A | 8 | 48 | | | More emphasis could be placed on demand management options in adapting to change. In previous sections the role of individual stakeholders is highlighted in | NA |

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| | | | | | | resource management but little is mentioned in terms of the role of the stakeholder in adapting water resources management.<br>(Government of Ireland) | |
| G-3-61 | A | 9 | 1 | | 48 | Section provides examples of poor management, but the relationship to climate change is not provided.<br>(Government of USA) | Yes. The purpose of the section is to present the current vulnerabilities either related to climate change or not. |
| G-3-62 | A | 9 | 3 | 9 | 4 | Sentence is not finished<br>(Government of Canada) | Addressed = Done |
| G-3-63 | A | 9 | 4 | | 4 | " . . . and prone to cause water-related." Sentence ends prematurely, needs an object. Probably "problems."<br>(Government of USA) | Addressed = Done |
| G-3-64 | A | 9 | 10 | 9 | 11 | This sentence is not clear --- is it still referring to the Yellow River? It is 700km upstream?<br>(Government of Canada) | Addressed = Done |
| G-3-65 | A | 9 | 11 | 9 | 12 | Would be nice to know briefly what the counter-measures were<br>(Government of Canada) | Addressed = Done |
| G-3-66 | A | 9 | 12 | 9 | 14 | Text missing? Suggest change to '…..reduced flows combined with water demands of irrigation and municipal water supply have affected environmental flows… '. The authors should include the following "regulation of the Murray River has resulted in wetlands receiving less regular inundations. This is being addressed through the Living Murray Initiative".<br>(Government of Australia) | Addressed = Done |
| G-3-67 | A | 9 | 16 | 9 | 18 | The desalination plant must serve only part of Mexico, not the whole country?<br>(Government of Canada) | Reworded |
| G-3-68 | A | 9 | 16 | | 18 | Language used is biased – that U.S. "has been forced to build". Authors should take care to simply present the facts. E.g., sentence could read "The US has treaty obligations to provide Mexico with at least 1.8 cubic kilometers of water a year and has built a desalination plant to ensure that Mexico receives freshwater." Language should also be corrected in corresponding figure 3.2. Note also that the high salinity of the Colorado is due both to high withdrawals but also due to the fact that it drains agricultural land with soils that have high salt content. But regardless, the problem with this example is that it is about poor management or overuse of a resource, but isn't about climate change.<br>(Government of USA) | Accepted.<br>A climate connection could be made, in that salinity increases during low flow periods. Heavy use of the resource, and climate are intertwined.<br>We can soften the language, but the suggested wording conveys a false impression that the construction of the desalting plant was entirely motivated by U.S. generosity. Here is a description of the history taken from the US Bureau of Reclamation web site:<br>In accordance with a 1944 treaty between the United States and Mexico, the United States is |

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| | | | | | | | obligated to deliver 1,500,000 acre feet of Colorado River water to Mexico each year. During the 1960s, the quality of the water delivered to Mexico became so poor that Mexico filed a formal protest. A special commission on Colorado River quality was established in 1973, headed by former Ambassador Herbert Brownell.<br><br>As a result, Minute No. 242 (Minute) of the International Boundary and Water Commission was adopted. The Minute requires the United States to ensure that water arriving at Morelos Dam has an average annual salinity of no more than 115 (+/- 30) parts per million (ppm) over the average annual salinity of water arriving at Imperial Dam. The Yuma Desalting Plant was conceived by the United States as a permanent solution to meet the provisions of the Minute.<br><br>Source:http://www.usbr.gov/lc/yuma/facilities/ydp/yao_ydp_history.html<br><br>[KM] |
| G-3-69 | A | 9 | 26 | | 26 | The discovery of arsenic in water wells is not a "recent" discovery.<br>(Government of USA) | A<br>We need to review this literature & respond. Note, however, that it is important to distinguish between a purely agronomic concept of water productivity & a basin-scale economic concept of water use efficiency. "More crop per drop" is not the only relevant goal. [KM] |
| G-3-70 | A | 9 | 29 | 9 | 30 | Is flourosis climate sensitive?<br>(Government of Canada) | Water withdrawals is likely to rely more on groundwater extriolation due to the increasing water demand. |
| G-3-71 | A | 9 | 32 | | 36 | The extreme flooding of 1998 in Bangladesh has already been mentioned<br>(Government of Ireland) | Where? Not in the current Chapter 3 of WGII. |

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| G-3-72 | A | 9 | 32 | | 36 | Clarify the purpose of including these examples here.<br>(Government of USA) | Show how floods are also obstacles for sustainable development. |
| G-3-73 | A | 9 | 33 | | | 1000 1,000<br>(Government of Korea) | NA |
| G-3-74 | A | 9 | 41 | | 42 | Please provide the documentation that saline intrusion was due to sea level rise and not other factors such as over-pumping of aquifer.<br>(Government of USA) | **Revised** |
| G-3-75 | A | 9 | 43 | 9 | 44 | this statement needs more explanation as the significance is not immediately clear<br>(Government of Canada) | **Revised** |
| G-3-76 | A | 9 | 43 | | 44 | Please clarify the meaning of this sentence.<br>(Government of USA) | **Revised** |
| G-3-77 | A | 9 | 47 | | | Map does not support statement that "well corresponding to the areas with high water stress", e.g., Sahel, Lake Victoria, Elbe.<br>(Government of USA) | **Changed** |
| G-3-78 | A | 9 | | | | It would be beneficial to this section if a clear statement of the vulnerability being discussed was given and then particular examples were briefly provided to back this up. This would also reduce the length of the section.<br>(Government of Ireland) | **Section considerably revised** |
| G-3-79 | A | 9 | | | | A regional indication of the main driving forces behind vulnerabilities would be helpful.<br>(Government of Ireland) | **Revised** |
| G-3-80 | A | 10 | 1 | 10 | 28 | It would be helpfull to add the average annual water availability based on a ten-year perid 1991-2000, to recognise the influence of the ongoing climate change process in the last decades.<br>(Government of Germany) | **We believe that our present way of presentation is better** |
| G-3-81 | A | 10 | 1 | 10 | 29 | figure could include some Canadian reference i.e. shrinking glaciers, flooding, prairie drought<br>(Government of Canada) | **There is a small sample of boxes only** |
| G-3-82 | A | 10 | 30 | | 30 | Figure 3.2 has a useful background map. However, the boxes could be improved. The box about the Mexico desalination plant should be edited to remove statement about US being forced. The box about subsidence should point to Houston/Galveston as well.<br>(Government of USA) | Boxes revised |
| G-3-83 | A | 10 | | | | Delete or modify text boxes in figure so that they reflect current vulnerabilities or management issues (many don't). Title also needs to have the word "example" in it.<br>(Government of USA) | All boxex now reflect current vulnerabilities. It is clear that these are examples only. |
| G-3-84 | A | 11 | 19 | | | WG WG1 | o.k. |

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| | | | | | | (Government of Korea) | |
| G-3-85 | A | 11 | 27 | | 30 | This section may give the impression that the magnitude of uncertainty in simulated changes after the 2020s derived from hydrological models is reduced or not important, this is not the case. Over longer time horizons the amount of uncertainty derived from all sources increases, with uncertainty in simutalted changes derived from emissions scenario and hydrological model likely to be similar in magnitude. eg (Wilby, 2005)<br>(Government of Ireland) | Completely re-drafted and re-shuffled. References to Wilby and co-authors included |
| G-3-86 | A | 11 | 41 | 11 | 42 | Is first sentence correct for all climate parameters? (check against content of WGI).<br>(Government of Australia) | o.k., addressed |
| G-3-87 | A | 11 | 41 | 12 | 4 | is there a recommended approach? Is it possible to conclude which approach yields more robust results?<br>(Government of Canada) | Addressed – re-worded |
| G-3-88 | A | 11 | 51 | | | (e.g. Murphy et al. 2004;…).<br>(Palmer & Räisänen 2002; Murphy et al. 2004).<br>(Government of Korea) | o.k. |
| G-3-89 | A | 12 | 12 | | | (Arnell 2004; Döll et al. 2003) (Döll et al. 2003; Arnell 2004)<br>(Government of Korea) | o.kj. |
| G-3-90 | A | 12 | 30 | 12 | 30 | should the title be "Incorporation"?<br>(Government of Canada) | Accepted |
| G-3-91 | A | 12 | 43 | | 44 | The statement beginning with " This leads…" needs to be referenced<br>(Government of Ireland) | No, page limit! |
| G-3-92 | A | 13 | 14 | 13 | 21 | does IWRM have any relevance for adaptation to climate change - does it help to increase adaptive capacity? The relevance of this statement is not clear<br>(Government of Canada) | Explanation given |
| G-3-93 | A | 13 | 19 | | 21 | Provide support for statement that IRM will be followed all around the world.<br>(Government of USA) | Careful wording now |
| G-3-94 | A | 13 | 36 | 13 | 37 | why is the cost of transport of water expected to decrease?<br>(Government of Canada) | Revised |
| G-3-95 | A | 13 | 36 | | 36 | Cost of desalination may not continue to decline if energy prices continue to increase.<br>(Government of USA) | Revised |
| G-3-96 | A | 14 | 13 | 14 | 15 | There seems to be a mistake here. The report as a whole doesn't support a claim that 550 ppm would result "in increase of temperature since pre-industrial times below the 2 degrees target".<br>(Government of Finland) | Cannot find such wording |
| G-3-97 | A | 14 | 20 | 14 | 21 | the significance of this sentence is not clear - and doesn't seem to relate to the rest | Reworded |

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| | | | | | | of the paragraph<br>(Government of Canada) | |
| G-3-98 | A | 14 | 21 | | | (Alcamo et al. 2003; Alcamo et al. 2000;…).<br>(Seckler et al. 1998; Alcamo et al. 2000; Vörösmarty 2000; Alcamo et al. 2003)<br>(Government of Korea) | Addressed = Done |
| G-3-99 | A | 14 | 23 | | 32 | Clarify the point of this discussion in this paragraph.<br>(Government of USA) | Reworded |
| G-3-100 | A | 14 | 25 | | 25 | ". . . of irrigated land will increase from 1.27 to 1.41." Need a unit. 1.27 what?<br>(Government of USA) | Clarified |
| G-3-101 | A | 14 | 49 | | 50 | (e.g. Hayhoe et al. 2004;…). (e.g. Hayhoe et al. 2004; Kay et al. 2005; Zierl & Bugmann 2005).<br>(Government of Korea) | Addressed = Done |
| G-3-102 | A | 14 | | 17 | | It would be helpful to include a paragraph on the characteristic of catchments which influence changes in surface water. Catchments most at risk from climate change are those dominated by surface runoff. With groundwater dominated catchments, reductions in streamflow during the summer months are not as severe due to the buffering capacity of increased storage from earlier in the year<br>(Government of Ireland) | Page limit!!! |
| G-3-103 | A | 15 | 6 | | | Shabalova et al. 2003; Andreasson et al. 2003 Andreasson et al. 2003; Shabalova et al. 2003<br>(Government of Korea) | Done |
| G-3-104 | A | 15 | 12 | | 13 | (Jha et al. 2004;…). (Jha et al. 2004; Arnell 2005; Wilby 2005; kay et al. 2006).<br>(Government of Korea) | Done |
| G-3-105 | A | 15 | 36 | | 38 | Stewart et al. 2004;…...Hayhoe et al. 2004; Christensen et al. 2004; Dettinger et al. 2004; Hayhoe et al. 2004; Knowles & Cayan 2004; Leung et al. 2004; Payne et al. 2004; Stewart et al. 2004; Vanrheenen et al. 2004;<br>(Government of Korea) | Done |
| G-3-106 | A | 15 | 40 | | 41 | (Andreassan et al. 2004;…). (Bergstrom et al. 2001; Andreassan et al. 2004; Graham 2004)<br>(Government of Korea) | Done |
| G-3-107 | A | 15 | 46 | | 47 | (Barnett et al. 2005;…) (Singh & Kumar 1997; Mark & Seltzer 2003; Barnett et al. 2005).<br>(Government of Korea) | Done |
| G-3-108 | A | 15 | 47 | 15 | 48 | An explanation as to why increased glacier melt is offset by increased precipitation would be useful.<br>(Government of Australia) | Changed wording |

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| G-3-109 | A | 15 | 48 | 15 | 48 | Reference "Schneeberger et al, 2003" is missing in the list of references (Government of Germany) | Reference included |
| G-3-110 | A | 16 | 46 | | 47 | (Boorman 2003; Booij 2005;…) (Burlando & Rosso 2002; Evans & Schreider 2002; Menzel & Burger 2002; Arnell 2003b;2004; Boorman 2003; Booij 2005) (Government of Korea) | Done |
| G-3-111 | A | 17 | 3 | | 4 | Need to specify which Great Lakes – North American or African? (Government of USA) | North American, done |
| G-3-112 | A | 17 | 13 | | | Should this have a reference? (Government of Australia) | Page limit! |
| G-3-113 | A | 17 | 16 | | 17 | (Gerten et al. 2004;…) (Rosenberg et al. 2003; Gerten et al. 2004; Gordon & Famiglietti 2004) (Government of Korea) | Done |
| G-3-114 | A | 17 | 17 | | | brackets missing, 2003, 2003), (Government of Korea) | Done |
| G-3-115 | A | 17 | 20 | | | the year of publication missing, (Betts, submitted) (Government of Korea) | Done |
| G-3-116 | A | 17 | 23 | | 27 | Explain “stomatal conductance”. This is a good example of the challenges that arise when trying to summarize works form a diverse field. However, unless the authors pay attention to their audience, that overall effect is muddy and will have less impact. (Government of USA) | Re-worded |
| G-3-117 | A | 17 | 32 | | 32 | Provide explanation and supporting documentation for this sentence, since is not provided in the rest of the paragraph. If additional documentation is not available, then the sentence should be deleted. Moreover, other parts of the chapter suggest that groundwater will be less available due to sea level rise and groundwater depletion. Hence one might expect that fewer people would be able to use groundwater. (Government of USA) | Substantial re-wording |
| G-3-118 | A | 17 | 49 | | | brackets missing, 2005. 2005). (Government of Korea) | Done |
| G-3-119 | A | 17 | | 18 | | Reference could be made to the role of changes in the variability of precipitation and groundwater. In cases where there are reductions in groundwater recharge, winter precipitation becomes even more critical in refilling stores. The occurrence of a dry winter in conjunction with reductions in autumn recharge would likely lead to severe drought conditions with groundwater drought conditions as experienced in the UK this year becoming more frequent and pronounced. Increased exploitation of groundwater resources in urban areas as well as lower groundwater levels can | Re-worded. Pproposal seeks considerable extension, which cannot be met due to page limit. |

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| | | | | | | also lead to problems with land subsidence.<br>(Government of Ireland) | |
| G-3-120 | A | 18 | 34 | | 34 | Insert, "Although rising water tables in dry areas are usually beneficial…" before "There". Also provide the basis for suggestion that Western USA towns will have problems from such a rise in water tables.<br>(Government of USA) | Inserted. Done |
| G-3-121 | A | 18 | 43 | | 48 | Is there a process explanation for these observations?<br>(Government of USA) | Cannot react – page limit. Re-worded |
| G-3-122 | A | 19 | 34 | 19 | 39 | Please add the information about the standard deviation.<br>(Government of Germany) | Information not available |
| G-3-123 | A | 20 | 16 | 20 | 19 | this paragraph seems to repeat basic information from the previous paragraph<br>(Government of Canada) | Reworded |
| G-3-124 | A | 20 | 46 | 20 | 46 | Please add the information about the percentile of the 100-year drought.<br>(Government of Germany) | Careful reference to the source |
| G-3-125 | A | 20 | 49 | | 50 | Kay et al is published in 2006 not 2005. The paper highlights that flood peaks decrease by the end of the century in parts of the south and east of England despite an increase in rainfall. The sentence in the report suggests that flood peaks throughout Britain are likely to decrease. This is not so. The decreases suggested by Kay et al 2006 are for catchments with large storage potential. By the end of the century winter precipitation is diverted to refilling catchment storage and thus reduces the magnitude of floods by this time. Again highlighting the importance of catchment characteristics in determining catchment response to climate change.<br>(Government of Ireland) | Corrected |
| G-3-126 | A | 21 | 28 | 21 | 28 | Please delete "today´s climate and water use", insert "climate and water use of 1961-1990;<br>(Government of Germany) | Done |
| G-3-127 | A | 21 | 28 | 21 | 28 | 100-years droughts: please add the information about the standard deviation<br>(Government of Germany) | Page limit! Reference given |
| G-3-128 | A | 21 | 31 | 21 | 31 | There is no such reference as Lehner 2005 in the list of references (but Lehner et al. x 2)<br>(Government of Finland) | Corrected |
| G-3-129 | A | 22 | 14 | | 28 | The use of confidence ratings of assertions appears for 3 paragraphs, then stops. Is this intentional?<br>(Government of USA) | Now uniform |
| G-3-130 | A | 22 | 26 | | 28 | (Mimikou et al. 2000;…). (Mimikou et al. 2000; Neff et al. 2000; Bouraoui et al. 2004).<br>(Abler et al. 2002;…) (Fisher 2000; Abler et al. 2002) | Addressed = Done |

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| | | | | | | (Government of Korea) | |
| G-3-131 | A | 22 | 45 | | 46 | … Environment Canada 2004; Borman 2003) … Borman 2003; Environment Canada 2004).<br>(Government of Korea) | Addressed = Done |
| G-3-132 | A | 23 | 1 | | | a blank line unnecessary<br>(Government of Korea) | O.k. |
| G-3-133 | A | 23 | 4 | 23 | 4 | Murray-Darling'.<br>(Government of Australia) | OK, addresed |
| G-3-134 | A | 23 | 14 | | 15 | (Bobba et al. 2000;…) (Han et al. 1999; Bobba et al. 2000; Williams 2001; Ministry for the Environment 2002; Loaiciga 2003; Chen et al. 2004).<br>(Government of Korea) | Ok, addressed |
| G-3-135 | A | 23 | 17 | | 18 | This is a strong statement. An increase in extreme events could cause more disease outbreaks IF more pathogens are carried into source waters and IF treatment systems don't inactivate the pathogens.<br>(Government of USA) | Non excatly, which some research have shown that even with treatment systems there are cases of outbrakes (such as occure in Milwakee with cryptosporium) due to the transport of pathogenes (located in latrines, in fields) to water wells. Please see more details on Chpater 8 and in the references cicted. |
| G-3-136 | A | 23 | 18 | | | … D'Souza et al. 2004; Hijioka et al. 2002). … Hijioka et al. 2002; D'Souza et al. 2004).<br>(Government of Korea) | Ok, addressed |
| G-3-137 | A | 23 | 19 | | 21 | Need to explain the connection between drought, diarrhea, and decreased water quality, and explain the endless cycle.<br>(Government of USA) | This is done on chapter 8 , unfortunatley with have a limited space assigned to the chapter and subsections |
| G-3-138 | A | 23 | 19 | | 20 | (Environment Canada 2004; Patz 2001), (Patz 2001; Environment Canada 2004),<br>(Government of Korea) | Ok, addressed |
| G-3-139 | A | 23 | 23 | | 24 | (Maya et al. 2003;…) (Lipp et al. 2001; Jimenez 2003; Maya et al. 2003; WHO 2004)<br>(Government of Korea) | Ok, addressed |
| G-3-140 | A | 23 | 25 | | 26 | (Pachauri 2004;…) (Magadza 2000; Kashyap 2004; Pachauri 2004)<br>(Government of Korea) | Ok, addressed |
| G-3-141 | A | 23 | 43 | | 44 | Why would the infiltration rate change? Does this imply some change in the porosity and permeability of geologic materials?<br>(Government of USA) | Ok, explained in text |
| G-3-142 | A | 23 | 50 | 24 | 5 | The connection between climate change and people using water sources contaminated with Arsenic or Fluoride is unclear. A fluorosis case in Niger was due | Request in opossition to several made by another reviewer |

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| | | | | | | to a shallow, not a deep well. The poisoning story is dramatic and tragic, but the connection to climate change is not clear.<br>(Government of USA) | |
| G-3-143 | A | 24 | 25 | | 26 | (Environment Canada 2004;…) (Luketina and Bender 2002; Environment Canada 2004; Patrinos and Bamzai 2005),<br>(Government of Korea) | Ok, addressed |
| G-3-144 | A | 24 | 31 | 25 | 51 | The section 3.4.5 "Erosion" is inadequate in its scope in that erosion is always accompanied by sedimentation in some other location. For example in a river course, increased erosion in one location causes enhanced sedimentation somewhere further downstream. Often it is the sedimentation that is more of a problem than the erosion e.g., in reservoirs. Therefore, I would suggest changing the title (and scope) of chapter 3.4.5 into "Erosion and sedimentation", or similar. Furthermore, the chapter is highly complex in nature due to the fact that erosion and sedimentation are often anthropogenic problems that are interlinked with engineering measures and land use in the catchment and the stream itself and therefore, cannot be solved simply as a function of climate change (this is the case with almost all climate related problems, of course, and not exceptional)<br>(Government of Finland) | Ok, addressed |
| G-3-145 | A | 24 | 33 | 24 | 37 | Not just increased rainfall amounts and intensities will probably increase erosion rates but in northern regions also the assumed warmer winters which would bring an increasing amount of winter precipitation as rain instead of snow. As pointed out by Puustinen et al. (in press) the suspended solids and particulate phosphorus concentrations may double in hydrologically disadvantageous (wety autumn followed by mild and rainy winter) years, thus greatly increasing the erosion when compared to "normal years" with more continuous snow cover. This result is based on long-term field experiments in south-west Finland.<br>(Government of Finland) | Ok, addressed |
| G-3-146 | A | 24 | 36 | 24 | 36 | There is not quite clear which "variety of reasons" is meant. Please give examples for "a variety of reasons", e.g. also melting of permafrost in some areas.<br>(Government of Germany) | Wording changed |
| G-3-147 | A | 24 | 50 | 24 | 50 | Authors need to explain what makes the two sites in Germany "exemplary".<br>(Government of Australia) | Deleted bit |
| G-3-148 | A | 25 | 1 | | | the name of the author(s) missing, (2000, 2003)<br>(Government of Korea) | Done |
| G-3-149 | A | 25 | 26 | 25 | 39 | The authors should provide an assessment of which scenarios concerning erosion are more accurate.<br>(Government of Australia) | Accuracy of scenarios is uncertain |

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| G-3-150 | A | 25 | 26 | | 39 | It is possible that warming will result in a decrease in soil organic matter concentration in soils that, in turn will lead to an increase in the erodibility of the soil because a loss of organic matter usually leads to a soil structure that is more susceptible to erosion Huntington, 2003. It will also lead to a decrease in available water holding capacity that in turn will lead to lower net primary productivity and lower biomass that will also favor greater erosion (Huntington, 2003). Huntington, T. G., Available Water Capacity and Soil Organic Matter. 2003, pages 1-5, Chapter In Lal, R. (ed.) Encyclopedia of Soil Science, DOI: 10.1081/E-ESS 120018496, Marcel Dekker, New York. (Government of USA) | O.k., addressed |
| G-3-151 | A | 26 | 1 | | 2 | a blank line unnecessary (Government of Korea) | O.k. Editorial |
| G-3-152 | A | 26 | 13 | 26 | 17 | It would seem better to broaden this statement beyond a single case example of the US. (Government of Australia) | New material will be added. Pavel |
| G-3-153 | A | 27 | 1 | | 2 | (Wichelns et al. 2002;…) (Wichelns et al. 2002; Easter and Renwick 2004; Orr and Colby 2004; Saleth and Dinar 2004; Svendsen 2005) (Government of Korea) | editorial |
| G-3-154 | A | 27 | 26 | | 27 | (Easter et al. 1998;…) (Miller et al. 1997; Easter et al. 1998) (Government of Korea) | editorial |
| G-3-155 | A | 28 | 20 | | 22 | 0 0%, 14 14% (Government of Korea) | editorial |
| G-3-156 | A | 28 | 28 | | | (Downing 2003; Mote 1999) (Mote 1999; Downing 2003) (Government of Korea) | editorial |
| G-3-157 | A | 29 | 13 | | 22 | Para on hydro power. It would be useful to know how much hydro power these countries actually generate in order to interpret the impact of the projected changes in hydropower production potential. That is, if Portugal does not generate much hydropower, a decline in the potential may not be as damaging as if Portugal relied heavily on hydro. (Government of USA) | Will be addressed, % added Petra/Kathleen |
| G-3-158 | A | 29 | 28 | | 32 | The discussion of Millennium Development targets is not directly relevant to the assessment. Chapter should stick to discussing the science and not introduce new, undefined, political concepts. Also, assumption doesn't consider role that increased runoff plays in increasing turbidity, hampering water treatment. (Government of USA) | Reference to MDG deleted at this point. It is addressed later in the chapter. |
| G-3-159 | A | 30 | 4 | | | 8200 8,200 (Government of Korea) | editorial |

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| G-3-160 | A | 31 | 5 | | | (Arnell 2004; Alcamo 2002) (Alcamo 2002; Arnell 2004) (Government of Korea) | editorial |
| G-3-161 | A | 31 | 22 | | | US$ 1/ 1 US$/ , US$ 0.6/ 0.6 US$/ (Government of Korea) | editorial |
| G-3-162 | A | 32 | 1 | | | a blank line unnecessary (Government of Korea) | editorial |
| G-3-163 | A | 32 | 4 | | | (Alcamo et al. 2005;…) (Vörösmarty et al. 2000; Alcamo 2003; Alcamo 2005) (Government of Korea) | editorial |
| G-3-164 | A | 32 | 10 | | | 1000 1,000 (Government of Korea) | editorial |
| G-3-165 | A | 32 | 12 | | | 1092-2761 1,092-2,761 (Government of Korea) | editorial |
| G-3-166 | A | 32 | 13 | | | 1538 1,538 (Government of Korea) | editorial |
| G-3-167 | A | 32 | 23 | 32 | 25 | Table 3.2 contains relevant information but is difficult to interpret, it should be reviewed to make the information more clear. (Government of Australia) | Table will be revised, and additional explanation will be included in the text. |
| G-3-168 | A | 32 | 23 | | | the whole contents (Government of Korea) | Unclear to which part of the text this is referring to. |
| G-3-169 | A | 32 | 24 | | | 1000 1,000 (Government of Korea) | editorial |
| G-3-170 | A | 33 | 3 | 33 | 6 | This paragraph is misleading, as a distinction between climate and socio-economic factors is possible. There is a large number of papers that have attributed increases in losses mostly to socio-economic factors (see references in Pielke et al. 2005 in BAMS 86(10), 1481-1483). However, there is now also some evidence that part of the losses are attributable to climate change. See a report on a recent workshop by Schiermeier 2006 in Nature 441, 674-675. Please add these references. (Government of Netherlands) | Text will be revised and upgraded. Katheen |
| G-3-171 | A | 33 | 9 | 33 | 28 | The work by Hall (2005) and Evans (2004) mentioned here rather give projections for the future, and cannot be referred to in order to provide historic evidence of attribution of flood losses. The paper by Choi (2003) and references that are listed in the paper by Pielke et al. 2005 in BAMS 86(10), 1481-1483 give a better historic evidence base. Please include these references. (Government of Netherlands) | This paragraph is explicitly focused on projections, hot historical evidence. Text will be revised to clarify. Kathleen |
| G-3-172 | A | 33 | 37 | 37 | 25 | Authors need to clearly identify and describe potential adaptation strategies, and the related concepts should be explored clearly and in greater detail. (Government of USA) | More examples will be added. Text has been reorganized and upgraded. Nigel and Pavel. |

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| G-3-173 | A | 35 | 18 | 36 | 19 | To add some adaptation practice examples also for European region would be appropriate (as in 12.5.1)<br>(Government of Czech Republic) | Examples will be added, 2002 flooding. Pavel |
| G-3-174 | A | 35 | 18 | 36 | 20 | Adaptation options in this section could also mention water trade (between regions, industries and from rural to urban) as one of the mechanisms to aid adaptation.<br>(Government of Australia) | Text and references will be added Kathleen |
| G-3-175 | A | 35 | 20 | 36 | 19 | The largest effects on nutrient leaching, especially in northern regions, can be expected if adaptation leads to an expansion of the permanent crop cover and the use of lighter soil tillage methods such as direct sowing, which minimise the field area that is left bare during the winter period. In this way the area that otherwise would be subject to increased surface and subsurface leaching is reduced (Hildén et al. 2005, Puustinen et al. in press).<br>(Government of Finland) | References and a sentence will be added to water quality section 3.4.4 Pavel |
| G-3-176 | A | 35 | 36 | 36 | | It is not clear that this policy suggestion is appropriate in this report. It seems to endorse on-going payments from government for irrigators not to irrigate.<br>(Government of Australia) | This comment is based on a misreading. Market transfers are meant, text will be clarified. Kathleen |
| G-3-177 | A | 37 | 30 | 37 | 37 | This statement is very repetitive. What's the difference between the two conceptual challenges?<br>(Government of USA) | Will be reworded to explain both non-stationarity of the future as well as multiple sources of uncertainty Pavel |
| G-3-178 | A | 38 | 0 | 39 | | Conclusions: Implications for SD - too much focus on the impacts, and not enough on adaptation. Focus this section on Water govenance, and different types of structures available for managing water.<br>(Government of Finland) | This section will be upgraded and edited. Pavel and Kathleen |
| G-3-179 | A | 38 | 3 | | 6 | This sentence seems to imply that Chang et al. found that long-term climate change increased nitrogen loadings by 50%? Or did he simply find that after a wet period the loadings were 50% higher than during a dry period. If the latter, then another clarifying sentence needs to be added to remove the implication that climate change caused the problem; if the former, another sentence is needed to explain this unusual result.<br>(Government of USA) | This reference does not appear at this place in the text. Will search for it and make correction if appropriate. Pavel |
| G-3-180 | A | 38 | 35 | 38 | 36 | It seems difficult to find in the body of the chapter the basis for the conclusion in the first sentence. The chapter seems not to have discussed specific numeric future temperature rises and their impacts. The expression 'additional climate impacts' lacks meaning. A reference point linked to pre-industrial temperature is another case in the report in lack of consistency in the use of historic temperature reference points (pre-industrial, 1990,...).<br>(Government of Australia) | This will be replaced by a clear statement tied to text. Pavel |

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| G-3-181 | A | 38 | 36 | 38 | 37 | It is not clear how well second sentence aligns with Table 3.2 (which itself is hard to understand).<br>(Government of Australia) | Table will be revised and text will be changed to be consistent. ( Parry 2001) will be referenced in both places Pavel |
| G-3-182 | A | 38 | 38 | | 40 | Introducing a political concept that is not defined and demonstrated as relevant to assessment. Also, there are 8 MDG's, not 7 (development of a global partnership for development). The language on MDG's in text and in the table don't make the link between the goals and climate change. The relevance of the MDG's to this discussion is not clear. Suggest deletion of sentence line 38-40, and Table 3.5.<br>(Government of USA) | The text about MDG will be revised and upgraded. Pavel |
| G-3-183 | A | 40 | 29 | | | 1:(Bobba 2000), 2:… (Bobba 2000; Kistemann 2002; Mirza et al. 2003; Barnett 2004, environment; Döll 2005; Lehner 2005)<br>(Government of Korea) | editorial |
| G-3-184 | A | 40 | | | | Wording in Figure 3.7 doesn't reflect uncertainties, especially in the text boxes. Also, the figure needs a title.<br>(Government of USA) | IPCC confidence qualifiers will be added to each box on the map. Petra and Pavel |
| G-3-185 | A | 40 | | | | See Australian Government comment on Fig TS-4 (duplicates Fig 3.7). There seems to be problems with units of runoff (as represented in TS-4, but not restated in Fig 3.7). And the magnitudes of runoff reduction in arid Australia are hard to reconcile with the minimal precipitation.<br>(Government of Australia) | Figures will be checked for consistency. Petra and Pavel |
| G-3-186 | A | 41 | 13 | 41 | 14 | From WG I SOD (figure 10.7.5), 550 ppm is unlikely to result in a global warming less than 2°.<br>(Government of France) | Tex t will be revised to explain better the implications of the 2 degree target to water. Pavel |
| G-3-187 | A | 41 | 13 | | 15 | Language doesn't reflect uncertainties associated with impacts at specific levels of ghg concentrations in atmosphere.<br>(Government of USA) | Will be clarified and expanded, see also G3-186 Pavel |
| G-3-188 | A | 41 | 21 | 42 | 31 | The text in the end section on uncertainties implies to some extent that the freshwater models used are too inaccurate to give any real indication of future changes. I think a sentence here reiterating the impacts we predict with high confidence might help to balance this out a little.<br>(Government of UK) | Will be edited and clarified. Nigel, Taikan and Pavel |
| G-3-189 | A | 41 | 21 | | | In terms of key uncertainties there is no emphasis placed on rainfall-runoff model uncertainty. The use of such models is widespread in climate impact assessment and thus their limitations and the quantification of uncertainty derived from their use needs to be addressed. Wilby 2005 has shown that rainfall-runoff model uncertainty is comparable in magnitude to emission scenario uncertainty. Murphy et al (2006) in the bibligraphy consider the quantification of uncertainty in such | Will be edited and upgraded Nigel, Taikan and Pavel |

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| | | | | | | models for climate impact assessment.<br>(Government of Ireland) | |
| G-3-190 | A | 42 | 4 | | 31 | It is suggested that developments and further research is also required into the assumptions and uncertainty surrounding the impact of climate change on soil hydrological properties. In the majority of climate impact assessments significant assumptions are made in this area. However, it is highly likely that changes in precipitation and temperature will alter the hydrological response of soils and thus the response of the catchment system. Little work has been conducted in this area. (Government of Ireland) | This will be mentioned in relation to water related parameters such as possible change in water holding capacity. Pavel |

## LATE COMMENTS

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| 3-1 | LATE | 0 | | | | This requisite is receiving high priority in every international action to protect this vital resource. This is the reason why, from the early stages of this fourth assessment period, the IPCC was requested to produce a Special Report on Water. Later, on the assumption that Chapter 3 would cover the world water problem in a complete and integrated form, the Special Report was reduced to the status of an IPCC Technical Paper. In addition, IPCC 20 (Paris 2003) approved, among other six, a seventh Cross-Cutting Theme (CCT) on Water. The above mentioned, added to the increasing importance this crucial natural resource, makes very clear the necessity to rise the standard of Chapter 3 to arrive to a fully satisfactory final draft, for approval by the Working Group and adoption by the Panel. | Chapter largely improved |

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| | | | | | | (Government of Argentina) | |
| 3-2 | LATE | 0 | | | | There is improvement with respect to FOD. However, SOD still shows the tendency to refer hydrology and water resources issues, progress, problems and requirements (but only research and management) for a few IPCC regions. This shortcoming is also affected by the lack of cross-references with the different Regional Chapters, as required. This comment brings the opportunity to mention that the title given to figure 3.2 does not cover the issues reported in its present title.. It would better read it as follows:" Some current regional fresh water resources vulnerabilities". In fact the figure shows very little on management issues. Furthermore, this figure should include some comment to bring the reader s attention to the Regional Chapters dealing with these issues. Particularly in what concerns the regional key vulnerabilities in the water resources, hydrology and related sectors.<br>Furthermore, SOD focus more on theoretical than on operational water management issues. Present and future. Important references on the control and management of water resources should be coordinated with the Regional Chapters CLAs. Chapter 3 s authors should remember that this chapter, plus the sectorial and the regional ones will make the foundation of the IPCC Technical Paper on Water and the Panel s approved CCT on Water, involving te three IPCC WGs. Therefore, some of the missing information on actions to be taken by governments and decision making levels, such as the need to improve "water productivity" and enhance "irrigation efficiency", should be referred to.<br>Finally, the reading of this chapter has shown that there are repetitions and a lack of appropriate drafting coordination between the different authors, who, in some cases, have develop statements presenting apparent contradictions with those appearing in other sections of the chapter. Such an action would enable to reduce the extension of the chapter, as necessary.<br>(Government of Argentina) | Chapter improved, as per recommendations |
| 3-3 | LATE | 0 | | | | The SOD shows that there is still room for improvement and, above all, the need to satisfy the basic AR4' requisite for improving the treatment of the integrated water management issue, which had been poorly treated in TAR.<br>(Government of Argentina) | IWRM is mentioned |
| 3-4 | LATE | 0 | | | | The quality of the sectoral chapters (3 to 8) looks quite diverse. However, practically all of them show the same two shortcomings.<br>1.- the lack of strong appeal to decision makers regarding the assumption of their country s responsibility to implement fully their commitments in respect to the performance of geophysical and biological observations and compile the necessary | Addressed |

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| | | | | | | social, economic and related human health information to understand better the implications of climate change in their different trades.<br>2.- The necessity to improve cross referencing among them and with the regional chapters<br>(Government of Argentina) | |
| 3-5 | LATE | 0 | | | | SOD is still giving to much space to the hydrological aspects in some regions, missing some, like the Latin American Region.<br>Further, it shows a poor cross-cutting with some sectoral ones and with the regional chapters.<br>(Government of Argentina) | Difficult to take care of cross-references with regions while keeping page limit |
| 3-6 | LATE | 0 | | | | Latin America references to water resource areas vulnerable to climate change are restricted to glaciers´s reduction, but this issue is not included in page 3 line 48 as it should be. Include after Western Australia, "Pacific basins of Peru".<br>(Government of Argentina) | Addressed in 3.4.3 |
| 3-7 | LATE | 3 | 3 | 3 | 5 | These introductory remarks should be re drafted to provide a more appropriate approach to Chapter 3 objectives. Suggestions are following:<br>a) The fresh water problems (meterological, hydrological, social, economic and else) are basically of a local and sub-regional nature and their causes and effects are influenced by climate change. Therefore, it would clearer to say: Since fresh water issues are particular to local, national and sub-regional scales, relevant information and specific key vulnerabilities to climate change are found in the regional chapters (9 to 16).<br>b) For AR4 one of the specific requirements for chapter 3 is to improve and expand the information available in previous IPCC assessments with regard to water management. In fact, the magnitude of the problem to be faced from now on, calls for the best possible information on integrated water management.<br>Therefore, this introduction to the chapter ´s aim should also mention this very important requirement.<br>c) Finally we should amend the reference to the Chapter 1 incumbencies, in line 4 it should read "water related observed changes and responses, in natural and managed systems"., which is completely different meaning than "water-related observation data". On this very critical problem (lack of observation data) more comments are given below.<br>(Government of Argentina) | Addressed in 3.1 |
| 3-8 | LATE | 3 | 8 | 3 | 8 | Cancel the first mention to vulnerabilities so to read: current and future impacts and vulnerabilities, adaptation and sustainable use of freshwater, as affected by climate change, are summarized below. | Reworded |

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| | | | | | | (Government of Argentina) | |
| 3-9 | LATE | 3 | 9 | 3 | 10 | The statement in these lines would be superfluous.<br>(Government of Argentina) | Revised |
| 3-10 | LATE | 3 | 14 | 3 | 15 | "more than one sixth of the world population live in snowmelt-fed river basins and …", where the number of one sixth should be checked.<br>(Government of China) | Confirmed |
| 3-11 | LATE | 3 | 16 | 3 | 16 | After the dot add: More than a quarter of people worldwide relay on groundwater for drinking.<br>Before closing the following sentence, replace groundwater by coastal aquifers and add estuaries, so to read: salinization of aquifers and estuaries<br>(Government of Argentina) | If we did this, we would need a supporting material. Otherwise we get criticised. |
| 3-12 | LATE | 3 | 21 | 3 | 22 | After the coma, following the word regions, add: generalized glaciers retreat and changes in volume and timing of, etc<br>(Government of Argentina) | Bullet deleted |
| 3-13 | LATE | 3 | 28 | 3 | 28 | Assuming that what follows has the same confidence level, before the confidence level reference add the following: “These changes would affect the aquifers´ recharge and modify the groundwater quality.”<br>(Government of Argentina) | Revised |
| 3-14 | LATE | 4 | 6 | | | "Globally, water demand will grow…", where the "water demand" should be change to "irrigation water demand"<br>(Government of China) | Revised |
| 3-15 | LATE | 4 | 11 | 4 | 11 | Replace " a larger variability in runoff" instead of saying " a greater increases or smaller decreases in runoff<br>(Government of Argentina) | Bullet removed |
| 3-16 | LATE | 5 | 5 | 5 | 5 | It is Millennium Development Goals (MDGs), no Targets.<br>(Government of Argentina) | Addressed = Done |
| 3-17 | LATE | 5 | 17 | 5 | 18 | In the second phrase, starting on line 16, make a change to provide a direct geophysical sense to the man-made actions, so to read: "on surface and sub-surface water cycles, having effects on the local and meso-scale atmospheric circulation and influencing the local and regional climate conditions.<br>The disastrous precipitation events registered in Haiti, in 2004 and in NW Argentina, in the summer of 2006 so demonstrate.<br>(Government of Argentina) | Addressed = Done |
| 3-18 | LATE | 5 | 17 | 5 | 17 | Between “on” and “atmosphere” add "local and regional" and also writte "affecting" instead of "and". Then the phrase should read "effects on local and regional atmospheric circulation, affecting regional climate".<br>(Government of Argentina) | Addressed = Done |

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| 3-19 | LATE | 5 | 46 | 5 | 46 | As already mentioned in the comments to FOD, the figure is missing the consumptive use of natural ecosystems. As in any reference on an author work, the reference of the adjustment shall be mentioned, as done in many previous similar cases.<br>(Government of Argentina) | DA. That is included in land use. |
| 3-20 | LATE | 6 | 29 | 6 | 29 | There is a remarkable lack of reference to critical cases, like that affecting the extensive NE Brazil (4 million km2), the heavily populated and important productive regions in Central Chile and Central Western Argentina, Peru, etc.. A clear reference to the IPCC regions ´s chapters will obviate duplicated information and provide a better link between this chapter and the regional ones would obviate this type of shortcomings<br>(Government of Argentina) | Disagree. Avoid duplication. |
| 3-21 | LATE | 6 | 39 | 6 | 39 | It would be better to read "may also exert", instead of "have also been exerting"<br>(Government of Argentina) | Addressed = Done |
| 3-22 | LATE | 7 | 5 | 7 | 6 | The poor information available to authors regarding the impact of population growth in other countries, like Peru, Central Chile, NE Brazil, and no doubt, other developing regions, emphasizes even more the already mentioned need to cross-refer with the Regional Chapters,<br>(Government of Argentina) | Agree. |
| 3-23 | LATE | 7 | 6 | | | There is a lack of reference to Southeastern Atlantic Basin of Brazil, Central Chile and Central Western Argentina basins. See Regional Chapter 13 page 8 lines 50 to page 9 line 1.<br>(Government of Argentina) | Addressed = Done |
| 3-24 | LATE | 7 | 23 | 7 | 24 | Here again, reference to the Regional Chapters is recommended<br>(Government of Argentina) | Addressed = Done |
| 3-25 | LATE | 7 | 40 | 7 | 42 | The critical issue of natural polluted underground water resources with Arsenic and Fluor, which is also influenced by climate change and the increasing demand for fresh water, should be referred and cross-cut with the Regional Chapters<br>(Government of Argentina) | Addressed = Done |
| 3-26 | LATE | 7 | 40 | | 42 | It must be included a reference to the critical issue of natural polluted underground water resources with Arsenic and Fluor, which is also influenced by climate change and the increasing demand for fresh water. Lack of reference with the Regional Chapter 13 page 11 lines 10 to 12 and 12 to 14.<br>(Government of Argentina) | Addressed = Done |
| 3-27 | LATE | 7 | 49 | 7 | 50 | The last part of the phrase should be improved. It could be read "although it is clear that lower water availability reduces dilution of contaminants, leading to higher pollutant concentration | Addressed = Done |

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| | | | | | | (Government of Argentina) | |
| 3-28 | LATE | 8 | 6 | 8 | 6 | Geographically wise, in addition to mention the impact of sea water intrusion in rivers, reference to estuaries is pertinent. Therefore, the phrase should read" Salinization also affects estuaries and rivers. Again, the cross-reference with the regional chapters would show that millions of urbanites living in the River Plate Estuary, in Argentina and Uruguay are already becoming affected by seawater intrusion.<br>(Government of Argentina) | Addressed = Done |
| 3-29 | LATE | 8 | 10 | 8 | 20 | This paragraph is totally incomplete because it does not refer to the critical situation of more than 200 million people affected by the insidious natural contamination by Arsenic; Fluor and Lead. The failure of the project to open millions of wells in India and Bangladesh, resulting in the water supply of heavily contaminated water, shall be mentioned.<br>Cross reference with Chapter 8 - Human Health is fundamental and the same applies to the Regional Chapters . The Atlas of Water .Clarke R & J. King-Earthscan, 2004) provides factual information on this issue.<br>Further the analyses made in the recent published WHO book on “Climate Change and Health” mention the problems involved in mining natural polluted water.<br>(Government of Argentina) | Addressed = Done |
| 3-30 | LATE | 8 | 22 | 8 | 27 | The information in this paragraph is good,; however, it is quite incomplete. As already mentioned when reviewing FOD, the oceans warming, due to GHG effect is one important factor in the exacerbation of the hydrological processes. The amount of about 13.2 x 1022 Joules of heat energy put into the oceans and seas (Barnett et al, Science, 13 April 2001) has enhanced evaporation and, hence, the incorporation of large amounts of energy in the atmosphere exacerbating extreme events.<br>A study with the sponsorship of the EPA / USA, on the Impact of Climate Change on the Change on the Argentina s Pampas (Hydrometeorological part - CanzianiO, J.C. Gimenez, 2202), provides information.<br>(Government of Argentina) | DISAGREE. That is out of scope of this chapter. |
| 3-31 | LATE | 9 | 3 | 9 | 4 | "In some regions on the global fresh water resources are particularly vulnerable to current climatic variation and prone to cause water-related”. However the water-related issues in the introduced examples, seems, are mainly caused by different kinds of human activities, such as high withdrawal, ground water overexploitation, pollution et al. rather than current climatic variations. Suggest to give the effect of climatic variation on these human activities or to add the relationship between climatic variation and human activities. | Addressed = Done |

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| | | | | | | (Government of China) | |
| 3-32 | LATE | 9 | 20 | 9 | 24 | Regarding the comment on Lake Victoria, being this a chapter involving the effects of climate change and not only those of man-made pollution and eutrophication, the paragraph shall also mention the adverse effect of the water warming on ecosystems. Then, the change of the habitat conditions for some fish species (i.e. tilapia), should be mentioned. Therefore, the phrase should read as follows: "In addition to the adverse warming effects, in the case of Lake Victoria, etc". Logically, cross reference to Chapter 4 is necessary, (Government of Argentina) | **Changed paragraph** |
| 3-33 | LATE | 9 | 26 | 9 | 30 | Here again, information on fluorosis shall refer to the critical situation in other regions - Latina America (Mexico and Argentina) etc. Cross-reference to Regional Chapters is required. (Government of Argentina) | Addressed = Done |
| 3-34 | LATE | 9 | 29 | | 30 | It must be included a reference to Regional Chapter 13 page 11 lines 12 to 14. (Government of Argentina) | Addressed = Done |
| 3-35 | LATE | 10 | 41 | 10 | 41 | Reference to desalinization techniques, which were implemented in many regions years ago and the new developments (case of Singapore) as well as the fog the fog-droplets catching, in some regions (i.e. Peru and Chile, in this last case through - Camanchaca ´s mining, should be mentioned. (Government of Argentina) | DA<br>Examples removed here. Desalination listed in 3.3.2 |
| 3-36 | LATE | 10 | | | | In Figure 3.2, suggest to add Haihe River in North China and inland river basins in arid and semi-arid region in Northwest China(Liu Chunzhen 2003: The Vulnerability of Water Resources in Northwest China. Journal of Glaciology and Geocryology Vol.25 No.3:309-314(in English) and Liu Chunzhen 2005:The primary analysis of hydrological cycle and its ecological function of inland river basins in China. Arid Meteorology. Vol.23 No.3:12-15.(in Chinese). Available at also http://essi.nju.edu.cn/AIACC/website/index.htm as well. (Government of China) | DA. Fig 3.2 shows examples world wide and an example for China should balance with other nations/regions. |
| 3-37 | LATE | 11 | 1 | 11 | 1 | It would be opportune to discriminate between atmospheric and soil humidity. Both are important meteorological variables closely link to the evaporation and infiltration, and also recognized as variables defining flood conditions, particularly in plains / flatlands. (Government of Argentina) | Reworded |
| 3-38 | LATE | 11 | 7 | 11 | 7 | The definition of magnitude in sciences recommends to replace ”increments” in the place of “magnitudes” (Government of Argentina) | O.k. |
| 3-39 | LATE | 11 | 17 | 11 | 17 | Between global and temperature add surface, so to read global surface temperature. | O.k. |

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| | | | | | | (Government of Argentina) | |
| 3-40 | LATE | 11 | 22 | 11 | 22 | Add the qualificative "mean" so to read correctly “Global mean sea level rise” . (Government of Argentina) | O.k. |
| 3-41 | LATE | 11 | 27 | 11 | 27 | In addition to the model uncertainties, it is necessary, as indicated in other parts of this chapter the scale ´s problem, Climate and hydrological models are, at present, worked in unmatched, different scales (i.e basin scale versus sub-continental scale) (Government of Argentina) | Scale problems mentioned in 3.8 |
| 3-42 | LATE | 12 | 41 | 12 | 44 | The two sentences in these lines are not quite representative of the real facts. Changes in inter-annual or daily variability of climate variables are taken into account, very particularly in agrometeorological studies, closely linked to the impacts of the hydrometeorological variables in crop production. However, it has to be agreed that "other geophysical and geological variables (i.e terrain ´s slope, geomorphology and their edaphological structures are poorly considered to foresee floods and droughts and, in particular regarding irrigation requirements. Also, there are few studies on the water use efficiency for different crops. (Government of Argentina) | Revised |
| 3-43 | LATE | 12 | 46 | 13 | 9 | Reading this important paragraph one comes to the conclusion that still there is little information for decision making. It presents a good scientific approach; however, is missing a reference on the value of under- ground water resources to supplement water requirements in rain-fed crops and surface water resources for irrigation. Such a reference, with the necessary clarification that competitive use of both surface and underground water resources may present the limitations that would result when both sources of water have the same origin; as it is the case for streams, lakes, reservoir and underground water resources fed from ice /snowmelt, in the arid, semiarid foothills of mountain regions.(Case of Central Chile and Central Western Argentina) (Government of Argentina) | Reworded |
| 3-44 | LATE | 13 | 24 | 13 | 24 | After "land cover" add "land use practices" (Government of Argentina) | O.k. |
| 3-45 | LATE | 13 | 28 | 13 | 38 | This paragraph is missing the reference to a recent publication by Thayer Sudder, entitled "The Future of Large Dams" Earthscan, 2005. This books analyses the WCD Final Report Dams and Development: A New Framework for Decision Making. The book deals with social, environmental and political costs of large dams, bringing issues of interest to developing countries ´decision makers. (Government of Argentina) | Was already referenced but wronlgy as Scuddler instead of Scudder |
| 3-46 | LATE | 13 | 40 | 13 | 49 | This paragraph brings the need to inform on the recent studies on the problems stemming from the consumption of tap water. The chemical reactions among the | Too specific, and no assumptions for the future mentioned in comment. |

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| | | | | | | different substances used to clean and purify water, to make it more sure are the cause of potential diseases, like bladders ´cancer ( New Scientist, August 2005,page 48 ) Cross reference with Chapter 8 is necessary.<br>(Government of Argentina) | |
| 3-47 | LATE | 14 | 6 | 14 | 6 | It is suggested to insert "would" between system and decrease, to read "in the freshwater system would decrease".<br>(Government of Argentina) | "may" inserted |
| 3-48 | LATE | 14 | 7 | 14 | 8 | The real fact is that food production in many countries has already created hazards deriving from the use, normally excessive, of agrochemical. Therefore, in view of the increasing commercial requirements for food, this use will be incremented. Therefore, in line 8, the phrase should read: "emission, which critically affect water quality in developing countries are very likely to increase"<br>(Government of Argentina) | See comment below |
| 3-49 | LATE | 14 | 8 | | | emissions are very likely to increase in developing countries, affecting critically water quality (add this phrase)<br>(Government of Argentina) | added |
| 3-50 | LATE | 14 | 23 | 14 | 32 | This paragraph reserves a re-drafting. For instance, its first line repeats developing countries with no sense. The rest would require a better reading, particularly for decision-making levels.<br>(Government of Argentina) | reformulated |
| 3-51 | LATE | 14 | 41 | 14 | 41 | What has already been said about the important energy accumulation because of the terrestrial atmosphere greenhouse effects, suggest that the reference to " energy availability" be informative of both the solar and the terrestrial energy availability<br>(Government of Argentina) | Disagree |
| 3-52 | LATE | 14 | 46 | 14 | 46 | It is felt that the authors have missed the recent developments stemming from the AIACC projects and the vulnerability and impact studies requested under the UNFCCC Article 12 (National GHG inventories).<br>They are not gray literature, but many of them are valuable research studies. Again, cross reference with Regional Chapters is opportune<br>(Government of Argentina) | Difficult access. Too many of those. Probably more relevant to regions |
| 3-53 | LATE | 15 | 26 | 15 | 26 | It would be interesting to know what does it mean the phrase between brackets, particularly to understand which could be the significance of statistical evaluations with projected values of a difficult variable to model.<br>(Government of Argentina) | O.k. |
| 3-54 | LATE | 15 | 32 | 15 | 43 | Once again, cross-reference with the Regional Chapters is necessary Changes in the river flow seasonality has also been detected and studied in other IPCC regions<br>(Government of Argentina) | Careful with regional cross-refs. Page limit |

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| 3-55 | LATE | 17 | 30 | | 49 | There must be included in the paragraph a phrase emphasizing the lack of basic information in developing countries and the need to improve their hydrometeorological data base.<br>(Government of Argentina) | Addressed in 3.8 |
| 3-56 | LATE | 17 | 30 | 17 | 49 | Regarding this paragraph there would be a few things to clarify. First, we are already withdrawing water from underground aquifers at a faster rate than it can be replenished; however, the scarcity of measurements of the underground water levels and the lack of isotopic studies to determine the recharge time as well as the effective characterization of aquifers, does not permit the appropriate underground water management. It is now the opportunity to promote such type of measurements, including that of underground water quality, so to obviate the brutal failure of underground water projects, as it has happened in India and Bangladesh. Therefore, it is not merely the lack of research, in many areas, particularly in developing regions, it is the lack of basic information. In this regard, the two first sentences need redrafting to bring to the attention of decision makers the need to improve the hydrometeorological data base.<br>Under lines37 and 38, it is necessary to add, between brackets,: edaphological conditions . Finally, it should be noted that there is repetition of same statements, as shown in page 18.<br>(Government of Argentina) | Page limit! |
| 3-57 | LATE | 17 | 30 | 18 | 38 | In addition to the comment above, on repetitions, the polishing of this paragraph should include some comments on underground water management, in spite of the fact that they could be expanded later.<br>It is crucial that decision making begin to understand that underground water sources are also finite and that good management, including the analyses of underground water quality, is a must.. A cross-reference with Chapter 13, regarding the joint management of the Guaraní aquifer, between Argentina, Brazil, Paraguay and Uruguay, could be useful. A reference on aquifers´ with ice/snowmelt feeding would be important due account taken of glaciers retreat, the increasing snowfalls in some regions and the fact that it is uncertain the time horizon for their disappearance.<br>(Government of Argentina) | Improved. Careful with cross-refs |
| 3-58 | LATE | 19 | 1 | 19 | 1 | The brackets are missing two geophysical variables of importance: the local geomorphology and the edaphology of its soils.<br>(Government of Argentina) | Revised |
| 3-59 | LATE | 19 | 45 | 19 | 45 | Since the curves shown in the already mentioned paper by Barnett T, D, W.Pierce and R. Schnur, (Science, April 2001), show little latitudinal difference in the | Reworded. We do not refer to the past here. |

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| | | | | | | amount of heat accumulated in the oceans, it would be better to cancel the information between comas. Instead of saying " especially in low latitudes" include some reference on the remarkable energy amount accumulated in the world oceans, in the last 50 years<br>(Government of Argentina) | |
| 3-60 | LATE | 20 | 4 | 20 | 19 | As shown in Chapter 13, the study of extreme events in the Pampas mentions the increasing intense storms, both in intensity and frequency, though the annual mean precipitation shows, in average, small increases, below the order of 10 %.<br>Therefore, cross-reference is suggested.<br>(Government of Argentina) | We are very careful with regional cross-references, for the sake of page limit |
| 3-61 | LATE | 22 | 12 | 24 | 28 | These pages and lines refer to Water Quality, a very important issue due account taken of the critical issue the humanity is already facing, i.e. more people less water. A first comment is the tendency to repeat statements (i.e line 24 to 28 and lines 44 onwards, on page 22)<br>Now, regarding the modification of water treatment plants, mentioned In line 41, page 22, an important reference should be added. It is the one resulting from the current potabilization techniques. The problem is not only bacteria. The use of different chemical substances for water "purification", leave in the water the traces of "desincfection by-products (DBPs). Over 500 DBPs have been identified. The epidemiological studies have found links between long-term consumption of water with high levels of DBPs and the risk of aggressive forms of cancer, such as the bladder carcinoma. DBPs have also been linked to spontaneous abortions and birth defects. ( New Scientist, 3 December 2005, page 48). This issue shall be interlinked with Chapter 8.<br>(Government of Argentina) | Revised |
| 3-62 | LATE | 24 | 1 | 24 | 1 | The recent publication of the already mentioned Atlas of Water (Earthscan, UK, 2004) and the valuable information it contains on the many aspects of the water resources, including a good reference on the natural polluted underground water by Arsenic, Fluoride, Lead, etc, suggest the convenience to include it between the same brackets that the UN 2003 report). Further, the whole paragraph would be enriched with the latest references on insiduous underground water pollution, for instance that of. New Scientist, August 2003,article "Arsenic ´s fatal legacy grows, and the one on the State of World Water 2001 World Water 2001, published by the World Water Forum of Journalists, with the sponsorship of the Ministry of Environment and Forest, of Bangladesh and the UNDP Bangladesh, and the UNDP, Dhaka, 2001. In view of the social and economic importance of this issue - Arsenic pollution affects more than 200 million people over all the world, including the | Reworded. Page limit! |

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| | | | | | | USA (with about 13 million people affected), this issue should be cross referred in Regional Chapters and with Chapter 8, as already mentioned. (Government of Argentina) | |
| 3-63 | LATE | 24 | 17 | | | Replace "lack of information" by a explicitly mention of lack of basic hydrometeorological data (Government of Argentina) | Addressed in 3.8 |
| 3-64 | LATE | 24 | 17 | 24 | 17 | In this paragraph, the reference on "lack of information" must explicitely mention the flagrant lack of basic hydrometeorological data (Government of Argentina) | Addressed in 3.8 |
| 3-65 | LATE | 26 | 5 | 26 | 9 | This paragraph should also mention the relative benefits arising from climate change, i.e. changes in precipitation distribution may bring into food production some rain-fed areas which have had negative water balances. As an example, the flooding of 8 million hectares in the depressed Pampas, was so to say, compensated with the expansion of the agricultural frontier to the semiarid-arid lands of the west of the Province of Buenos Aires. Also new food producing activities, like fish cropping by means of aquaculture, were developed. Again, cross-reference, in this case with Chapter 13, is recommended. (Government of Argentina) | Too much detail for introductory wording of 3.5. Examples of benefits of climate change for water related sectors are mentioned later in 3.5. Will be cross-referenced with Chapter 13. |
| 3-66 | LATE | 26 | 19 | 26 | 34 | This paragraph does not cover the hydrological conditions in large flatlands. Reference to Regional Chapters, in particular Chapter 13 cover this shortcoming. (Government of Argentina) | This is a general paragraph, does not refer to any specific hydrological conditions. |
| 3-67 | LATE | 26 | 21 | 26 | 22 | The phrase referring to water infrastructure, use patterns, etc, is incorrect for a report aiming at a worldwide value. In many developing countries, and even in some developed ones, it is incorrect to say that infrastructure, use patterns and institutions have evolved to fit current conditions. The main goal of this chapter is to bring information to decision making to assume the urgent need for integrated water management procedures that , as far as the reality show, are far to be fully implemented in many parts of the world. (Government of Argentina) | This paragraph is edited to accommodate the comment; liaise with Ch 13<br><br>Kathleen |
| 3-68 | LATE | 26 | 26 | | 34 | Include a cross reference with Chapter 13: The flooding of 8 million hectares in the depressed Pampas in Argentina, was so to say, compensated with the expansion of the agricultural frontier to the semiarid-arid lands. Also new food producing activities, like fish cropping by means of aquaculture, were developed in flooded areas. (Government of Argentina) | Will be liaised with Chapter 13<br><br>Kathleen |
| 3-69 | LATE | 26 | 37 | 33 | 34 | Reference is made to the full sub-paragraph 3.5.1 "How will climate change affect the balance of water demand and water availability". | The effects of climate change on water use efficiency and related water productivity are |

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| | | | | | | Although there are comments for some segments of this sub-paragraph, it is clear that it misses the concept of water productivity and water use efficiency, key elements for the best possible management of such a scarce basic resource. In fact, the first challenge is to raise the efficiency of irrigation, very particularly since agriculture accounts for 70 % of the world water use.<br>Further, decision makers should start to understand that flooding cropping yards does not improve yields. The need to speak about water productivity is important, particularly when we realize that surface water irrigation efficiency ranges between 25 and 40 % in India, México, Pakistan and Phillipines while goes between 50 and 60 % in Israel and Japan. As known, the irrigation efficiency depends not only from the mode and condition of irrigation systems but also from the mean water balance conditions - temperatures, humidity and soil types- and would call, as already done in certain countries, on the more water economy way to satisfy the plants water requirements, in their different stages of development. Information on this management conditions is, for the many reasons we know, badly necessary in developing regions for decision making.(Ref. Boosting water productivity, by Postel S. and A.Vickers,WorldWatch State of the World 2004; FAO: Crops and Drops, Drops, 2002; Unlocking the Water Potential of Agriculture, FAO 2003; Water Use, Gleic P., The World ´s Water200-2001, Island Press 2000.<br>(Government of Argentina) | addressed later in this section. |
| 3-70 | LATE | 26 | 45 | 26 | 45 | Replace "would", instead of " or will "<br>(Government of Argentina) | OK |
| 3-71 | LATE | 27 | 34 | 27 | 34 | Add, at the end of the sentence: "as well as by the effectiveness of the irrigation methods".<br>(Government of Argentina) | OK |
| 3-72 | LATE | 28 | 14 | 28 | 14 | Insert "management" between future and changes, so to read: future management changes.<br>(Government of Argentina) | OK |
| 3-73 | LATE | 28 | 23 | 28 | 23 | Replace "would be" by "is"<br>(Government of Argentina) | OK |
| 3-74 | LATE | 28 | 26 | 28 | 27 | To remark the differences between the sentence above and this one, add “however” before the increase. In line 27 replace “would” instead of “will”<br>(Government of Argentina) | OK |
| 3-75 | LATE | 28 | 34 | 39 | 10 | This section shall include a reference on the potential effects of acidic depositions, including the acidification arising from the increasing CO2 concentration in the atmosphere. Increasing wildfires and provoked fires exacerbate this CO2 content<br>(Government of Argentina) | Cannot see the relevance of this comment |

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| 3-76 | LATE | 29 | 14 | 29 | 15 | It is not only hydropower generation and transport, but also commercial and sport fishing activities, having a large social and economic importance in many countries. (Government of Argentina) | Will be edited/rephrased Kathleen |
| 3-77 | LATE | 31 | 16 | 31 | 19 | Suggest add the vulnerable inland river basins in semi-arid and arid basins in China (The vulnerability of climate change impact on the Western China is available at http://essi.nju.edu.cn/AIACC/website/index.htm) (Government of China) | We will insert material as appropriate. Kathleen |
| 3-78 | LATE | 32 | 30 | 32 | 31 | Assuming that the comment made above, on the need to speak about "water productivity"", is developed in TOD, it would be opportune to add, between brackets the term "water productivity" (Government of Argentina) | Will include term water productivity. Pavel |
| 3-79 | LATE | 33 | 1 | 33 | 7 | Following the idea that AR4 and very particularly this Chapter 3 shall bring decision levels to assume their basic and fundamental responsibility to provide for improving data and information, it is suggested to amend the text. The idea is to say, after droughts", the following: "in many areas the scarcity of concurrent geophysical data and socio-economic information does not permit to distinguish, etc; instead of saying "it is not possible to distinguish". (Government of Argentina) | This paragraph will moved to 3.2 and edited accordingly because it relates to past trends and not to future projections. Petra |
| 3-80 | LATE | 35 | 18 | 36 | 19 | There is no doubt that the effectiveness of adaptation options is founded in the availability of basic information – geophysical, social, economic, environmental and even cultural – as well as on the community habits and behavior. Since AR4, as it has been pointed out when the Panel decided to have its Fourth Assessment,, shall be a tool for sustainable development, emphasis should be put also in the recipients ´ responsibility, either governments or private institutions, to assume their roles, as suppliers of basic data.<br>In the case of hydrometeological events, the need for observations and monitoring is a local/regional responsibility. The same is applicable to the first and simplest adaptation effort, that is the implementation of the required hydrometeorological watching and alert systems, and the emission of early warnings to safeguard the communities and their goods. Although in line 17, on page 36, some reference is made, the importance of such an adaptation action, particularly when climate projections show the exacerbation of extreme events (both in intensity and frequency) calls for some stronger presentation. Decision makers must know that saving life and goods justify efforts to improve the associated hydrometeorological facilities and services.<br>(Government of Argentina) | Good point, will include. |
| 3-81 | LATE | 35 | 34 | 35 | 34 | Within the thematic of providing fresh water for human consumption, and even for | Table 3.4 will be expanded. |

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| | | | | | | some irrigation purposes, there are many experiences accumulated along centuries in arid lands. Seawater distillation using solar radiation energy was and is still applied. Also capturing fog droplets in some regions, like in the west coast of South America, in particular in Peru and Chile, solves the human needs and some agriculture ´s water requirements.<br>Another solution, which, in the long term, is not energy consuming, is the transfer of water between basins. In pre-Colombian times, the indigenous populations transferred water from the Pacific to the Atlantic basin. Nowadays, engineering development enables the transference of fresh water from the Lake Marcopomacocha on the Atlantic Basin, to the City of Lima water supply system, on the Pacific Basin.<br>Information on the pre-Colombian, indigenous development in the area of water resources is available in the book " Macchu Picchu: A Civil Engineering Marvel, by Wright K and A. Valencia, ASCE Press, 2000. Therefore, in the Table 3.4, it will be opportune to add reference on water basin transference between basins, on te Supply side, logically, reporting also the pre-Inca civilizations experience in this field. The above mentioned book also includes information on the development of water reservoirs, elementary water filtration techniques and irrigation channels design, in the High Andes, in Peru. The case study in Chapter 13 refers these matters.<br>(Government of Argentina) | |
| 3-82 | LATE | 37 | 26 | 37 | 37 | Since increasing population is bringing greater stress, affecting water supply, it is clear that appropriate water management actions are necessary and urgent. Therefore, it is suggested that the phrase be reshaped saying, for instance, " In addition to the recognized urgency to implement water management practices, it shall be noted that climate change is already adding two major conceptual challenges to water management practices. First, etc.<br>Regarding line 32, it may be convenient to say " the future is foreseen as highly uncertain"<br>(Government of Argentina) | Section has been rephrased. |
| 3-83 | LATE | 39 | 20 | 39 | 20 | Add "health" after "energy".<br>(Government of Argentina) | Will do. Pavel |
| 3-84 | LATE | 41 | 21 | 42 | 30 | The following are the comments devoted to point 3.8 "Key Uncertainties and Research Priorities".<br>First of all, although the lack of basic information has been mentioned more than once, in these SOD ´s comments as it was mentioned when reviewing FOD, reading this chapter and knowing the real problems on the lack of basic information, it | This comment will be accomodated in the revised text where appropriate. Pavel |

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| | | | | | | looks like if science can be made without data. As known, data limitations – geophysical, biological, social, economic, etc - are the most negative factors to proceed with adaptation and any sustainable development action. Since IPCC is an intergovernmental body and the climate change is a global issue, it looks rather strange to observe the authors reluctance to put in black and white and clearly state this critical shortcoming. A very recent article, in Science, Vol 312, 23 June 2006 puts the emphasis in the lack of data to check model ´s results regarding the Andean glaciers ´rapid retreat. This is, no doubt a critical issue for all the countries along the Andes which water needs are still solved by snow/ice melt.<br>Regarding some other comment, in line 26, of page 41, information on other geophysical variables of importance in water management, particularly in extreme event situations, call for a reliable information on the geomorphological and edaphic characteristics of any type of environment.. In this respect, it is understood that management and adaptation should include the consideration of the hydrographic nature of different basins – arrheic, endorrheic or else – water infiltration, aquifer recharge, runoff and other environmental variables.<br>Regarding line 28, it would be quite opportune to mention the critical lack of underground water data. This shortcoming explains the failure of important international projects through which millions of wells were drilled in Asia with the disastrous consequences of the human use of naturally poisoned water (AR, F).<br>Furthermore, since the fresh water pH defines the viability of ecosystems´ development, the issue of acid precipitation and deposition, and, nowadays, the necessity to assess the acidification of surface waters due to tye increasing concentration of carbon dioxide in the atmosphere, already acidifying sea water, should be considered. Observations and research are needed in this area of water resources.<br>Finally, the introduction of the “water productivity” concept, as it was done, during the “green revolution” with the so called “food productivity”, call for the attention of water managers, for improving water use efficiency.<br>(Government of Argentina) | |