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

Government and Expert Review of Second Order Draft

Specific Comments

EXPERT REVIEW COMMENTS

Chapter 18

August 2006

Organization of the review comments file

Comments are organized as follows:

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

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

Discussion of expert review comments and record keeping

IT IS RECOMMENDED THAT:

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

Substantive comments

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

Non-substantive comments

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

General

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

Chapter 18:

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

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
18.Z1	GENERAL This isn't really an assessment in the IPCC meaning of the word. Much of the text and conclusions are unsupported by reference to the literature in the current knowledge base. See, for example, Section 18.3 – almost no references in 5 pages. The text is too much like a statement of the authors' own views. Frankly, in its current state, this needs more attention than any of the other chapters: It needs a lot of reading and assessment of a wider recent literature by the authors (also see 11. below). The fundamental question is not clearly addressed and is not answered. This is: "What is the current extent of our knowledge about the relative roles that adaptation and mitigation might play in meeting the challenge of climate change?" By 'relative' is meant the trade-offs, synergies, mixes etc. and their status for different places, sectors/systems, scales, times and stakeholders.	Still true that large expanses of text have no supporting references. An example is page 28, with just 3 references of which 2 are to the Chapter 18 CLAs, and the third is to a CLA of Chapter 17. However, there are now good sections on trade-offs and synergies, mixes etc.	We've done the best we can.
18.Z2	CONTENT The current draft does not cover much of what Plenary requested in the outline (and was developed at the Marrakech and Potsdam meetings: see reports from these in the Green Book, LA1)	See comment 18.Z3	Okay.
18.Z3	Weak or absent topics include: • Costs and benefits, damages avoided • Mixes of strategies, trade-offs and synergies • Uncertainties • Gaps in knowledge and research • Scale issues (e.g. is mitigation always global and adaptation always local?) • Timing issues (e.g. on adaptation buying time for mitigation and vice versa) • Different roles and objectives of different stakeholders.	These are all covered. It's not easy to find them, and much of this is because the authors haven't followed the PAO. It would work much better if they did, at least through a system of sub-headings to draw out these topics.	Okay.
18.Z4	Where is reference to literature which explores relative damages avoided (and costs) in specific cases by adaptation versus mitigation and combinations of these. Table 18.1 is key in this respect, since at the moment it is	Table 18.1 has been removed. There is little mention of specific cases.	See Section 18.5 and supporting material.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
	the main source of concrete information. However, the references are an eclectic selection, and there is no evidence of a systematic hunt through the literature. Some references are peripheral to adaptation and mitigation in climate change, e.g., urban food growing. It must be made clear how these inform the climate change debate. Not all papers are post-TAR. It would have been better organized by topic, with references used in support. Finally, how does Table 18 help in analysing the relationship between adaptation and mitigation?		
18.Z5	Case studies and hard data are needed to support the conclusions	No case studies. Some hard data, but surely there is more in the literature.	Okay.
18.Z6	The chapter overlaps significantly in the later sections on development and sustainability with Chapter 20. Sustainability is not an issue identified in the Ch 18 outline, but is the focus of Ch 20. Where sustainability becomes crucial to an assessment of A-M, its inclusion should be brief and linked to Ch 20.	There is still a considerable amount on sustainability scattered through the middle sections. Depending on exact content of Chapter 20, this could probably be shortened.	JR: Some of the sustainability discussion in 18.3 could be moved to chapter 20, if desired.
18.Z7	The section on international agreements should be omitted or totally rewritten to clearly demonstrate its relevance to the chapter. This was the recommendation of the between-chapter session at LA1 Vienna. There is interest in discussing the Montreal Protocol as a special case, since the objectives of the Protocol will work against Article 2 of UNFCCC.	Now removed	Okay.
18.Z8	Once the additional material has been assessed, careful prioritising will be needed, in order to stay within page limits.	Within page limits	Okay.
18.Z9	The Executive Summary makes some clear points but how are they an advance on TAR (are they reinforcing TAR conclusions, or are they new)? More importantly, there is no evidence that these are conclusions based on a substantive assessment of the new literature.	ES is OK.	Okay.
	SPECIFICS		
18.Z10	The schematics add little and could be combined into one summary figure.	Still true that heavy on schematics. Fig 18.3 and Table 18.1 should be combined.	Done.
18.Z11	No footnotes, please.	None in SOD	Okay.
18.Z12	Regarding the lack of assessment of the literature (which is the crux of our comments), we suggest that you assess: a) the literature which includes both adaptation and mitigation (we agree that this is limited); b) the literature on damages avoided (and at what cost) by adaptation;	Doubtful whether this is a reasonably comprehensive assessment of the literature. The reference list (8 pages) must be the shortest in the WG2 AR4.	JR: hard to avoid short reference list, given lack of literature

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
	c) the literature on damages avoided (and at what cost) by mitigation; d) then compare your assessment under b) and c) and add them to a). Much of this literature is at the local level (e.g. World Bank project assessments and NAPAs) and may not lend itself to any regional level or global assessment, largely because this is such a new and complicated topic.		
18.Z13	However, to take a global topic and one which is not so new: consider the trade-offs between near-term beneficial effects of higher CO_2 especially in higher latitude agriculture vs damages from higher temperatures elsewhere (and especially beyond the near-term), which underlie the point of inflexion between net global gains and net losses in the Tol, Nordhaus, etc. calculations of global net effect of climate change; and you could do the same, where the literature exists, for specific regions and different sectors.	Not done at the global scale. Done for some sectors, notably agriculture and forestry, and the trade-offs are discussed , and comparisons made between developed and developing countries, and wet and dry climates. That's about the limit of it. Again, all would be much clearer if you used sub-headings more.	This text has been changed substantially in response to these and other concerns.
18.Z14	We suggest you broaden the author base by identifying CAs and their contributions.	Just 4 CAs in SOD	Seven contributing authors now.
	Chapter 18 FOD comments by Co-Chairs and TSU	**Has this been addressed in the SOD?**	**Author response**
18.F1	**Comments 18.F1 – 18.F20: Martin Parry** General This chapter needs to (but does not yet) assess literature on damages avoided (i.e. benefits) by differing amounts of mitigation (eg stabilisation). This is the only place in AR4 where such material is located. It is requested in the plenary-approved outline where the bullet point is: "Consideration of costs and damages avoided and/or benefits gained".	There is text on "Consideration of costs and damages avoided and/or benefits gained".	Okay.
18.F2	There is literature on impacts under some stabilisation scenarios (eg 550 and 750 model experiments); and there are also SRES scenarios (the latter enable inference of impacts under some mitigation scenarios because A1B broadly = 750 ppm stabn parthway, B1 =550, and B2=650 (see Swart, Mitchell, Morita, Raper Global Envtl Change 12 (3) 2002); and there is the range of assessments for impacts at different T increments (see Warren paper in Exeter 2005 mtg book).	There are few references to stabilization, but by no means comprehensive. No attempt to develop systematic tables. Warren paper is referred to but dismissed as qualitative and 'not very reliable'	This text has been changed substantially.
18.F3	Such an assessment would a) enable support of your assumption (that adaptation is inevitably required) by	Authors do go through these steps but in a way that is not properly founded in the	Disagree.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
	indicating what impacts would occur under moderate/large/very large amounts of mitigation. Again, there is lierature on this; b) then enable you to make some comparisons with benefits achieved by adaptation (the latter being covered in Ch17). Then c) you would have an evidence-based assessment of the current knowledge about the differing benefits achievable under adaptation vs. mitigation. At present this chapter only asesses the literature about the **theory ** of the inter-relationships between A and M; it does not evaluate the literature on benefits where this exists(see for example OECD benefits project 2003; Social Costs of Carbon report 2005, etc) Also missing are other sections identified in the plenary-approved outline: "Timing issues: timing of outcome, including rates of change; time discounting". This was intended by Plenary to lead to some discussion of what is currently known about the different outcomes (especially benefits) achieved by earlier vs later actions on mitigation and adaptation. In the end you need to contribute to the wider questIon, put too crudely but it still needs to be answered: Would it be cheaper to adapt than to mitigate? Or in what mix A and M? And would this need to vary over time? I see Chapter 17 as addressing adaptation costs and damages avoided, whilst Chapter 18 examines damages avoided by mitigation and makes the comparison between the two. Chapters 17 and 18 need to liaise on this.	literature – it is more like text on their own opinions. This is still true It comes across strongly in the text that it doesn't really matter, because the costs of both are very small compared to baseline costs. For example, costs of implementing renewable energy are small compared to costs of generating electricity for a whole country, so what does it matter whether its more expensive than adaptation. This is a depressing point of view, and largely ignores social costs.	Added more empirical and modelling information. This text has been changed substantially.
18.F4	There are very few CAs, reinforcing the impression that this chapter is not an extensive review of what is currently known, but a reflection of the views of the small team of authors.	Still true – just 4 CAs	Seven.
18.F5	There is little connection with WG3 assessment. The virtual dialogue www set up at La Reunion at your request was supposed to facilitate dialogue with WG3; but it was barely used and consequenly been closed down. This draft does not address head on the issues identified by Plenary, which we wanted to take further by labelling as a cross-cutting theme and by devoting a chapter to it.	There are many references to material in WG3 now.	Okay.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
18.F6	Below are comments from M. Parry ON ZERO-ORDER DRAFT in January 2005, [with additional notes in square brackets indicating response to these made in FOD] GENERAL 1. This isn't really an assessment in the IPCC meaning of the word. Much of the text and conclusions are unsupported by reference to the literature in the current knowledge base. See, for example, Section 18.3 - almost no references in 5 pages. The text is too much like a statement of the authors' own views. Frankly, in its current state, this needs more attention than any of the other chapters: It needs a lot of reading and assessment of a wider recent literature by the authors (also see 11. below). The fundamental question is not clearly addressed and is not answered. This is: "What is the current extent of our knowledge about the relative roles that adaptation and mitigation might play in meeting the challenge of climate change?" By 'relative' is meant the trade-offs, synergies, mixes etc. and their status for different places, sectors/systems, scales, times and stakeholders. [This fundamental Q is still not addressed]	There are now sections on synergies and trade-offs, but still with the message under 18.F3	Okay.
18.F7	The current draft does not cover much of what Plenary requested in the outline (and was developed at the Marrakech and Potsdam meetings: see reports from these in the Green Book, LA1) [and still does not cover these]. The main omission, which it is crucial to make good, is a thorough assessment of the literature on damages avoided under different amounts of mitigation. There are now assessments using GCM stabilisation scenarios. there is also the range of SRES impact asessments.	Still true. Much of required material is there but hidden – authors need to use sub-section headings to highlight the required PAO material	Done.
18.F8	Weak or absent topics include: " Costs and benefits, damages avoided; " Mixes of strategies, trade-offs and synergies; " Uncertainties; " Gaps in knowledge and research; " Scale issues (e.g. is mitigation always global and adaptation always local?); " Timing issues (e.g. on adaptation buying time for mitigation and vice versa); " Different roles and objectives of different stakeholders [these topics are not adequately covered: especially : "Costs, benefits and damages avoided"; and "timing issues"]	Covered; may not be adequate given that largely theoretical with few examples, lack of systematic approach	Okay.
18.F9	Where is reference to literature which explores relative damages avoided (and costs) in specific cases by	About 20% literature is pre-TAR. Table 18.1 has gone. Benefits are assessed,	Okay.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
	adaptation versus mitigation and combinations of these. Table 18.1 is key in this respect, since at the moment it is the main source of concrete information. However, the references are an eclectic selection, and there is no evidence of a systematic hunt through the literature. Some references are peripheral to adaptation and mitigation in climate change, e.g., urban food growing. It must be made clear how these inform the climate change debate. Not all papers are post-TAR. It would have been better organized by topic, with references used in support. Finally, how does Table 18 help in analysing the relationship between adaptation and mitigation? [literature on 'benefits' is still not assessed]	but in a very theoretical approach.	
18.F10	Case studies and hard data are needed to support the conclusions [better on FOD]	Still weak – some examples have been removed (Table 18.1 has gone)	Okay.
18.F11	The chapter overlaps significantly in the later sections on development and sustainability with Chapter 20. Sustainability is not an issue identified in the Ch 18 outline, but is the focus of Ch 20. Where sustainability becomes crucial to an assessment of A-M, its inclusion should be brief and linked to Ch 20 [has not been moved to ch 20]	See comment 18.Z6	Done.
18.F12	The section on international agreements should be omitted or totally rewritten to clearly demonstrate its relevance to the chapter. This was the recommendation of the between-chapter session at LA1 Vienna. There is interest in discussing the Montreal Protocol as a special case, since the objectives of the Protocol will work against Article 2 of UNFCCC [OK in FOD]		Done.
18.F13	Once the additional material has been assessed, careful prioritising will be needed, in order to stay within page limits.	Within page limits	Okay.
18.F14	The Executive Summary makes some clear points but how are they an advance on TAR (are they reinforcing TAR conclusions, or are they new)? More importantly, there is no evidence that these are conclusions based on a substantive assessment of the new literature.	Not clear in ES how they relate to TAR	Done.
18.F15	SPECIFICS 9. The schematics add little and could be combined into one summary figure No footnotes, please.	See comments 18.Z10 and 18.Z11	

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
18.F16	Regarding the lack of assessment of the literature (which is the crux of our comments), we suggest that you assess: a) the literature which includes both adaptation and mitigation (we agree that this is limited); b) the literature on damages avoided (and at what cost) by adaptation; c) the literature on damages avoided (and at what cost) by mitigation; d) then compare your assessment under b) and c) and add them to a). [Not done in FOD]	See comment 18.Z12	
18.F17	Much of this literature is at the local level (e.g. World Bank project assessments and NAPAs) and may not lend itself to any regional level or global assessment, largely because this is such a new and complicated topic. However, to take a global topic and one which is not so new: consider the trade-offs between near-term beneficial effects of higher CO2 especially in higher latitude agriculture vs damages from higher temperatures elsewhere (and especially beyond the near-term), which underlie the point of inflexion between net global gains and net losses in the Tol, Nordhaus, etc. calculations of global net effect of climate change; and you could do the same, where the literature exists, for specific regions and different sectors. [not done in FOD]	See comment 18.Z13	
18.F18	We suggest you broaden the author base by identifying CAs and their contributions. [only 2 CAs, the least of all chapters]	Now 4 CAs	
	Chapter 18 SOD comments by Co-Chairs and TSU		**Author response**
18.S1	**LENGTH:**	There are 32 pages of text and the target is 31, so within the margin of error the chapter is on target.	Okay.
18.S2	**ARE PAO HEADINGS PRESENT?**	No, the authors look to have gone their own way.	Done.
18.S3	**HAVE MOST GENERAL COMMENTS OF ERs FROM ZOD AND FOD BEEN COVERED?**	No	Done.
18.S4	**ARE REFERENCES BROADLY COMPLETE?**	Doubtful that this is a broadly complete coverage – hopefully the Expert Reviewers can help us with this.	They have indeed.
18.S5	**IS THERE LINE-OF-SIGHT TEXT ➔ ES AND TEXT+ES ➔ TS+SPM?**	Text to ES is all right. Hard to say with SPM and TS – Not much has been carried forward from Ch 18 to the draft SPM and	Okay.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
		TS largely because its content does not lend itself well to these.	
18.S6	Large sections of the text have no or few references, which isn't appropriate in an assessment report. Where this happens, the authors should consider replacing the text with short tables, and at least one source for the material in the table, and this would work well, for example, on page 6 (a page which currently has no references).		More references now.
18.S7	Section 18.2 on TAR findings is far too long (over 2 pages) with some long quotes. It could be halved in length.		Done.
18.S8	Extremely slow to get going. Up to the end of page 11, the chapter is looking back to the TAR and setting out the links to other chapters in the AR4. This is too discursive.		Changed structure to be less slow.
18.S9	This is an academic treatise which will not greatly inform policymakers, who would find it largely impenetrable and, where they could understand it, irrelevant to their needs. Specifically, more is needed on knowledge of damages avoided/not avoided by mitigating actions: On 1.04.06 Martin Parry wrote to authors with this request: "In [draft] the text [that you sent me] you make some general statements about damages avoided under 850 and 450ppm. Can you please expand this to do 2 things: a) create a longer-than-present paragraph describing more example impacts covering the range of ppm, eg, 450, 550, 650, 750 and 850, drawing on the FUND study, the Millions at Risk study , the new ecosystem study cited in the refs, etc ; and b) see if you can construct a small table with these example damages levels cited against the differing ppm levels. We believe that, if this is possible, then it may be useful to include this in the SPM and Technical Summary, since it would be so obviously relevant to policymakers. Of course, gaps of knowledge in the table may also be useful to report. We suggest, again, that you try to do this.		Thank you. Done.
18.S10	The chapter is: • weak at the beginning in Sections 18.1-18.3: section on the TAR is far too long, there are too few references, target appears to be other academics rather than decision-makers. • better in the middle Sections 18.4 and 18.5–but still needing more attention. • Not an assessment in Section 18.6. It explicitly states that 18.6 considers the policy and institutional implications of the assessment in the preceding sections – do we want this? If so, with some improvements it could be OK.		Structure has been changed.
18.S11	**In summary, the authors need to**: • Make the changes we have suggested above: specifically: a) undertake a proper assessment of current knowledge of the relative damages avoided by mitigation and by adaptation {there is far more on each of these two areas that should be assessed and then compared}; b) consider what inferences can drawn from a), regarding the mix of ad and mit that might be appropriate in various circumstances. The additions made since the FOD on this item are short, and far from complete. There is no reference to the literature on SRES that give some indications of impacts under different levels of forcing and different adaptive capacities. And c) cross-refer to the (quite extensive) material in WG3 chapters. • Make the chapter useful to the policymaker, by being clear about your conclusions and by make the		Done.

	Chapter 18 ZOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
	text less academic and opaque • Make sure that all areas of the text are adequately populated with references. This chapter should be an assessment of current published knowledge. • Follow the PAO in their headings. • Cut down number of pre-TAR references. • Make sure chapter gets going sooner by halving text in Section 18.2. • In Executive Summary, provide references back to sources in main text, in the form [18.x] • Help the reader by providing more sub-headings, for example on page 28 a sub-heading on Mainstreaming is required.		

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-18-1	A	0	0	0	0	The chapter has an inconsistent picture of whether there is or is not a tradeoff between adaptation and mitigation. The summary page 3 line 7 has a very well written explanation of how the notion of an optimal mix of mitigation and adaptation is problematic, and page 6 box explains very well how the related actors and budgets are different. However, page 8 line 11 then talks about "balancing mitigation and adaptation options" and section 18.4.1 blatantly contradicts earlier discussions by stating as a fact that "adaptation and mitigation are substitutes" when they are in fact complementary, and that "adaptation and mitigation compete for finite resources" when it has been explained earlier that different budgets are involved. Page 16 suggests a need for the derivation of an "optimal policy" and quotes results of individual studies, without reflecting on the vast array of assumptions that go into determining the results of such studies, i.e. the fact that rarely are such studies accompanied by an appropriate level of uncertainty analysis; the studies rarely reflect the wide array of literature in the field of climate change damages and impacts. Page 23 lines 49-51 and page 24 line 6-7 also talks about a mitigation-adaptation tradeoff. Thus overall the chapter begins with a well balanced picture of how adaptation and mitigation interact, but later sections (particularly 18.4) contradict this. Thus section 18.4 needs to be re-written to reflect the statements in the chapter summary about the difficulties inherent in cost benefit analysis, the reasons why adaptation and mitigation are complementary, and why it is not necessarily the case that implementing more of one implies implementing less of the other because different budgets and actors are involved. Although page 16 line 14 does touch on one aspect of this, this is not enough. (Rachel Warren, School of Environmental Sciences)	We have attempted to be more consistent and explained where the inconsistency is a reflection of the literature. JR; I agree that we send inconsistent messages.
E-18-2	A	0	0			on structure of the chapter - I would suggest: i) moving (and shortening) 18.2 to the introduction section - this material is better placed right up front; ii) adding a sub-section in introduction to provide an overview of the concepts and definitions to be used in the chapter (e.g. different types of interactions between adaptation and mitigation, ad capacity and mit capacity, should be introduced briefly up front); iii) move the subsection on cimate policy institutions to section 18.3 and place it within a broader discussion of institutional changes that facilitate or guide economic development and governance; iv) the new sub-section 2 should remain 18.3 on response capacity and development; v) to be followed by 18.5 on examples of inter-relationships; vi) potential costs and damages avoided; vi) 18.6 elements for effective implementation. (Jan Corfee-Morlot, University College London & OECD)	The structure of the chapter has been changed.
E-18-3	A	0	0			General comments: 1) congratulations on a much improved chapter; 2) two sections	These two sections have been rewritten quite

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						remain very problementatic and need a significant rewrite or dropping i) the new section 18.4 on costs and damages avoided and ii) 18.6 on implementation. Given the late stage of production of AR4 it would be useful at this point to give thought to the added value of these sections given other material of a similar nature either elsewhere in WGII or in WGIII. For example, there are now small section on IA literature, costs and avoided damages of adaptation and mitigation in Ch 17, also in Ch 19 and 20, of WGII, also in Ch 3 of WGIII. On elements for effective implementation these are also clearly covered in ch17 and 20 (on adaptation) and on mitigation, WGIII ch 12 (on SD & mitigation). (Jan Corfee-Morlot, University College London & OECD)	substantially in response to these and other comments.
E-18-4	A	0				The chapter is a considerable improvement in the FOD. The organisation is good and the writing clear, with some important points. (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Thank you.
E-18-5	A	0				The chapter clearly show evidence of scholarship, discipline and solid research. Chapter 18, as FOD, clearly shows more maturity (P. H. Liotta, Pell Center for International Relations and Public Policy)	Thank you.
E-18-6	A	0				Overall Comment: A vast improvement over earlier drafts here. While some tightening still remains to be done (particularly in latter sections), overall focus and theme are consistent. I note that the current discipline literature addresses three related factors: adaptation, resilience and vulnerability. To distinguish between adaptation and vulnerability is useful—and correct—in this chapter. But not to address the relationship of resilience to either adaptation or mitigation seems a central weakness of this chapter. (,)	Thank you. Resilience is not a concept that was suggested in the plenary-approved outline.
E-18-7	A	0				Greatly improved from FOD and many concerns addressed in my FOD review now addressed. (Tom Kram, Netherlands Environemntal Assessment Agency)	Thank you.
E-18-8	A	0				General comment: the other area of concern is around the treatment of adaptive capacity. It is NOT in my view synonymous with adaptation capacity. Adaptive capacity is a term that finds its origin not in climate change but in complex policy systems management. In other words, its meaning outside of formal climate change circles is significantly broader than the definitional space being suggested under the IPCC and my concern is that we are needlessly confusing things to the broader research community through the current definition of adaptive capacity being suggested in this chapter. I will make relevant suggestions in the later comments. I am quite happy with the term response capacity to cover off both adaptation and mitigation, but further differentiation should distinguish between	See detailed comments on the relevant section below. JR: Happy to change to 'adaptation capacity' but this would need ot be made ocnsistent across all chapter and WGs.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						adaptation capacity or mitigation capacity, not adaptive capacity, due to the potential for confusion in the mainstream literature (see Adaptive Capacity by Carl Sussman for mainstream definition - "Sussman defines adaptive capacity as: the skill to take the initiative in making adjustments for improved performance, relevance and impact. Fundamentally, it is the ability to respond to and instigate change." Clearly, such a definition would also cover climate change mitigation activities. Response capacity is a way of beginning to address this not insignificant semantic issue. (John Drexhage, International Institute for Sustainable Development)	
E-18-9	A	0				General comment: the one area that is still problematic is the underappreciation of mitigation - adaptation linkages on land use and water policy/programs. The benefits, particularly for development, but also in terms of reduced (absorbed) ghg emissions and increasing resilience for natural resouce systems to climate change are real and significant, particularly in the case of rural areas for most developing countries. (John Drexhage, International Institute for Sustainable Development)	Accept. This has been reflected more strongly in Section 18.5, but the literature on this point is quite limited.
E-18-10	A	0				General comment: authors should be congratulated for a much improved iteration over the first draft. In particular, the ES tells a good story and for the most part highlights the appropriate conclusions found in the chapter. I would also suggest that there is excellent material on linkages with sustainable development and some thought should be given towards perhaps using some/much of that text for Chapter 20 which explicitly addresses SD and adaptation. In fact, the way in which SD is addressed in this chapter, including its linkages with adaptation, is, frankly superior to the text found in Chapter 20. Discussion between CLAs of both chapters on strengthening Chapter 20's SD component would be highly advisable. (John Drexhage, International Institute for Sustainable Development)	Thank you. JR: thanks
E-18-11	A	0				Finally, I should note that Chapter 18 appears to have taken a step back in terms of coherency in certain sections of this draft, particularly in the earlier part of the chapter. Perhaps in an attempt to respond to suggestions for the inclusion of additional material, the 'storyline' has been lost and overarching conclusions do not emerge as clearly. This is a systemic problem with the IPCC process, and is also evident in Chapter 17, whereby the focus on describing research mitigates against the process of synthesis and identification of overarching conclusions in the main text. In any event, as I suspect that Chapter 18 will evolve, a watching brief needs to be kept on the overlap with Chapter 17. I would suggest that attempts are made to make sections 18.2 and 18.3 more concise and to the point. The first section, in particular, suffers from the writing style, which tends to describe the findings of the	The structure has been changed, hopefully increasing coherence.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						TAR one by one rather than putting the synthesis of these findings to the fore. Having said all that, both these chapters are progressing well and the authors should be congratulated on assembling an impressive array of material. (Mick Kelly, University of East Anglia)	
E-18-12	A	0				Figure 18.3 is nit a useful diagram either, too complicated and diffuse; further Table 18.1 must be distinguished enough not to seem redundant. (P. H. Liotta, Pell Center for International Relations and Public Policy)	Diagrams have all been reconsidered.
E-18-13	A	0				Figure 18.2 This is not a useful diagram, particularly since the notion to "act, then learn, act then learn again" is the mantra of U.S. Undersecreatry of State for Global Affairs and Democracy Paula Dobriansky, who is the official adminsitration representative on climate issues.To follow a "act, learn, act again" cycle may be increasing impractical--and increasingly less adaptable. As complexity increases, the learning adaptation cycle must decrease as well—simply to remain at the same level of knowledge. As Tainter reminds us in *The COllapse of Complex Societies*, complexity is not a fall from heaven into primordial chaos; rather, it is a stabilizing event that occurs when complex societies can no longer sustain themselves. Collapse, in other words, is a return to a more normal human condition. The "act, learn, act then learn again" cycle is insufficient to keep pace. (P. H. Liotta, Pell Center for International Relations and Public Policy)	Has been deleted.
E-18-14	A	0				Biodiversity seems a little undervalued in this chapter. The recent CBD paper on Climate Change Adaptation and Biodiversity might be work consideration by the authors in their assessment of adaptation and mitigation for biodiversity. (Lara Hansen, WWF)	Not relevant to mitigation.
E-18-15	A	0				Although this chapter is a large improvement over the previous draft, the narrative could still be stronger regarding the fact that Mitigation (M) and Adaptation (A) do not trade-off at ANY levels because of incomensurate temporal and spatial scales of impacts . The thrust of this chapter could still be much simplified; At a program and project level M projects can have A co-benefits/disbenefits and conversely A projects can have M co-benefits/disbenefits. Maximizing A/M synergy is a function of "Response Capacity". (Henry David Venema, International Institute for Sustainable Development)	Agree and done.
E-18-16	A	1	1	29	1	There seems to be a general problem that this chapter overlaps with section 3.5 of Wg3 which discusses the benefits from mitigation in terms of avoided damages also. The material either needs to be deleted from this chapter or it needs to summarise briefly statements made in WG3 section 3.5 and cross reference it. (Rachel Warren, School of Environmental Sciences)	We have worked with authors of WG-III to ensure consistency.
E-18-	A	1	10	1	10	F. Denton is from The Gambia and not Senegal	Accept.

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17						(Youba Sokona, Sahara and Sahel Observatory (OSS))	
E-18-18	A	1		34		Following are the references noted in our comments and don't seem to be in the report. Most of them are available at http://members.cox.net/igoklany/ : Goklany, IM. 1995. Strategies to Enhance Adaptability: Technological Change, Economic Growth and Free Trade. Climatic Change 30: 427-449. Goklany, IM. 1998. Saving Habitat and Conserving Biodiversity on a Crowded Planet. BioScience 48 (1998): 941-953 Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. Goklany, IM. 2000b. Applying the Precautionary Principle to Global Warming. Center for the Study of American Business, Washington University, St. Louis, Mo., USA. Policy Study 158. November 2000. Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. Goklany, IM. 2005c. Is a Richer-but-warmer World Better than Poorer-but-cooler Worlds? 25th Annual North American Conference of the US Association for Energy Economics/International Association of Energy Economics, September 21-23, 2005. Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. (Indur Goklany, US Department of the Interior)	We have considered them and incorporated them if and where appropriate.
E-18-19	A	2	1			Similar comment as #1 above: use of IPCC language on confidence levels is questionable at best. (Tom Kram, Netherlands Environemntal Assessment Agency)	Double-checked and changed where necessary.

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E-18-20	A	2	3	2	13	Illustrates the previous point: no one can challenge the general statement labelled [very high confidence], but does not necessarily apply to the next sentence that is much more controversial. (Tom Kram, Netherlands Environemntal Assessment Agency)	Double-checked and changed where necessary.
E-18-21	A	2	3		13	Your first major take-home message seems rather weak to me, and you actually are much stronger in the underlying text. What needs to come much more clearly across in the bold statement is that adaptation and mitigation not just "can help reduce", but are "complementary necessities" - A is unavoidable because of the climate change we're already committed to, and significant mitigation action is needed if climate change is to be slowed and constrained to a level where adaptation is actually possible and/or afordable. Also, don't beat about the bush: it's not just that A is only possible with very high cost - some adaptation is impossible, if CC gets out of hand. Some natural ecosystems cannot adapt, and that is very well documented in the literature. Even some managed ecosystems may not be managed - it's just not feasible. You should start this executive Summary MUCH MORE strongly! (Susanne Moser, National Center for Atmospheric Research)	This paragraph has been deleted and partially rephrased elsewhere. JR; agree
E-18-22	A	2	3		13	This conclusion is in contrast to the chapter, which argues that adaptation and mitigation are substitutes; choices need to be made. Furthermore, there are studies that show that mitigation increases the risks of climate change; this is should be pointed out, and "high confidence" is more appropriate than "very high confidence". (Richard Tol, Hamburg University)	This paragraph has been deleted and partially rephrased elsewhere.
E-18-23	A	2	4	2	5	The statement that climatic benefits mitigation would be hardly noticeable until 2040 is not correct. Such a statement depends on the emission scenario assumed , aerosol emissions assumed in the reference case etc. As a consequence it is not possible to make such a broad statement or indeed be more precise than to say something like until from "may not be significant until the 2020s". (William Hare, Potsdam Institute for Climate Impact Research (PIK))	This paragraph has been deleted and partially rephrased elsewhere. Reference to 2040 has been altered.
E-18-24	A	2	5	2	5	Need to note that mitigation does carry immediate local benefits in the form of ancilliary benefits, particularly improved air quality. (John Drexhage, International Institute for Sustainable Development)	This paragraph has been deleted and partially rephrased elsewhere.
E-18-25	A	2	5			There are two sources of inertia that have to be accounted for in providing estimates of how rapidly mitigation programs may bear fruit. First, as the SPM notes, is the inertia of the climate system. Second is the inertia of the economic system – something we note WG I has no expertise in. It will take about 50 years to renew the existing energy system. The estimate of “40 years” does not seem to	This paragraph has been deleted and partially rephrased elsewhere.

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						consider this source of inertia. Accordingly, we believe the "2040" should be replaced by "50 years hence". (Indur Goklany, US Department of the Interior)	
E-18-26	A	2	6	2	7	Replace "The benefits … immediate, …" with the following: "**Although** the benefits of adaptation are **frequently** local to regional in scale, **some adaptation measures (e.g., trade and coordinated roll back of subsidies for overuse of energy, land and other natural resource) can provide global benefits. Moreover, by contrast to mitigation, benefits of adaptation** can be immediate, …" [New language is shown in **bold**; deletions not shown]. For extended rationale,see Goklany (2006a). (Indur Goklany, US Department of the Interior)	We feel that this level of detail is not justified in the Executive Summary.
E-18-27	A	2	10	2	11	The statement is too broad and should say only "some further climate change". If one looks at the range of mitigation scenarios in the literature there are scenarios that would avoid significant changes by the 2020s compared to the reference case. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Changed to "further impacts of climate change"
E-18-28	A	2	11	2	13	i.e. mitigation and adaptation DO involve some trade off in terms of long run costs. (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Yes.
E-18-29	A	2	11	2	13	I wonder why you are opposing mitigation and adaptation. Both are necessary and depending in the context focus should made on one or other. (Youba Sokona, Sahara and Sahel Observatory (OSS))	We are not opposing the two. "Complementarity" has now been defined in Section 1
E-18-30	A	2	13	2	13	"Very high….costs" is too ambiguous. Suggest reframing it in the context of Article 2 of the UNFCCC, so that it reads "to a magnitude of climate change that would be unable to avoid dangerous interference with the global climate system", regardless of the adaptation investment. (John Drexhage, International Institute for Sustainable Development)	Disagree.
E-18-31	A	2	13			after "costs" insert "and with limited effectiveness" (Danny Harvey, Dept of Geography, University of Toronto)	This is implied.
E-18-32	A	2	20	2	23	Statement is a bit too simplistic - urban planning and nature conservation, for example, also clearly entail mitigation aspects, and the sectors identified under mitigation all carry adpatation characteristics as well. Suggest the sentence be deleted. (John Drexhage, International Institute for Sustainable Development)	Statement has been deleted.
E-18-33	A	2	20	2	23	mitigation also involves the construction sector i.e.buildings can be up to 50% of energy demand (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Statement has been deleted.
E-18-34	A	2	20		23	Should mention that adaptation is also much more context specific than is mitigation. Might also mention the energy sector as regards adaptation as it	Statement has been deleted.

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						concerns hydropower as well as shifts in electricity (and other fuel) demand from increased cooling needs and/or heating. (Jan Corfee-Morlot, University College London & OECD)	
E-18-35	A	2	22	2	22	It would be good to mention also "forestry" as an example of the sectoral interests (Martin Welp, University of Applied Sciences Eberswalde)	Statement has been deleted.
E-18-36	A	2	25	2	32	Not untrue, but as IPCC aims to serve information needs of national governments as well and many of those struggle with their role in adaptation, at least a bit more aon that subject is warranted. As it stands now, it seems as if adaptation were best left to individual decision makers without any role for national public policies. (Tom Kram, Netherlands Environemntal Assessment Agency)	"National policies" has been added.
E-18-37	A	2	25		32	What is meant by the word "levels" - do you mean (geographic) scales of governance? (Jan Corfee-Morlot, University College London & OECD)	Yes, and the corresponding change in responsibility.
E-18-38	A	2	28	2	29	The statement "The benefits of mitigation are global…" is too simplistic and not true under all circumstances. The statement is only valid if, because of global warming, everyone is a loser at all times. But we know this is true only if warming is excessive. At low-to-moderate global temperature increases, there will be winners and losers. See Goklany (2006a). This should be corrected. (Indur Goklany, US Department of the Interior)	We have included the word "climate" before "benefits" to avoid confusion.
E-18-39	A	2	29	2	30	The phrase "Both costs and benefits of adaptation accrue locally" is incorrect. There are many instances of adaptation costs and benefits accruing on regional and global scales, of which three examples follow. Research on heat-/drought-tolerant crop varieties is funded and implemented on a global scale through CGIAR. An increase in electricity use due to more air conditioning in hot summers will have regional costs through increased electricity prices throughout the grid area. Benefits of coastal protection that avoid displacement of population include lower migratory pressure on industrialized countries. (Axel Michaelowa, Hamburg Institute of International Economics)	Accept. Added "and nationally".
E-18-40	A	2	29	2	30	Modify "Both the costs and benefits to adaptation accrue locally" to read as follows: "**Although in most cases, both the costs and benefits to adaptation accrue locally, to the extent that adaptations can provide global benefits by reducing pressures on global biodiversity, reducing hunger or diseases such as malaria, and advancing sustainable development, they can provide global benefits.**" [New language is shown in **bold**; deletions not shown.] See Goklany (2006a) for more detailed rationale. (Indur Goklany, US Department of the Interior)	We feel that this level of detail is not justified in the Executive Summary.
E-18-	A	2	29	2	30	Are all adaptation benefits only local? What about adaptation options that might	Accept. Added "and nationally".

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41						prevent the large scale mobilization of human populations? (William Hare, Potsdam Institute for Climate Impact Research (PIK))	
E-18-42	A	2	29		32	Your definition of "local" better include (as your text later one discusses more adequately" "national and subnational" levels, because it is simply wrong that most adaptation will just happen locally. Much local adaptation will not be able to happen without higher-level support, initiative, facilitation, guidance, or financing. It just will not. (Susanne Moser, National Center for Atmospheric Research)	Accept. Added “and nationally”.
E-18-43	A	2	30	2	32	Sentence should be modified to reflect that mitigation can also happen due to private action (voluntary activities such as offsetting air travel emissions or other private activities are happening in many industrialised countries, see Ch. 13 of WG III). While currently adaptation may be dominated by private action, this could change in the future due to the risk that private investment in adaptation may be below the social optimum and thus government investment is done to ensure reaching of the social optimum. (Axel Michaelowa, Hamburg Institute of International Economics)	Done.
E-18-44	A	2	30	2	32	You should probably qualify the statement about mitigation being driven by national / international policy and agreements. There are an increasing number of examples of mitigation being driven from the "bottom" up - regional or local context (Jan Corfee-Morlot, University College London & OECD)	Done.
E-18-45	A	2	31	2	32	To the extent that sustainable development actions (which would increase adaptive capacity) are driven by international agreements and fora (e.g. the 2002 Summit), such actions would be advanced by such agreements. (Indur Goklany, US Department of the Interior)	True, but the statement refers to *most* adaptation. Such international agreements and fora are rather a unique case.
E-18-46	A	2	31	2	31	Adapation is at present driven by local actions but in the future could be also be driven by international priorities (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Agree. JR: many of the preceding (and following) comments are in line with my comments on thie executive summary text. I think it needs to be revised.
E-18-47	A	2	32		32	unclear what "public arrangements" of impacted communities are. (Susanne Moser, National Center for Atmospheric Research)	Disagree.
E-18-48	A	2	38	2	39	Replace "afforestation" by "reforestation, avoided deforestation and afforestation". In general most of the statements in the chapter concerning "afforestation" would be as well, if not better applied to "reforestation" and "avoided deforestation" . Section 18.4.4 contains a very good discussion of these three sequestration	Example has been deleted.

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						methods. This is not carried through into the general statements about "afforestation". Could change "afforestation" to "reforestation" of "forestry measures" and explain somewhere that this means all three. (Rachel Warren, School of Environmental Sciences)	
E-18-49	A	2	38	2	39	P. 16 r. 11 Optimal policy mix. Coming back to your example on P. 2 r. 38 and 39, and P. 3 r. 7-20. Highest ancillary benefits from mitigation for developing countries are not health benefits from reduced outdoor air pollution but afforestation and similar practices with forestry. Despite all problems mentioned, linking adaptation and mitigation in such a way would reduce SCC and overall costs. Some other references other case studies on this issue?. Also p. 19 r. 23-33. (Juan Llanes-Reguerio, University of Havana)	Too much detail, not relevant here.
E-18-50	A	2	41	2	42	How is rural electrification based on renewables synergistic between adaptation and mitigation? Rather it appears to be synergistic between mitigation and sustainable development. (Jean Palutikof, Met Office)	Example has been deleted.
E-18-51	A	2	43	2	47	Another example of conflict between language and confidence label: limited confidence in the word "may" to me suggest one must be pretty shure such inter-relationships are insignificant. Not sure where this is based on. (Tom Kram, Netherlands Environemntal Assessment Agency)	Statement has been rephrased.
E-18-52	A	2	46			at the end of the lead sentence I would suggest adding "across different scales of governance" (Jan Corfee-Morlot, University College London & OECD)	Statement has been rephrased.
E-18-53	A	2	49	2	50	"synergies provide no guarantee that resources are used in the most efficient manner" - this is spurious, there is never ANY guarantee that resources are used in a "most efficient" manner, and certainly impossible in this case as it assumes that (intractable) spatial and temporal incomensurability can be overcome to formulate the M+A optimization problem. In fairness the following sentence, beginning with "Moreover" is valid. (Henry David Venema, International Institute for Sustainable Development)	Disagree. This is an important statement.
E-18-54	A	2	50	3	1	Not at all where the evidence for overlooking essential actions comes from. A speculative statement which adds little (Jim Skea, University of Sussex)	Disagree.
E-18-55	A	2	50	3	1	Delete sentence as it is not substantiated by the literature. Synergies will always be one of many decision criteria, not the overriding one. (Axel Michaelowa, Hamburg Institute of International Economics)	Disagree. This is reported in Klein et al. (2005)
E-18-56	A	2		3		Synergies between climate policies and non-climate considerations, such as poverty alleviation, sustainable development, and urban pollution control (sustainable	These synergies are not the topic of this chapter.

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						development is discussed among others on pages 12-13 and 26-27) are of such high relevance that these should be mentioned also in the executive summary. (Martin Welp, University of Applied Sciences Eberswalde)	
E-18-57	A	3	1	3	3	Rural energy provision should be included in this list - a massive unmelt development challenge heavily stressed by the World Summit on Sustainable Development and the COP-8 Delhi Declaration. (Henry David Venema, International Institute for Sustainable Development)	Not clear what the adaptation benefits are.
E-18-58	A	3	2			Give examples of sectors where opportunities are limited. (Jean Palutikof, Met Office)	Done.
E-18-59	A	3	3	3	5	Sentence would be easier to understand if "the need for" (line 4) would be deleted. (Axel Michaelowa, Hamburg Institute of International Economics)	Disagree. Sentence is clear.
E-18-60	A	3	3	3	5	Replace the last sentence with: "**Some recent literature provides a** conceptual **framework** and **some** empirical information that explicitly considers both adaptation and mitigation, **but more work is needed in these areas to better assess** potential synergies in climate policy." [New language is shown in **bold**; deletions not shown.] See Goklany (2006a) for one conceptual framework which would integrate adaptation, mitigation and sustainable development actions. See also Goklany (2005a). (Indur Goklany, US Department of the Interior)	Disagree. The suggested paper would not have helped to assess the need for and potential of synergies in climate policy, as suggested in the sentence. No change.
E-18-61	A	3	7	3	20	P. 16 r. 11 Optimal policy mix. Coming back to your example on P. 2 r. 38 and 39, and P. 3 r. 7-20. Highest ancillary benefits from mitigation for developing countries are not health benefits from reduced outdoor air pollution but afforestation and similar practices with forestry. Despite all problems mentioned, linking adaptation and mitigation in such a way would reduce SCC and overall costs. Some other references other case studies on this issue?. Also p. 19 r. 23-33. (Juan Llanes-Reguerio, University of Havana)	Not relevant here.
E-18-62	A	3	7		20	This paragraph presumes a lot - it presumes that we are all operating in an optimising economic framework -- yet tradeoffs can be monetized or not and decisions may or may not be made in such a framework. Evidence to date indicates that climate policy and other environmental decisions are more likely to be made outside of this framework than within it (see Sagoff, Ostrom and Dietz on these points). However I do agree that analysis within such a framework can be extremely insightful to decision-makers as one input among others. This material should be presented in a decision-neutral way (i.e. not assuming that it will the basis for decisions rather that it will provide input to decisions). I suggest rewriting to address these points i.e. to replace "decisions on tradeoff" in first sentence with "understanding the specific economic tradeoffs" ; also line 16 replace	This statement has been rephrased with these comments in mind.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						"implementation of tradeoffs" with "design and implementation of decisions based on economic tradeoffs" (Jan Corfee-Morlot, University College London & OECD)	
E-18-63	A	3	16	3	20	Very good and important statement - there is no global optimal solution (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Thank you.
E-18-64	A	3	16	3	20	Change phrase into: "It is challenging to identify an optimal mix of adaptation and mitigation due to the well-known problems of quantifying welfare impacts on stakeholders living at different points in time and having widely differing political influence." Budgets for action are always limited in an economy and thus the assumption of no budget constraint underlying the wording should be deleted. (Axel Michaelowa, Hamburg Institute of International Economics)	Disagree. See previous reviewer. The point about limited budgets is made in the chapter.
E-18-65	A	3	17	3	20	A. Replace “is problematic” on line 17 with “may be difficult to implement…”. B. Eliminate “assumes that there is a zero sum budget for adaptation and mitigation and it would be possible to capture” with “requires reconciliation of” Rationale, the framework in Goklany (2006a) does not assume a zero sum game, it assumes that some actions would have greater benefit-cost ratio than others, and should therefore be implemented ahead ofthese others. C. Add at the end of this sentence the following: “Although this is a difficulty inherent to the analyses of all mitigation options as well.” (Indur Goklany, US Department of the Interior)	A. Done B. Disagree C. This is not relevant in the context of this chapter.
E-18-66	A	3	22	3	32	Also very good point. (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Thank you.
E-18-67	A	3	28	3	32	Excellent concluding statement to the ES. This concept also needs to be noted and developed in Chapter 20. (John Drexhage, International Institute for Sustainable Development)	Thank you.
E-18-68	A	3	30	3	33	We need more information on the determinants of "Response Capacity" to justify the introduction of this concept so prominently in this document. (Henry David Venema, International Institute for Sustainable Development)	More substance is provided in Section 18.6
E-18-69	A	4	0			good introduction (Henry David Venema, International Institute for Sustainable Development)	Thank you.
E-18-70	A	4	1	5	19	The introduction is long and not very well targeted to the central themes of the chapter. I suggest reworking per outline for structural changes above. (Jan Corfee-Morlot, University College London & OECD)	It has been somewhat restructured and clarified.
E-18-71	A	4	3	4	14	The price of CO2 credits should only be determined by market mechanisms under flexible trading schemes. Governments should not determine the price of CO2 for taxing purposes. (James Bero, BASF)	Not relevant here.

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E-18-72	A	4	3	4	14	In North America, since 1997 the Industrial sector has steadily reduced its GHC emissions, and is the only sector showing decline in GHG emissions. Source: Department of Energy, Energy Information Administration (http://www.eia.doe.gov/) (James Bero, BASF)	Not relevant here.
E-18-73	A	4	3		14	I doubt that this is the best way to open the chapter. Whether or not the Convention exists, climate change is still underway and adaptation and mitigation would still be the two main ways to address it (beyond doing nothing). I suggest reworking the introduction to be more general and then to move quickly to the focus of the chapter which is on interactions between adaptation and mitigation. (Jan Corfee-Morlot, University College London & OECD)	We disagree.
E-18-74	A	4	8	4	8	The 5.2% is only relevant with Australian and US ratification. And I understood it was a global reduction not a country average. Suggest simply putting a full stop to the sentence after "emissions" and deleting the rest of the sentence. (John Drexhage, International Institute for Sustainable Development)	We deleted the percentage.
E-18-75	A	4	16	4	18	We don't believe that the sentence "Chapter 17 … effective adaptation" is true at all times under all circumstances, and have provided comments to that effect on Chapter 17. We suggest substituting "constraints" for "limits", and that adaptation options may be limited if temperature increases are high enough (whatever that means). (Indur Goklany, US Department of the Interior)	We have checked this with Chapter 17 and ensured consistency between the two chapters.
E-18-76	A	4	16	4	16	Suggest changing sentence to: "Adaptation, therefore, is unavoidable". (John Drexhage, International Institute for Sustainable Development)	Done.
E-18-77	A	4	16			Rework the sentence: "Adaptation is a necessary part of the policy mix to respond to climate change." (Jan Corfee-Morlot, University College London & OECD)	See comment above.
E-18-78	A	4	16			Replace "a necessity (Parry et al.1998)" with "is inevitable (Goklany 1995, Parry et al.1998)" (Indur Goklany, US Department of the Interior)	See comment above.
E-18-79	A	4	16		24	acknowledge that some adaptation may very well be impossible - example for a sector: some portions of winter recreation, such as snomobiling; some natural ecosystems like reefs, alpine meadows etc. (Susanne Moser, National Center for Atmospheric Research)	This depends on money and technology. This statement is not justified.
E-18-80	A	4	18		22	Lonsdale and so on do not show this. They show that adaptation to 5 metre sea level rise would be very difficult. There is, however, no reason to believe that this is a likely scenario. (Richard Tol, Hamburg University)	Corrected.

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E-18-81	A	4	20	4	20	See comment 5 (John Drexhage, International Institute for Sustainable Development)	?
E-18-82	A	4	20			after "costs" insert "and with limited effectiveness" (Danny Harvey, Dept of Geography, University of Toronto)	This is implied.
E-18-83	A	4	29	4	30	Please explain how the level of climate change is determined by adaptation and mitigation efforts (Youba Sokona, Sahara and Sahel Observatory (OSS))	The following sentence does that.
E-18-84	A	4	29			Article 2 does not refer to dangerous climatic change, it refers to dangerous interference in the climate system resulting from GHG concentrations. Thus, reword as; "The level of greenhouse gas concentrations and associated climatic changes, and whether or not these are dangerous (cf. Article 2 .... " (Danny Harvey, Dept of Geography, University of Toronto)	Disagree. This is a matter of interpretation.
E-18-85	A	4	30		31	It may be semantic, but I don't think the distinction here between indirect and direct damage prevention is useful. One could argue that mitigation avoids damages entirely whereas adaptation only limits it. (Jan Corfee-Morlot, University College London & OECD)	Disagree. See comment E-18-83.
E-18-86	A	4	32			Insert “usually” between “rather” and “have”, and at the end of this sentence the following: “although Goklany (1995, 2000a, 2003, 2005a, 2005c, 2006a) has frequently emphasized these links.” (Indur Goklany, US Department of the Interior)	Rephrased. “Rather” implies that this is not a black-and-white issue.
E-18-87	A	4	34			replace the word "negotiators" with "policy-makers and other decision-makers" (to make this point more general) (Jan Corfee-Morlot, University College London & OECD)	This sentence has been rephrased.
E-18-88	A	4	39		50	The energy policy framing in this paragraph is too narrow. Since 1992, there has been formal international recognition of the role of other gases and of sinks in ghg mitigation. Ii would rework this paragraph. (Jan Corfee-Morlot, University College London & OECD)	Done.
E-18-89	A	4	39		50	may want to make clear that you don't just mean the energy sector, but all energy using activities, including in transportation, industry, residential etc. (Susanne Moser, National Center for Atmospheric Research)	Done.
E-18-90	A	4	40			replace "enhancing sinks" with "other mitigation options (e.g. sinks)" (Jan Corfee-Morlot, University College London & OECD)	Done.
E-18-91	A	5	1	5	9	There is number of key questions missing such as where it make more sens to focus on adaptation and where on mitigation. I wonder if the questions you are highlighting make any sens for instance in a LDC country or in small island state countries? Introducing a question of substitute between adaptation and mitigation could be misleading.	Not sure what these questions would be.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Youba Sokona, Sahara and Sahel Observatory (OSS))	
E-18-92	A	5	1	5	9	The total potential abatement in the Industry sector is small compared to the total abatement potential in the energy supply and transport sectors, and that mitigation of GHG emissions is best served by emphasizing energy conservation rather than implementing technology improvements in Industry. (James Bero, BASF)	We are not comparing sectors here. That's WG-III's job.
E-18-93	A	5	1	5	12	the concept of a finitude of funds contradicts the sensible statements made elsewhere that it is not a zero sum game and there appear not o be direct trade-offs between adaptation and mitigation (Jim Skea, University of Sussex)	Corrected.
E-18-94	A	5	1	5	9	18.1.1: The recognition of the difference between adaptation and mitiagtion is critical and must receive emphasis—from the beginning. One apparent weakness of the entire chater, however, is the danger of simply impelementing EITHER adaptation or mitigation measures. The U.S., for example, offically wishes to focus on adaptation--but by not incorporating mitiagtion instruments may cause startegic consequence. (P. H. Liotta, Pell Center for International Relations and Public Policy)	We assess the literature, we cannot give policy recommendations.
E-18-95	A	5	3			GAIM is not in the list of refs (Jan Corfee-Morlot, University College London & OECD)	Corrected.
E-18-96	A	5	3		4	Combine the 1st and the 2nd questions -- they are inseparable as defining what is optimum will be based on normative choices or criteria that will vary by decision-maker (Jan Corfee-Morlot, University College London & OECD)	Disagree.
E-18-97	A	5	11	5	13	Add the following references to the end of this sentence: Goklany (2000a, 2003,2005a, 2006a) (Indur Goklany, US Department of the Interior)	Relevant reference has been added.
E-18-98	A	5	13	5	15	Replace this sentence with the following: "Some recent literature indicates there are significant synergies, particularly in terms of advancing both adaptive and mitigative capacities simultaneously (Goklany 2005a, 2006a), although other literature is more skeptical about the ability or desirability of exploiting these inter-relationships (Venema and Cisse 2004, Klein et al. 2005)." Despite our willingness to accept this formulation, we are deeply skeptical about the claim that it is either impossible or undesirable to exploit the inter-relationships between adaptation and mitigation (see Goklany 2005a, 2006a, for instance). (Indur Goklany, US Department of the Interior)	Accepted
E-18-99	A	5	15			Venema and Cisse, 2004 is not in the reference list - please also refer to the forthcoming special issue of MITI for a synthesized peer-reviewed publication on	Corrected.

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						this subject (accepted for publication before the WG2 deadline). (Henry David Venema, International Institute for Sustainable Development)	
E-18-100	A	5	15			Insert a new sentence on line 15 that reads as follows: "Goklany (2005a, 2006a) suggests that it should also be possible to advance both adaptive and mitigative capacities through the pursuit of sustainable development goals." (Indur Goklany, US Department of the Interior)	This is addressed later in the chapter (Section 18.6).
E-18-101	A	5	27		40	Not sure you need this - the chapter is short and you will have a detailed TOC no? (Jan Corfee-Morlot, University College London & OECD)	Yes, it is important to be clear about the structure from the beginning.
E-18-102	A	5	28			18.2 refers only to the TAR (Jim Skea, University of Sussex)	Indeed.
E-18-103	A	5	43	6	46	Why is this a Box? Simply make it Section 18.1.3 (John Drexhage, International Institute for Sustainable Development)	Done.
E-18-104	A	5	43	6	47	it is not clear why Box 18.1 is a box, since it's simply a piece of text and the only box in the chapter (Jim Skea, University of Sussex)	Done.
E-18-105	A	5	43	6	46	Box needs refs -- Corfee-Morlot and Agrawala 2004 speak to these issues (e.g. lines 8-23, p 6). That book and the special issue of GEC contain many more useful references. (Jan Corfee-Morlot, University College London & OECD)	Yes.
E-18-106	A	5	43	6	47	Box 18.1 Is Definition of Mitigation is correct but new Definition on 4AR. Please look at the Glossary. From the Chapter you may learn (P.2 and others) that mitigation could be induced by Adaptation policies. (Juan Llanes-Reguerio, University of Havana)	Unclear what is meant here.
E-18-107	A	5	50			reword as: " … challenge, whereas adaptation is selective: it can …" (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-102	A	5	28			18.2 refers only to the TAR (Jim Skea, University of Sussex)	FT: OK
E-18-103	A	5	43	6	46	Why is this a Box? Simply make it Section 18.1.3 (John Drexhage, International Institute for Sustainable Development)	Up to CLAs and Co-Chairs
E-18-104	A	5	43	6	47	it is not clear why Box 18.1 is a box, since it's simply a piece of text and the only box in the chapter (Jim Skea, University of Sussex)	See 103
E-18-105	A	5	43	6	46	Box needs refs -- Corfee-Morlot and Agrawala 2004 speak to these issues (e.g. lines 8-23, p 6). That book and the special issue of GEC contain many more useful references. (Jan Corfee-Morlot, University College London & OECD)	Box was supposed to be a 1/2page summary of main similarities and differences. It evolved into a complex discussion in response to two rounds of reviews. It is still a summary of basic points that are elaborated and supported

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
							by citations throughout the chapter. No need for more references here.
E-18-106	A	5	43	6	47	Box 18.1 Is Definition of Mitigation is correct but new Definition on 4AR. Please look at the Glossary. From the Chapter you may learn (P.2 and others) that mitigation could be induced by Adaptation policies. (Juan Llanes-Reguerio, University of Havana)	True, but this does not change the basic features of mitigation and adaptation. No change.
E-18-107	A	5	50			reword as: " … challenge, whereas adaptation is selective: it can …" (Danny Harvey, Dept of Geography, University of Toronto)	OK
E-18-108	A	5	51			Following reference to Golanky add the sentence along the lines of: It is important to note that there are some impacts that adaptation cannot respond to (cross-reference Ch. 17 & 19); this includes loss of habitat and species vulnerable to rapid climate change and abrupt geophysical change (e.g. THC). (Jan Corfee-Morlot, University College London & OECD)	Not the point here and not necessarily true: some habitats lost, others created due to CC. There is ample opportunity to adopt to impacts of THC shutdown. No change.
8-109	A	6	4	6	9	Even if effective mitigation actions (efforts?) need to involve several countries does not imply that mitigation activities are not taking place at local, regional or national levels. It's a bit strange that you did not mention risk in association with adaptation. As adaptation is occring and will occur spontaneously while mitigation needs incentives and/or penality. (Youba Sokona, Sahara and Sahel Observatory (OSS))	OK. Replaced "largely take place" by "are largely initiated" The point is not where action is but rather at what level effecive action can be triggered: UNFCCC (M) vs watering my garden (A)
E-18-110	A	6	4		29	This whole paragraph is FAR more adequate in describing where adaptation will happen. As is, it contradicts your Executive Summary summary. This section should be the basis on which you write that ES; it's the more accurate reflection of reality. (Susanne Moser, National Center for Atmospheric Research)	Agree – no change here.
E-18-111	A	6	7	6	8	Some adaptation actions that require collective actions include trade – a most useful adaptation measure (see Goklany 1995, 2006a) and reduction in subsidies for over use of energy and land (which also would reduce GHG emissions; see Goklany 2005a, 2006a). (Indur Goklany, US Department of the Interior)	True but beyond the depth and level of detail required for a short overview of main similarities and differences. No change.
E-18-112	A	6	7	6	9	Important adaptation efforts go beyond national boundaries such as research on heat-/drought-resistant crop varieties, research on vaccines/drugs against climate-dependent disease vectors or adaptation to sea-level rise in multi-national deltaic regions (e.g. Bangladesh-India, Belgium-Netherlands). Suggested wording to substitute ".. whereas adaptation ...boundaries, although": "A majority of adaptation efforts are limited by national boundaries, but key adaptation activities can be as global as mitigation." (Axel Michaelowa, Hamburg Institute of International Economics)	Disagree with "as global" plus examples are special cases and still regional not global. No change.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-18-113	A	6	9	6	12	The benefits of mitigation are global only under certain circumstances, namely, if temperature change results in only losers. This is not necessarily true for low-to-moderate temperature increases. See Goklany (2006a). (Indur Goklany, US Department of the Interior)	True but again beyond the depth and level of detail required for a short overview of main similarities and differences. Plus: mitigation reducing POSITIVE impacts as well mentioned in p5 l49. No change
E-18-114	A	6	10	6	12	Rewrite the sentence: The costs of mitigation arise locally (economic spillovers are possible) and ancillary benefits might be realised at the local/regional level, while the benefits of mitigation are dispersed globally. (Jan Corfee-Morlot, University College London & OECD)	Disagree. Mitigation's local costs and global benefits are certain and the main point, spillovers and ancillary benefits may or may not accrue and are by-products. No change.
E-18-115	A	6	12	6	14	Positive spillovers associated with adaptation also include adaptations that would provide such global benefits as reducing biodiversity losses, malaria, other climate-sensitive diseases, and hunger (see Goklany 2006a). (Indur Goklany, US Department of the Interior)	These are not really global benefits and not really benefits of adaptation – no change.
E-18-116	A	6	16	6	17	Adaptation benefits can be as long-term as mitigation and strongly depend on the level of climate change impact which defines the level of adaptation (e.g. if dykes are raised to the sea level expected under unabated climate change in 3 centuries, the benefit only fully arises in 300 years). (Axel Michaelowa, Hamburg Institute of International Economics)	Emphasis here is on the near-term: benefits of adaptation can accrue very soon after the action/investment. No change.
E-18-117	A	6	17	6	29	Mitigation activities in US cities are an example of local instead of national public policies and could me mentioned here. Furthermore in the middle range investments in mitigation and technological learning can increase competetiveness of a nation/region. (Martin Welp, University of Applied Sciences Eberswalde)	"Local" here is already included in the "community-based initiatives". No change. True but not the point here. No change.
E-18-118	A	6	18	6	18	Drop "from much smaller climate change" (Jan Corfee-Morlot, University College London & OECD)	Was inserted in response to FOD review comment. "much" is not in the SOD text. No change
E-18-119	A	6	18	6	18	Change "smaller climate change" to "a less intensive climate change path". (John Drexhage, International Institute for Sustainable Development)	"Less intensive CC path" is unclear. Change to "less" or "reduced" CC?
E-18-120	A	6	19	6	19	the sentence starting "This divergence… " is opaque and adds nothing to the argument (Jim Skea, University of Sussex)	OK, delete it.
E-18-121	A	6	20	6	23	Sentence should be modified to reflect that mitigation can also happen due to private action (voluntary activities such as offsetting air travel emissions or other private activities are happening in many industrialised countries, see Ch. 13 of WG III). While currently adaptation may be dominated by private action, this could change in the future due to the risk that private investment in adaptation may be below the social optimum and thus government investment is done to ensure	True but so special that they are far beyond the depth and level of detail required for a short overview of main similarities and differences. No change.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						reaching of the social optimum. (Axel Michaelowa, Hamburg Institute of International Economics)	
E-18-122	A	6	21			add "sub-national, regional or" before "community-based initiatives." (Jan Corfee-Morlot, University College London & OECD)	OK, but sub-national would be regional so added: "regional or"
E-18-123	A	6	25	6	29	Aren't adaptation actions also taken in the light of uncertain and incomplete information. Aren't adaptation decisions already being taken as a result of climate change that has already occurred? (Jim Skea, University of Sussex)	Some are, but in most cases the level of uncertainty is far below the uncertainty surrounding mitigation actions. No change.
E-18-124	A	6	25		29	This contrast is not entirely accurate. Many adaptation decisions with long time horizons also need to be made in the face of considerable lack of information and uncertainty. There is no contrast here between mitigation and adaptation. (Susanne Moser, National Center for Atmospheric Research)	Disagree. Many adaptation happens ex-post whereas mitigation is always ex-ante. See also 123. No change.
E-18-125	A	6	25		29	the way this sentence is phrased implies that we do not believe implementation of mitigation policy or measures is gradual. Of course it is! Suggest reworking the sentence. It might also be useful to note that adaptation is also like to be necessary based on uncertain and incomplete information... both types of decision could be characterised as risk-based decisions. (Jan Corfee-Morlot, University College London & OECD)	This is not implied at all: learning and course correction explicitly mentioned for mitigation. Adaptation under certainty is not implied either, but the level of uncertainty is far below the uncertainty surrounding mitigation actions. No change.
E-18-126	A	6	27	6	27	learning and course correction in the future for mitigation is only possible to a limited extent owing to the time lags mentioned on page 4 line 12 (Rachel Warren, School of Environmental Sciences)	Agree, but not the main point here. No change.
E-18-127	A	6	32		42	The examples given here are not wrong but seem ad hoc and may be out of place in the box. If you keep this, you might mention that initial adaptation options may appear in coastal zones or water resources management sectors in some regiona that are already feeling the effects of climate change; by comparison initial mitigation actions are likely to be in other sectors (e.g. waste, energy). (Jan Corfee-Morlot, University College London & OECD)	No, the examples were suggested by reviewers of FOD and discussed in the writing team. They are considered to be the most characteristic examples to illustrate the point. No change.
E-18-128	A	6	34	6	36	This assertion needs substantiation or should be deleted. (Axel Michaelowa, Hamburg Institute of International Economics)	Substantiation is in the next sentences. No change.
E-18-129	A	6	34	6	36	There is a suggestion here again about zero sum games for adaptation and mitigation expenditure (Jim Skea, University of Sussex)	Yes, highly aggregated models have it, hence the explanation about the need to take a closer look. No change.
E-18-130	A	6	44		46	not sure what this last sentence really means or if it is even needed. (Jan Corfee-Morlot, University College London & OECD)	Senctence is clear. No change.
E-18-131	A	6	46			Add a new sentence on line 46 as follows: "The real issue in terms of developing such portfolios is whether damages from climate change and, more importantly, human well-being is advanced more	This is the global planner perspective whereas the sentence emphasizes the differences in the relative importance of A and M depending on

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						effectively through adaptation, mitigation, or a combination of both." (Indur Goklany, US Department of the Interior)	local and national conditions. No change.
E-18-132	A	6	47			Add a new sentence that reads as follows: "Finally, Goklany (2006a) notes that actions that would reduce societal vulnerability to climate-sensitive problems that might be exacerbated by climate change have very high benefit-cost ratios". (Indur Goklany, US Department of the Interior)	Not related to A-M similarities/differences. No change.
E-18-133	A	7	1	9	11	section on TAR is much too long and would be better placed in the introduction (Jan Corfee-Morlot, University College London & OECD)	Section significantly reduced in size but kept as section. Ch18 is the first of its kind and this section draws on related material in TAR WGII and III. Same commentator points to the usefulness of summarizing A-M linkages in TAR- see 145. Section shortened.
E-18-134	A	7	1	9	11	Considering the premium on space, this recap of TAR is too long. It should be shortened. (Indur Goklany, US Department of the Interior)	Section significantly shortened.
E-18-135	A	7	3		10	drop this para (Jan Corfee-Morlot, University College London & OECD)	No, this is an important summary of the historical origins of this chapter and explains why it was difficult to deal with A-M linkages in TAR. Explains the root of Ch18 of AR4 and intrudces this section. No change.
E-18-136	A	7	7	7	8	Is this Chapter 20 in the TAR or AR4? (Jean Palutikof, Met Office)	Ch 18 in TAR – corrected.
E-18-137	A	7	12			replace "of the SynR" with "for responses to broad policy questions" (Jan Corfee-Morlot, University College London & OECD)	OK Done.
E-18-138	A	7	20	7	25	drop this - not needed (Jan Corfee-Morlot, University College London & OECD)	It is needed, provides important summaryof the problems underlying TAR SR. Significantly shortened.
E-18-139	A	7	27	8	4	this material could be reworked and added to box (Jan Corfee-Morlot, University College London & OECD)	The first paragraph deleted, the rest is the summary of points pertinent to A-M linkages in TAR. Would not be practical to move into box.
E-18-140	A	7	28	7	28	I find the term "response capacity" much preferable to "mitigative and adaptive capacity". (John Drexhage, International Institute for Sustainable Development)	These are the terms used in TAR. Paragraph deleted anyway.
E-18-141	A	7	48		50	You should make clear that this is a clear shift then from the TAR. If we thought then that we could wait with adaptation because climate change is basically not a	OK, note added.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						problem yet, our views have clearly changed! (Susanne Moser, National Center for Atmospheric Research)	
E-18-142	A	7		8		I also question the dichotomy of where adaptation and mitigation costs will be born. Since many companies that have to invest in emission reductions are multinational and many of them receive some kind of governmental subsidies or incentives for doing so - the cost is not really just "borne" locally. Nor will adaptation happen in many cases without government support or even international compensation. So, I suggest you don't make so much of the differences between the two aspects of climate policy, but rather discuss the realities more fully. No need to see them as so dichotomously opposed, is there? (Susanne Moser, National Center for Atmospheric Research)	First, there is. The bulk of both mitigation and adaptation costs will be borne by different stakeholders – hence the problem with CBA, among other things. Second, and mainly: these are all direct quotes from TAR, had been through 3 round of review plus WG plenary approval. Cannot be changed rectroactively. No change here but these concerns are now reflected in Section 4. And dichotomy in TAR is explained in Section 1.
E-18-143	A	8	6		16	para could easily be dropped - there is no need for such an extensive quote (Jan Corfee-Morlot, University College London & OECD)	No, this was an important point in WGIII, one of the few A-M linkages in TAR. Quote turned into summary and drastically shortened.
E-18-144	A	8	11	8	11	"Balancing" mitigation and adaptation efforts again implies some kind of trade-off. In general I think the chapter needs scanned for a consistent set of messages here. (Jim Skea, University of Sussex)	Changed to “consider”.
E-18-145	A	8	46	7	48	useful to mention where sector chapters refer to interactions btwn mitigation and adaptation -- this should be done much more systemically and would enrich the chapter (Jan Corfee-Morlot, University College London & OECD)	There were very few of such references in TAR, most of them are cited in this short summary. Also: this supports response to 134, ie, to keep the section. No change.
E-18-146	A	9	1	9	1	A mention of small island states needs to include the impacts of sea level rise and the impacts of climate change on coral reefs which also contribute to the list of impacts mentioned. (Rachel Warren, School of Environmental Sciences)	This part of the text is now deleted.
E-18-102	A	5	28			18.2 refers only to the TAR (Jim Skea, University of Sussex)	FT: OK
E-18-103	A	5	43	6	46	Why is this a Box? Simply make it Section 18.1.3 (John Drexhage, International Institute for Sustainable Development)	Up to CLAs and Co-Chairs
E-18-104	A	5	43	6	47	it is not clear why Box 18.1 is a box, since it's simply a piece of text and the only box in the chapter (Jim Skea, University of Sussex)	See 103
E-18-105	A	5	43	6	46	Box needs refs -- Corfee-Morlot and Agrawala 2004 speak to these issues (e.g. lines 8-23, p 6). That book and the special issue of GEC contain many more useful	Box was supposed to be a 1/2page summary of main similarities and differences. It evolved

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						references. (Jan Corfee-Morlot, University College London & OECD)	into a complex discussion in response to two rounds of reviews. It is still a summary of basic points that are elaborated and supported by citations throughout the chapter. No need for more references here.
E-18-106	A	5	43	6	47	Box 18.1 Is Definition of Mitigation is correct but new Definition on 4AR. Please look at the Glossary. From the Chapter you may learn (P.2 and others) that mitigation could be induced by Adaptation policies. (Juan Llanes-Reguerio, University of Havana)	True, but this does not change the basic features of mitigation and adaptation. No change.
E-18-107	A	5	50			reword as: " … challenge, whereas adaptation is selective: it can …" (Danny Harvey, Dept of Geography, University of Toronto)	OK
E-18-108	A	5	51			Following reference to Golanky add the sentence along the lines of: It is important to note that there are some impacts that adaptation cannot respond to (cross-reference Ch. 17 & 19); this includes loss of habitat and species vulnerable to rapid climate change and abrupt geophysical change (e.g. THC). (Jan Corfee-Morlot, University College London & OECD)	Not the point here and not necessarily true: some habitats lost, others created due to CC. There is ample opportunity to adopt to impacts of THC shutdown. No change.
8-109	A	6	4	6	9	Even if effective mitigation actions (efforts?) need to involve several countries does not imply that mitigation activities are not taking place at local, regional or national levels. It's a bit strange that you did not mention risk in association with adaptation. As adaptation is occring and will occur spontaneously while mitigation needs incentives and/or penality. (Youba Sokona, Sahara and Sahel Observatory (OSS))	OK. Replaced “largely take place” by “are largely initiated” The point is not where action is but rather at what level effecive action can be triggered: UNFCCC (M) vs watering my garden (A)
E-18-110	A	6	4		29	This whole paragraph is FAR more adequate in describing where adaptation will happen. As is, it contradicts your Executive Summary summary. This section should be the basis on which you write that ES; it's the more accurate reflection of reality. (Susanne Moser, National Center for Atmospheric Research)	Agree – no change here.
E-18-111	A	6	7	6	8	Some adaptation actions that require collective actions include trade – a most useful adaptation measure (see Goklany 1995, 2006a) and reduction in subsidies for over use of energy and land (which also would reduce GHG emissions; see Goklany 2005a, 2006a). (Indur Goklany, US Department of the Interior)	True but beyond the depth and level of detail required for a short overview of main similarities and differences. No change.
E-18-112	A	6	7	6	9	Important adaptation efforts go beyond national boundaries such as research on heat-/drought-resistant crop varieties, research on vaccines/drugs against climate-dependent disease vectors or adaptation to sea-level rise in multi-national deltaic regions (e.g. Bangladesh-India, Belgium-Netherlands). Suggested wording to substitute ".. whereas adaptation ...boundaries, although": "A majority of adaptation	Disagree with “as global” plus examples are special cases and still regional not global. No change.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						efforts are limited by national boundaries, but key adaptation activities can be as global as mitigation." (Axel Michaelowa, Hamburg Institute of International Economics)	
E-18-113	A	6	9	6	12	The benefits of mitigation are global only under certain circumstances, namely, if temperature change results in only losers. This is not necessarily true for low-to-moderate temperature increases. See Goklany (2006a). (Indur Goklany, US Department of the Interior)	True but again beyond the depth and level of detail required for a short overview of main similarities and differences. Plus: mitigation reducing POSITIVE impacts as well mentioned in p5 l49. No change
E-18-114	A	6	10	6	12	Rewrite the sentence: The costs of mitigation arise locally (economic spillovers are possible) and ancillary benefits might be realised at the local/regional level, while the benefits of mitigation are dispersed globally. (Jan Corfee-Morlot, University College London & OECD)	Disagree. Mitigation's local costs and global benefits are certain and the main point, spillovers and ancillary benefits may or may not accrue and are by-products. No change.
E-18-115	A	6	12	6	14	Positive spillovers associated with adaptation also include adaptations that would provide such global benefits as reducing biodiversity losses, malaria, other climate-sensitive diseases, and hunger (see Goklany 2006a). (Indur Goklany, US Department of the Interior)	These are not really global benefits and not really benefits of adaptation – no change.
E-18-116	A	6	16	6	17	Adaptation benefits can be as long-term as mitigation and strongly depend on the level of climate change impact which defines the level of adaptation (e.g. if dykes are raised to the sea level expected under unabated climate change in 3 centuries, the benefit only fully arises in 300 years). (Axel Michaelowa, Hamburg Institute of International Economics)	Emphasis here is on the near-term: benefits of adaptation can accrue very soon after the action/investment. No change.
E-18-117	A	6	17	6	29	Mitigation activities in US cities are an example of local instead of national public policies and could me mentioned here. Furthermore in the middle range investments in mitigation and technological learning can increase competetiveness of a nation/region. (Martin Welp, University of Applied Sciences Eberswalde)	"Local" here is already included in the "community-based initiatives". No change. True but not the point here. No change.
E-18-118	A	6	18	6	18	Drop "from much smaller climate change" (Jan Corfee-Morlot, University College London & OECD)	Was inserted in response to FOD review comment. "much" is not in the SOD text. No change
E-18-119	A	6	18	6	18	Change "smaller climate change" to "a less intensive climate change path". (John Drexhage, International Institute for Sustainable Development)	"Less intensive CC path" is unclear. Change to "less" or "reduced" CC?
E-18-120	A	6	19	6	19	the sentence starting "This divergence… " is opaque and adds nothing to the argument (Jim Skea, University of Sussex)	OK, delete it.
E-18-121	A	6	20	6	23	Sentence should be modified to reflect that mitigation can also happen due to private action (voluntary activities such as offsetting air travel emissions or other private activities are happening in many industrialised countries, see Ch. 13 of WG	True but so special that they are far beyond the depth and level of detail required for a short overview of main similarities and differences.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						III). While currently adaptation may be dominated by private action, this could change in the future due to the risk that private investment in adaptation may be below the social optimum and thus government investment is done to ensure reaching of the social optimum. (Axel Michaelowa, Hamburg Institute of International Economics)	No change.
E-18-122	A	6	21			add "sub-national, regional or" before "community-based initiatives." (Jan Corfee-Morlot, University College London & OECD)	OK, but sub-national would be regional so added: “regional or”
E-18-123	A	6	25	6	29	Aren't adaptation actions also taken in the light of uncertain and incomplete information. Aren't adaptation decisions already being taken as a result of climate change that has already occurred? (Jim Skea, University of Sussex)	Some are, but in most cases the level of uncertainty is far below the uncertainty surrounding mitigation actions. No change.
E-18-124	A	6	25		29	This contrast is not entirely accurate. Many adaptation decisions with long time horizons also need to be made in the face of considerable lack of information and uncertainty. There is no contrast here between mitigation and adaptation. (Susanne Moser, National Center for Atmospheric Research)	Disagree. Many adaptation happens ex-post whereas mitigation is always ex-ante. See also 123. No change.
E-18-125	A	6	25		29	the way this sentence is phrased implies that we do not believe implementation of mitigation policy or measures is gradual. Of course it is! Suggest reworking the sentence. It might also be useful to note that adaptation is also like to be necessary based on uncertain and incomplete information... both types of decision could be characterised as risk-based decisions. (Jan Corfee-Morlot, University College London & OECD)	This is not implied at all: learning and course correction explicitly mentioned for mitigation. Mitigation under certainty is not implied either, but the level of uncertainty is far below the uncertainty surrounding mitigation actions. No change.
E-18-126	A	6	27	6	27	learning and course correction in the future for mitigation is only possible to a limited extent owing to the time lags mentioned on page 4 line 12 (Rachel Warren, School of Environmental Sciences)	Agree, but not the main point here. No change.
E-18-127	A	6	32		42	The examples given here are not wrong but seem ad hoc and may be out of place in the box. If you keep this, you might mention that initial adaptation options may appear in coastal zones or water resources management sectors in some regiona that are already feeling the effects of climate change; by comparison initial mitigation actions are likely to be in other sectors (e.g. waste, energy). (Jan Corfee-Morlot, University College London & OECD)	No, the examples were suggested by reviewers of FOD and discussed in the writing team. They are considered to be the most characteristic examples to illustrate the point. No change.
E-18-128	A	6	34	6	36	This assertion needs substantiation or should be deleted. (Axel Michaelowa, Hamburg Institute of International Economics)	Substantiation is in the next sentences. No change.
E-18-129	A	6	34	6	36	There is a suggestion here again about zero sum games for adaptation and mitigation expenditure (Jim Skea, University of Sussex)	Yes, highly aggregated models have it, hence the explanation about the need to take a closer look. No change.
E-18-130	A	6	44		46	not sure what this last sentence really means or if it is even needed. (Jan Corfee-Morlot, University College London & OECD)	Senctence is clear. No change.

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E-18-131	A	6	46			Add a new sentence on line 46 as follows: "The real issue in terms of developing such portfolios is whether damages from climate change and, more importantly, human well-being is advanced more effectively through adaptation, mitigation, or a combination of both." (Indur Goklany, US Department of the Interior)	This is the global planner perspective whereas the sentence emphasizes the differences in the relative importance of A and M depending on local and national conditions. No change.
E-18-132	A	6	47			Add a new sentence that reads as follows: "Finally, Goklany (2006a) notes that actions that would reduce societal vulnerability to climate-sensitive problems that might be exacerbated by climate change have very high benefit-cost ratios". (Indur Goklany, US Department of the Interior)	Not related to A-M similarities/differences. No change.
E-18-133	A	7	1	9	11	section on TAR is much too long and would be better placed in the introduction (Jan Corfee-Morlot, University College London & OECD)	Disagree. It is about the allocated length. First of its kind and draws on TAR WGII and III.
E-18-134	A	7	1	9	11	Considering the premium on space, this recap of TAR is too long. It should be shortened. (Indur Goklany, US Department of the Interior)	It was extended somewhat in response to FOD comments ….
E-18-135	A	7	3		10	drop this para (Jan Corfee-Morlot, University College London & OECD)	No, this is an important summary of the situation in TAR, the root of Ch18 if AR4. No change.
E-18-136	A	7	7	7	8	Is this Chapter 20 in the TAR or AR4? (Jean Palutikof, Met Office)	Ch 18 in TAR – corrected.
E-18-137	A	7	12			replace "of the SynR" with "for responses to broad policy questions" (Jan Corfee-Morlot, University College London & OECD)	OK
E-18-138	A	7	20	7	25	drop this - not needed (Jan Corfee-Morlot, University College London & OECD)	It is. No action.
E-18-139	A	7	27	8	4	this material could be reworked and added to box (Jan Corfee-Morlot, University College London & OECD)	No, this is the summary of points pertinent to A-M linkages in TAR. No action.
E-18-140	A	7	28	7	28	I find the term "response capacity" much preferable to "mitigative and adaptive capacity". (John Drexhage, International Institute for Sustainable Development)	This is a summary of TAR and the underlying paper. No action.
E-18-141	A	7	48		50	You should make clear that this is a clear shift then from the TAR. If we thought then that we could wait with adaptation because climate change is basically not a problem yet, our views have clearly changed! (Susanne Moser, National Center for Atmospheric Research)	Yes, and this is reflected by the AR4 WGII report. But here this is a quote from TAR. No change.
E-18-142	A	7		8		I also question the dichotomy of where adaptation and mitigation costs will be born. Since many companies that have to invest in emission reductions are multinational and many of them receive some kind of governmental subsidies or incentives for doing so - the cost is not really just "borne" locally. Nor will	First, there is. The bulk of both mitigation and adaptation costs will be born by different stakeholders – hence the problem with CBA, among other things.

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						adaptation happen in many cases without government support or even international compensation. So, I suggest you don't make so much of the differences between the two aspects of climate policy, but rather discuss the realities more fully. No need to see them as so dichotomously opposed, is there? (Susanne Moser, National Center for Atmospheric Research)	Second, and mainly: these are all direct quotes from TAR, had been through 3 round of review plus WG plenary approval. Cannot be changed rectroactively. No change.
E-18-143	A	8	6		16	para could easily be dropped - there is no need for such an extensive quote (Jan Corfee-Morlot, University College London & OECD)	No, this was an important point in WGIII, one of the few A-M linkages in TAR.
E-18-144	A	8	11	8	11	"Balancing" mitigation and adaptation efforts again implies some kind of trade-off. In general I think the chapter needs scanned for a consistent set of messages here. (Jim Skea, University of Sussex)	Changed to "consider".
E-18-145	A	8	46	7	48	useful to mention where sector chapters refer to interactions btwn mitigation and adaptation -- this should be done much more systemically and would enrich the chapter (Jan Corfee-Morlot, University College London & OECD)	There were very few cases in TAR, most of them cited in this summary. No change.
E-18-146	A	9	1	9	1	A mention of small island states needs to include the impacts of sea level rise and the impacts of climate change on coral reefs which also contribute to the list of impacts mentioned. (Rachel Warren, School of Environmental Sciences)	This was not raised in TAR. No change.
E-18-147	A	9	14	9	43	It seems to not very clear the approach of adaptive capacity you have outlined. Please seeHallie Eakin (Institutional change, climate risk, and rural vulnerability: cases from central Mexico. World DEvelopment Report vol 33, n°11 pp 1923-1938, 2005) of definition of adaptive capacity being considered to be one attribute of complex problem of vulnerability. Adaptative capacity is defined as those characteristics of an individual, household, or population group which enable it to alter or structurally reoganize its activities to diminish present threats to survival while enhancing its ability to address new risks. The effectiveness of any adaptation action for mitigating future sensitivity to climatic risk will be strongly influenced by the ways in which policy enables or inhibits households' capacity to address climatic challenges. (Youba Sokona, Sahara and Sahel Observatory (OSS))	JR: This is related to comment ES-18-8. We could certainly change the language to "adaptation capacity" but this would require agreement from all chapters in all WGs, and would be inconsistent with standard usage in the CC field.
E-18-148	A	9	14	14	21	This is an interesting section but too long with some confusion at the outset about definitions (e.g. mitigative capacity). There is a good overview of SD/CC issues and interconnections at the end, but I do not agree that there is a big distinction between SD/CC or CC/SD rather it could be argued that there is lots of common ground regardless of the direction of change. (Jan Corfee-Morlot, University College London & OECD)	JR: not clear what the confusion is so can't repond. Two lenses discussion is just heuristic device. No change.
E-18-	A	9	14	14	21	Comment on Section 18.3. This is where the issue of adaptive capacity, etc comes	JR: see response to E-18-147.

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149						to a head. My concern is that we (the somewhat too cloistered climate change community) try and change its spots and begin using terminology that is easily commuicable in the mainstream policy community. We should have addressed this twenty years ago and avoided the complications of using "mitigation" and "adaptation" in the climate change context in the first place. What I don't want to do is compound that mistake and now discuss 'adaptive' vs. 'mitigative' capacity. Given the definition I provided earlier, (see comment 3), mitigation clearly is covered under tradintional meanings of adaptive capacity. What works for me is to simply substitute mitigative and adaptive capacity with response capacity, and when breaking those down further, speak to adaptation capacity and mitigation capacity. This may seem like a minor point, but it's precisely these sort of definitional/semantic issues that can so easily work to continue to keep climate change in its esoteric ways. (John Drexhage, International Institute for Sustainable Development)	
E-18-150	A	9	23		43	These paragraphs should provide working definitions of mitigative capacity and adaptive capacity. On mitigative capacity this seems to be missing - rather we have a discussion of different notions found in the literature. Both of these topics are discussed elsewhere in AR4 and consistency is desirable (see Ch 17 & 20/II on ad capacity and Ch 12/III on mitigative capacity. I would rework these paras and put the definitions of the key concepts into the introduction. (Jan Corfee-Morlot, University College London & OECD)	JR: We cite the 4AR definition of AC. Then we cite the TAR definition of MC and note a more recent, improved definition. We will confirm consistency in definitions of AC with chapters 17 and 20. We are consistent with WGIII, chapter 12 on MC. MC and AC definitions don't belong in introduction. No change.
E-18-151	A	9	34	9	35	This is somewhat misleading at mitigative capacity exists at an institutional scale far moreso than adaptive capacity which resides much moreso at the level of the communities and social networks - admittedly there is some overlap. (Henry David Venema, International Institute for Sustainable Development)	JR: line references here and in next comment seem to be 8 lines off. Agree with point but don't think it is incosistent with text. No change.
E-18-152	A	9	35			Add as references (Goklany 2005a, 2006a). (Indur Goklany, US Department of the Interior)	JR: have looked at these references. They don't add anything. No change.
E-18-153	A	9	45			You say response capacity is new to the TAR, but on page 10 line 23 you talk about response capacities coverage in the TAR, which doesn't add up. (Jean Palutikof, Met Office)	JR: As we say on page 10, the concepts of AC and MC are discussed in the TAR, not RC. No change.
E-18-	A	9				Section 18.3: This section should précis the conclusions of Chapter 17 regarding	JR: Will look at chapter 17 again, to see

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154						factors determining adaptive capacity as a basis for considering the link with sustainable development rather than starting discussion of that aspect from scratch. Presumably there is also material in the WGIII report that is relevant here (on factors shaping mitigation capacity). At present, in focusing on response capacity, the discussion is skewed towards a few studies. (Mick Kelly, University of East Anglia)	if we can simply summarize their discussion of the AC/SD linkages. Our discussion here is already a shorter version of that found in WGIII, chapter 12. There are few studies cited because there is almost no literature.
E-18-155	A	10	4			Add at the end of this bullet the following: "public health services, and budgets and capabilities for research also contribute critically to the development of human capital (Goklany 2006a);" (Indur Goklany, US Department of the Interior)	JR: We are quoting Yohe and can't change the text. No change.
E-18-156	A	10	10			could add to this bulleted list, the degree to which the fossil energy sector exerts disproportionate political influence. (Henry David Venema, International Institute for Sustainable Development)	JR: see answer to previous comment
E-18-157	A	10	20	10	20	What did the "recent research" find? (Rachel Warren, School of Environmental Sciences)	JR: Our point here is what the recent research did, not what I found. We could add a sentence summarizing findings.
E-18-158	A	10	24	10	25	Add Goklany (2006a) as a reference. (Indur Goklany, US Department of the Interior)	JR: see response to E-18-152
E-18-159	A	10	25	10	26	I wonder if it is correct to say ability to adapt as adaptation is spontaneous. The question here is the effectiveness of the action (see above). In contrast one can say the ability to mitigate. (Youba Sokona, Sahara and Sahel Observatory (OSS))	JR: don't understand point.
E-18-160	A	10	32	10	43	For this para, add the following references: Goklany (2005c, 2006a). (Indur Goklany, US Department of the Interior)	JR: see response to E-18-152.
E-18-161	A	11	8			Define path dependency and lock-in - too technical for AR4 without explanation. (Jean Palutikof, Met Office)	JR: will add parenthesis
E-18-162	A	11	9	11	11	Sentence beginning 'Technical and social pathways…' Relevance? (Jean Palutikof, Met Office)	JR: will remove or add clause making relevance apparent.
E-18-163	A	11	9	11	12	A very jargon-riddled sentence (Henry David Venema, International Institute for Sustainable Development)	JR: will remove or add clauue making relevance apparent.
E-18-164	A	11	29	11	51	Drop Figure 18.1: it is not very illuminating or instructive without any indication of how alternative dvelopemnt pathways might interact with/depend upon/ drive Response capacity and/or the balance between adaptation and mitigation. An	JR: I think figure is useful but will defer to chapter WT. But see comment

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						interesting and relevant discourse addressed in the following paragraphs but not helped in any form by the Figure. (Tom Kram, Netherlands Environemntal Assessment Agency)	E-18-167.
E-18-165	A	11	30	11	51	fig 1 does not say anything and could be dropped (Jonathan Köhler, Tyndall Centre, university of Cambridge)	JR: See response to E-18-164.
E-18-166	A	11	41	11	48	Cross reference WGIII Ch 3 section 3.6 (Rachel Warren, School of Environmental Sciences)	JR: Will look and cross reference as appropriate.
E-18-167	A	11	49		51	in the figure capture add at the end: "and different levels and possibilities for adaptation an mitigation" - to capture that aspect mentioned in the text. It seems important enough! (Susanne Moser, National Center for Atmospheric Research)	JR: Will do if Figure is retained.
E-18-168	A	12	20	16	21	This statement in relation to the Kyoto Protocol is only true of this study and if other damage functions are used then other results are found eg . Roughgarden and Schneider (1999) It is inappropriate therefore to introduce one study from one part of the spectrum as a kind of stylized fact here. More general formulation should be found (William Hare, Potsdam Institute for Climate Impact Research (PIK))	JR: comments eems misplaced. It doesn't seem to apply to the cited text.
E-18-169	A	12	38	12	41	Add to this list of references, Goklany (1995) which was probably the first to make the connections between the ability to adapt (nowadays called adaptive capacity), the ability to mitigate (i.e., mitigative capacity), and sustainable development, and Goklany (2006a). (Indur Goklany, US Department of the Interior)	JR: have looked at these references. They don't add anything. No change.
E-18-170	A	12	42			change "which" to "that" (Danny Harvey, Dept of Geography, University of Toronto)	JR: agree
E-18-171	A	12	44	12	44	I find it very hard to see that sustainable development can be "seen through a climate change" lens. Sustainable development is almost by definition broader than climate change. The existence of co-benefits from climate actions does not imply at all that SD is nested inside climate change, (Jim Skea, University of Sussex)	JR: Presumably anything can be seen through a climate change lens, whether it is "broader" or "narrower". Seeing through alens is not the same as being nested inside. No change.
E-18-172	A	12	44			the connection with SD could be met with reference to clarified thinking from the TAR, which did not produce a clear definition of adaptive capacity, bud did observe that, "the ability to adapt clearly depends on the state of development… underdevelopment fundamentally constrains adaptive capacity,	JR: We refer to the TAR view on the linkage between adaptive response and evelopment paths on page 11, lines 13-15, and to the linkage between vulnerability on page 13, lines 18-19. No

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						especially because of a lack of resources to hedge against extreme but expected events" (IPCC, 2001c, p.899) (Ribot et al., 1996). Enhancing adaptive capacity, "involves similar requirements as promotion of sustainable development" such as resource access, poverty reduction, increased equity and increased capability to participate in local politics and actions (IPCC, 2001c, p. 899). (Henry David Venema, International Institute for Sustainable Development)	change.
E-18-173	A	12	47	12	47	Cross reference section on ancilliary benefits in WG3 Ch 3. Use of "might" is confusing, suggest "can" (since whether +ve or -ve effects on air pollution depends on specific mitigation option one is looking at. State calculated range of potential co-benefits (copy from elsewhere in IPCC). Explain that these cobenefits are immediate rather than long term in nature and that they can be extremely large. Make consistent with numbers quoted in Ch 3 WG3. (Rachel Warren, School of Environmental Sciences)	JR: See response to E-18-166 re cross-reference. Will change "might" to "can". Will look for quantitative results in ch. 3, WGIII.
E-18-174	A	13	1	13	1	What does the linkage between urban food growing in the UK and reduced crime have to do with climate change? (Jim Skea, University of Sussex)	JR: As the text notes the CC effect is reduced transport emissions. The other two dimensions cited illustrate thelink to development issues. No change.
E-18-175	A	13	1	13	4	How are these activities related to adaptation and mitigation? (Jean Palutikof, Met Office)	JR: will add the CC linkage in lines 3-7.
E-18-176	A	13	4	13	7	very good point - deserves elaboration (Henry David Venema, International Institute for Sustainable Development)	JR: see response to E-18-175
E-18-177	A	13	4		7	Not just for countries, but also within countries across sectors and within regions. (Susanne Moser, National Center for Atmospheric Research)	JR: agree but don't have references to cite. No change.
E-18-178	A	13	11	13	11	replace "conversely" with "obviously" or delete the sentence. (Henry David Venema, International Institute for Sustainable Development)	JR: change "conversely" to "however"
E-18-179	A	13	14	13	15	I don't find the "viewing through the Sd lens" approach very illuminating (Jim Skea, University of Sussex)	JR: The two approaches are very different in emphasis. No change.
E-18-180	A	13	18	13	19	Rewrite the sentence on this line as follows: "It has **also** been ~~further argued~~ **noted** that sustainable development ~~might~~ **would** decrease the vulnerability of developing countries to climate change impacts (IPCC 2001b; **Goklany 1995, 2000a, 2006a) and, moreover, would enhance both adaptive and mitigative capacities** ~~thereby having implications for the necessary amount of both adaptation and mitigation efforts~~. **This is based on the observation that the determinants of adaptive and**	JR: will look at references again and, if they support this text, will change as proposed.

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						mitigative capacities (e.g., availability of technological options, and access to economic resources, social capital and human capital) largely overlap, and that many of the factors underlying or related to these determinants are themselves indicators of sustainable development (e.g., per capita income, and various public health, education and research indices) (Goklany 2006a). There are two general approaches whereby progress could be made on sustainable development in conjunction with advances in adaptive and mitigative capacities. The first approach consists of implementing measures that would reduce existing climate-sensitive hurdles to sustainable development by reducing vulnerability to hunger, malaria or other climate-sensitive diseases and problems that might worsen under climate change. The second approach consists of broadly moving sustainable development forward by developing and/or nurturing institutions, policies and infrastructure to stimulate economic development, technological change, human and social capital, and reducing specific barriers to sustainable development. This, too, would enhance adaptive and mitigative capacities (Goklany 2000a, 2003, 2005a, 2006a)." [New language is shown in **bold**; deletions are indicated by ~~strikeouts~~.] (Indur Goklany, US Department of the Interior)	
E-18-181	A	13	18			the word "sustainable" is not needed. Any development will reduce vulnerability (for as long as it lasts). You could keep "sustainable" if you insert "longterm" before "vulnerability" (Danny Harvey, Dept of Geography, University of Toronto)	JR: disagree. There can be unsustainble development and it would not have the effect noted here. No change.
E-18-182	A	13	32	13	42	Add bullet point to summary at start of chapter about page 13 lines 32-42 the link between climate change and sustainable development (Rachel Warren, School of Environmental Sciences)	JR: This could be done but the TSU is laready suggesting less emphasis on SD int his chapter. No change.
E-18-183	A	13	32	14	8	Delete, as not related to topic of chapter and covered elsewhere in AR4 (Axel Michaelowa, Hamburg Institute of International Economics)	JR: This depends on resolution of TSU concern about length of treatement of SD in this chapter. But eliminating the text proposed here would make transition to text on page 14 very awkward.
E-18-184	A	13	34			Add Beg et al. citation here (Jan Corfee-Morlot, University College London & OECD)	JR: will do
E-18-185	A	13	44	14	8	Please make the reference to section 2 chap 12 WGIII (Youba Sokona, Sahara and Sahel Observatory (OSS))	JR: will do

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E-18-186	A	13	48		50	could also note that the climate change or global environmental change policy literature is also addressing these points; many relevant refs e.g. - Redclift, Michael, and Ted Benton (Eds.). 1994. Social Theory and the Global Environment. London and New York: Routledge.- Tonn, Bruce. 2003. "An equity first, risk-based framework for managing global climate change." Global Environmental Change 13:295-306. - Brown, Donald A. 2003. "The importance of expressly examining global warming policy issues through an ethical prism." Global Environmental Change 13:229-234. - Oppenheimer, M., and A. Petsonk. 2005 in press. "Article 2 of the UNFCCC: Historical Origins, Recent Interpretations." Climatic Change. - Ott, H E, H Winkler, B Brouns, S Kartha, M Mace, S; Huq, Y Kameyama, A P Sari, J Pan, Y Sokona, P M Bhandari, A Kassenberg, E L La Rovere, and A Rahman. 2004. "South-North dialogue on equity in the greenhouse. A proposal for an adequate and equitable global climate agreement." Eschborn, Germany: GTZ. - Banuri, Tariq, K. Goran-Maler, M.Grubb, H.K.Jacobson, and F.Yamin. 1996. "Equity and Social Considerations." in Climate Change 1995 - Economic and Social Dimensions of Climate Change, edited by J. Bruce, H. Lee, and E. Haites. Cambridge: Cambridge University Press. (Jan Corfee-Morlot, University College London & OECD)	JR: thanks, will add this point and these references.
E-18-187	A	14	1	14	44	Investing across all business sectors does not employ the best use of capital in addressing the mitigation issue. Investments should be directed to projects with the best cost:benefit ratio. (James Bero, BASF)	JR: I think this comment is for section 18.4
E-18-188	A	14	3			this is a value-laden and biased statement. Reword as " … balance to what some perceive as an overemphasis …" (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-189	A	14	14	14	18	Hydroelectricity is not yet the larger share of electricity production in the Sahel (Youba Sokona, Sahara and Sahel Observatory (OSS))	
E-18-190	A	14	16			An odd shift to the very specific Sahelian case (John Morton, University of Greenwich)	
E-18-191	A	14	17			insert a comma after "agriculture" and delete "both of" (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-192	A	14	18			insert a comma after "production" and "respectively (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-193	A	14	24			COMMENT SECTION 18.4 This is a new section that was not in the FOD and includes much material that is controversial in WGIII as accepted fact here. I think this is not correct here and this whole section should be reviewed to remove all	It is difficult to tell how much of the comment refers to Section 4.1 and how much to Section 4 in general. I suspect the latter to be the case.

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						issues which are properly the province of WGIII (William Hare, Potsdam Institute for Climate Impact Research (PIK))	I was under the impression that mitigation does fall exclusively under the mandate of WGIII but for purposes of comparison with adaptation options is also considererd in WGII. FT: Most parts of section existed, a new part was added at the CoChairs'request. Difficult to write and A-M chapter if it is limited to A .
E-18-194	A	14	26	15	19	Section 18.4.1 Very helpful. Row 38. But not perfect substitutes, "At the highest level of abstraction". I suggest clarifying that. (Juan Llanes-Reguerio, University of Havana)	Agreed, see text modification See suggested response to GOV comments on the same topic (substitutability).
E-18-195	A	14	28	18	44	section 18.4.1 blatantly contradicts earlier discussions by stating as a fact that "adaptation and mitigation are substitutes" when they are in fact complementary, and that "adaptation and mitigation compete for finite resources" when it has been explained earlier that different budgets are involved. Page 16 suggests a need for the derivation of an "optimal policy" and quotes results of individual studies, without reflecting on the vast array of assumptions that go into determining the results of such studies, i.e. the fact that rarely are such studies accompanied by an appropriate level of uncertainty analysis; the studies rarely reflect the wide array of literature in the field of climate change damages and impacts. Page 24 line 6-7 also talks about a mitigation-adaptation tradeoff. Thus overall the chapter begins with a well balanced picture of how adaptation and mitigation interact, but later sections (particularly 18.4) contradict this. Thus section 18.4 needs to be re-written to reflect the statements in the chapter summary about the difficulties inherent in cost benefit analysis, the reasons why adaptation and mitigation are complementary, and why it is not necessarily the case that implementing more of one implies implementing less of the other because different budgets and actors are involved. Although page 16 line 14 does touch on one aspect of this, this is not enough. (Rachel Warren, School of Environmental Sciences)	Agreed, see text modification in new section 18.3 that combines 18.4.1 and 18.5.1. New introduction and definitions are now consistent throughout the chapter.
E-18-196	A	14	30		30	After "uncertainies" add "and competing pressures, goals, and market signals." (Susanne Moser, National Center for Atmospheric Research)	Done
E-18-197	A	14	34	34	14	"…to adjust to climate change should it occur". It is argued elsewhere in the text that climate change can be observed already now. (Martin Welp, University of Applied Sciences Eberswalde)	Agreed, see text modification
E-18-198	A	14	34		34	"should it occur" is contradictory to the entire AR4, and contradictory to your own chapter, section 18.1. Delete, we're beyond that point! (Susanne Moser, National Center for Atmospheric Research)	Agreed, see text modification

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E-18-199	A	14	37	14	44	I do not understand your statement that adaptation and mitigation are policy substitutes; the more is done of the one, the less need to be done of the other; and adaptation and mitigation compete for finite resources (it is not a question of finite resources but the one of political will as resources exist such as money spend in irak and/or similar actions or on arms), the more is done of the one, the less can be done of the other. this is too restrictive and does not seem to me correct. The case of air conditioning affecting mitigation is when energy source is fossil. (Youba Sokona, Sahara and Sahel Observatory (OSS))	Note text modification
E-18-200	A	14	38	14	41	Statements 1 and 2 are simply too simplistic. Actions on mitigation and adaptation is not (or should not be) a zero sum game in either a policy or funding sense. We simply can not make a linear deduction on how much mitigation is required simply on the basis of how much has (or has not) been invested in adaptation. With uncertainties about range of temperature change, rate of temperature change, the impacts of those changes, let alone the costs of those impacts, to portray adaptation and mitigation as some sort of simple arithmetic challenge is dangerously misleading. I would redraft these two statements to reflect that complexity. Suggestions: "1. Adaptation and mitigation are not mere policy substitutes. Both are necessary to best prepare humankind for the changes in global climate that are and will be taking place over this century. 2. "Therefore adaptation and mitigation should not be regarded as competition for finite resources. There is a necessity to fund both sorts of activities, most effectively in ways that support other economic and social priorities." (John Drexhage, International Institute for Sustainable Development)	Point well taken. See text modification in new 18.3
E-18-201	A	14	40	14	41	there is an explicit claim here that adaptation and mitigation compete for funds. This is not supported elsewhere in the text. Is it possible to cite evidence (or the absence of evidence) to pin down this issue? Thinking how budget-setting processes work in the UK I can't think of a single mechanism through which a trade-off might become explicit. (Jim Skea, University of Sussex)	See text modification
E-18-202	A	14	40	14	41	poinjt no.2 not true if there are synergies (Jonathan Köhler, Tyndall Centre, university of Cambridge)	See text modification
E-18-203	A	14	43	14	43	Is there evidence that wind energy is more vulnerable to climate change than other forms of energy? (Jim Skea, University of Sussex)	No
E-18-204	A	14	44	14	45	should add to this bulleted list: "adaptation and mitigation can be mutually reinforcing and synergistic" such an omission is odd, given that the existence of synergies is prominently noted in the Exec Summary	Agreed

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						(Henry David Venema, International Institute for Sustainable Development)	
E-18-205	A	14		15		Section 18.4.1 should go beyond the basics of decision analysis. For one thing, it should state that there hasn't been much work in adaptation research that has been framed as a decision-nalytic problem under uncertainty; and second, you should mention some more sophisticated developments in this regard. For example, Lempert and colleagues approach to robust decision making. (Susanne Moser, National Center for Atmospheric Research)	There appears to be some confusion here. The point is to frame the problem identify the key elements, and highlight the fact that there will be opportunities for learning and midcourse corrections. ***This is not a section that reports on analysis.*** Although it would be desirable to present formal analyses of the interactions between mitigation and adaptation as the first paragrapth of 4.2 suggests this research is at a very rudimentary stage. Lempert work is cited in the revised chapter.
E-18-206	A	15	1	17	36	It is unclear to me what this paragraph adds - if we are going to present decision analysis as one (its seems from this preferable) "framework" for decisionmaking, certainly we must present in a more balanced way with other types of frameworks (e.g. how does it compare with CBA, CEA, TWA etc). Analytic-deliberative or more deliberative approaches might also be covered -- as ways to work with climate change choices and trade-offs in democratic policy processes. However, this material is now covered in many other parts of AR4 and in a more thorough way than what is found here (e.g. WGIII/Ch2; WGIII/Ch3, section 6; WGII/Ch19) so if you choose also to cover it here, it should be with the added value that a focus on ad/mit interactions can provide. Much wider coverage of the literature is needed than what is found here -- where we see only one or two, sometimes dated references to what is a large and growing literature in these various (model-based) approaches to policy assessment -- see refs from sections of AR4 cited above. (Jan Corfee-Morlot, University College London & OECD)	Please note above comments and clarifications in text. As noted by the reponder formal analytical techniques for addrssing the issue are presented elesewhere in AR4 including section 4.2and 3. Other frameworks are covered in following sections, this section frames the issue more broadly but not as a prescription for how all assessments should be pursued.
E-18-207	A	15	3	15	3	The only references in this section are very old. (Manne and Richels 1992 the most recent). Isn't there more literature around on decision analysis as applied to climate change? I thought Chris Hope at the Judge Institute in Cambridge UK had done some work (Jim Skea, University of Sussex)	This is not meant to be a reference to an analysis only to the “act then learn then act again” nature of the decision problem. I
E-18-208	A	15	10	15	51	This is all outdated material. It should be replaced with the following: "Early work on decision frameworks in the face of uncertainty suggested an incremental and iterative process of taking initial actions that leave open a wide range of subsequent emission trajectories, than deciding on subsequent steps on the basis of ongoing	The responder is presenting the results of an analysis. To the extent that integrated assessments are being reviewed in AR4 the assessment should be included. I find it

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						learning (Manne and Richels, 1992). A recent analysis by Harvey (2006) has examined two kinds of uncertainty: uncertainty concerning climate sensitivity and uncertainty concerning the global mean temperature change beyond which unacceptable impacts that should be avoided under Article 2 of the UNFCCC occur. He shows that, for any plausible future resolultion of these uncertainties, stringent near term constraints on CO2 emissions (retruning global fossil fuel emissions to the 2010 level by 2020) are required. If the outcome of further research indicates a climate sensitivity in the middle of the current concensus range of 1.5-4.5 C, then emission reductions must continue for at least another few decades and possibly down to zero by 2100. If the outcome of further research indicates a climate sensitivity at the low end of the current concensus range of 1.5-4.5 C, and if it indicates that major ecosystem loses will not likely occur until more than 2 C, then emissions could be stabilized at close to the 2010 level for the rest of the century. However, significant negative impacts to marine ecology would occur through the absorption of CO2 by the oceans and the resultant change in ocean water chemistry. Thus, irrespective of how current uncertainties are resolved (with the range currently regarded as plausible), stringent constraints on CO2 emissions are required. Further research to resolve current uncertainties has no practical implications for the required near term emission trajectory (given Article 2 of the UNFCCC), but will inform the additional constraints required after 2020". REFERENCE: Harvey, L.D.D.: 2006b, 'Plausible resolution of uncertainties in global-warming science has no near-term practical implications for climate policy', Climate Policy (submitted). (Danny Harvey, Dept of Geography, University of Toronto)	difficult to believe that there are no areas where better information would not be helpful
E-18-209	A	15	19			This is classic "Adaptive Management"; the term and Buzz Holling's work should be cited. (Henry David Venema, International Institute for Sustainable Development)	Agreed.
E-18-210	A	15	22	15	50	fig 2 is wrong, as it implies there is necessarily a choice between Adaptation and Mitigation. If they are undertaken by different actors, there may be no trade off (Jonathan Köhler, Tyndall Centre, university of Cambridge)	See clarifications to text
E-18-211	A	15		15		Figure 18.2 is actually pretty aweful and hard to understand. (Susanne Moser, National Center for Atmospheric Research)	Dropped
E-18-212	A	15				Section 18.4.2: Material on cost-benefit analysis etc duplicates material in Box 17.2 (Mick Kelly, University of East Anglia)	Does not. Here it is global CBA, Box 17.2 is CBA application in adaptation only. Cross reference to WGII Chapter. 2

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E-18-213	A	16	2	17	36	Section 18.4.2 Your comments devoted to decision tools (CBA, TWA, CEAs). Why not MCA, (Multi Criteria Assessment). Very useful when complexity, uncertainty and values in conflict. (Juan Llanes-Reguerio, University of Havana)	Added Cost-benefit analysis is a special form of multi-criteria analysis. In both cases, policies are judged on multiple criteria, but in cost-benefit analysis all are monetized while multi-criteria analysis use a range of mathematical methods to make trade-offs explicit and resolve them. Multi-criteria analysis has only few applications to climate change (e.g., Bell et al., 2003; Borges and Villavicencio, 2004).
E-18-214	A	16	11	16	11	P. 16 r. 11 Optimal policy mix. Coming back to your example on P. 2 r. 38 and 39, and P. 3 r. 7-20. Highest ancillary benefits from mitigation for developing countries are not health benefits from reduced outdoor air pollution but afforestation and similar practices with forestry. Despite all problems mentioned, linking adaptation and mitigation in such a way would reduce SCC and overall costs. Some other references other case studies on this issue?. Also p. 19 r. 23-33. (Juan Llanes-Reguerio, University of Havana)	These issues are relevant to the discussion on p 19, not addressed here.. No action.
E-18-215	A	16	14	16	14	Can this statement be explained? (Jim Skea, University of Sussex)	Explained. Note these positions are not contradictory: they just emphasize different aspects of the same problem.
E-18-216	A	16	14			insert "that" after "note" (Danny Harvey, Dept of Geography, University of Toronto)	Added.
E-18-217	A	16	15			Insert the following new paragraph: “Yet others, while noting that greater adaptability might reduce the costs of mitigation by either raising the level at which GHG concentrations lead to ‘dangerous anthropogenic interference’ or postponing mitigation, also note that adaptation and mitigation are temporal complements. Under this view, in the short-to-medium term (i.e., the next few decades) adaptation measures would be more cost effective, particularly measures that would reduce vulnerability to climate-sensitive problems that are currently urgent and could be exacerbated by climate change. However in the longer term, mitigation could be unavoidable. (Goklany 2003, 2005a, 2006a).” (Indur Goklany, US Department of the Interior)	Added: Yet others note that adaptation is the only available options for reducing climate change impacts in the short- to medium-term, while the long-term has a mix of adaptation and mitigation (Goklany, 2006).

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E-18-218	A	16	16	16	25	This paragraph is very one side description of cost benefit analysis (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Added "Cost benefit analysis requires conversion of many different damages to a common metric through monetisation, for example, by polling people's values of different benefits, and the use of discount rates, which is controversial over long time scales like those of climate change but common practice elsewhere. Discounting implies that long-time-scale earth system transitions such as melting of ice sheets, slowdown of the thermohaline circulation or the release of methane have small weight in a CBA and therefore tend to attach little weight to adaptation costs (see also C|hapter 17)."
E-18-219	A	16	21			models such as DICE and RICE have close to zero credibility as predictive tools (except maybe among some economists) so, AT THE VERY LEAST, insert the following after "abatement": "(subject to the assumptions, simplifications, and abstractions embedded in this model)" (Danny Harvey, Dept of Geography, University of Toronto)	Added: Note that DICE, like all models, has assumptions, simplifications and abstractions that affect the results.
E-18-220	A	16	22	16	25	This sentence is completely unbalanced and does not include all of the main reasons why CBA is not actually applied in practice to the climate change problem. These issues are discussiin in Chapter 2 of WGIII in a much more neutral way and I would suggest deferring this back to this WG (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Added "Cost benefit analysis requires conversion of many different damages to a common metric through monetisation, for example, by polling people's values of different benefits, and the use of discount rates, which is controversial over long time scales like those of climate change but common practice elsewhere. Discounting implies that long-time-scale earth system transitions such as melting of ice sheets, slowdown of the thermohaline circulation or the release of methane have small weight in a CBA and therefore tend to attach little weight to adaptation costs (see also C|hapter 17)."
E-18-221	A	16	24	16	25	Add "but cost benefit analysis also requires conversion of many different damages to a common metric through monetisation, and hence through subjective judgements about the values of very different benefits and the appropriate use of discount rates, which is very controversial. Rarely do such studies incorporate a	Added "Cost benefit analysis requires conversion of many different damages to a common metric through monetisation, for example, by polling people's values of

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						thorough uncertainty analysis of the implications of this process. Further, damages of climate change may well be experienced mainly due to the impacts of extreme weather events which are typically omitted from CBA anslyses and also very difficult to predict. The use of high discount rates means that long-time-scale earth system transitions of momentous consequence such as melting of ice sheets, collapse of the thermohaline circulation or the release of methane clathrates have almost no weight in a CBA analysis whilst they would be clearly of great importance to policy makers." (Rachel Warren, School of Environmental Sciences)	different benefits, and the use of discount rates, which is controversial over long time scales like those of climate change but common practice elsewhere. Discounting implies that long-time-scale earth system transitions such as melting of ice sheets, slowdown of the thermohaline circulation or the release of methane have small weight in a CBA and therefore tend to attach little weight to adaptation costs (see also C|hapter 17)."
E-18-222	A	16	27	16	41	Comment on whether TWA includes dynamics - in particular that with increased near term emissions rates of change of temperature are faster and so climate impacts for the same temperature rise are greater. (Rachel Warren, School of Environmental Sciences)	Italicised *rates* and magnitudes in original text.
E-18-223	A	16	27	16	41	(Repeated from review comment on FOD): in my view the TWA approach does precious little to the adpatation/mitigation dilemma. It sets boundaries based on the desire to avoid futures that are characterized in totally unscienfic language (Intolerable, unacceptable). In my view TWA rnaks under CEA, despite its having some specific interesting properties, it does not do significantly more than other CEA based models. (Tom Kram, Netherlands Environemntal Assessment Agency)	FT: insrert: it deals with adaptation indirectly through the application of the model. No, TWA is not a CEA see Toth 2003 in CC.
E-18-224	A	16	31	16	33	Is the TWA really only a "relaxed version" of CBA., It is based on a very different approach to policy. This sentence should be deleted (William Hare, Potsdam Institute for Climate Impact Research (PIK))	FT: Yes it is; see the TWA authors' own characterization. No change.
E-18-225	A	16	41	16	41	The statement that TWA can not provide an optimal policy is out of place here as it is only meaningful if it is assumed that an "optimal policy" can only be determined in purely economic terms and by implication CBA. Delete this please and defer this kind of discussion to WGIII Chapter 2 (William Hare, Potsdam Institute for Climate Impact Research (PIK))	FT: TWA never meant to be optimizing, see 224. Cross referencing added also in the section opening..
E-18-226	A	16	41			the statement that CBA can provide "optimal" policies is completely indefensible and, quite frankly, is surprising to see in a high-level report such as this! The policy of not reducing emission now because the expected deaths and suffering occur in the future will certainly not be regarded as "optimal" by those who die or suffer, not to mention the loss of irreplaceable ecosystem services that can't even be properly given a monetary value in the first place. The issue of whether CBA produces "optimal" results has been discussed by Azar (1998). This and the salient points from Brown (1998) should be discussed when introducing CBA. Brown (1998)	Added: (for a wide range of definitions of what is "optimal"; see Azar, 1998; Brown, 1998; Tol, 2001, 2002; Chapter 2) Note that we added this to the paragraph on cost-benefit analysis.

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						objects to the use of CBA to determine GHG emission trajectories on the grounds that (1) discounting is inappropriate, (2) CBA fails in many ways to account for the foundations of moral obligations, and (3) GDP is a mistaken measure of human well-being. REFERENCE: Azar, C. 1998 Are optimal emissions really optimal? Environmental and Resource Economics 11, 301-315; Brown, P.G. 1998 Toward an economics of stewardship: The case of climate. Ecological Economics 26, 11-21 (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-227	A	16	43	16	50	Suggest delete this para. It is clearly badly written, clearly biased and its subject matter belongs in WGIII (William Hare, Potsdam Institute for Climate Impact Research (PIK))	FT: text revised, clarification and cross-reference to WGIII added.
E-18-228	A	16	43	16	50	I find this paragraph to be quite biased in its tone and choice of words. I suggest something like: "Cost effectiveness analyses (CEA) recognize that it is not possible to assign a meaningful monetary value to the species and ecosystems that would be lost due to global warming (up to 50% of terrestrial species lost with 4 C warming, as indicated in Chapter 19, Section 19.3.4); that there are major conceptual, methodological, and ethical issues associated with discounting of future impacts; and that the costs of reducing emissions are highly dependent on a wide range of assumptions and conditions that to some extent are matters of policy choice. Instead, CEA focuses on finding the least-cost way of satisfying pre-determined GHG concentration limits." Then - add references to examples of CEA. (Danny Harvey, Dept of Geography, University of Toronto)	This conflicts with a more appropriate remark by the US government. It is not true either. Cost-effectiveness analysts have a variety of reasons not to do cost-benefit analysis.
E-18-229	A	16	43	16	43	Don't we need some citations of the many CEAs (Jim Skea, University of Sussex)	Citations added and cross-reference to WGIII Ch03 is made.
E-18-230	A	17	1	17	36	There seems to be an unusual emphasis on malaria - this text should address other impacts and the "more generally" aspects need to be expanded. (Rachel Warren, School of Environmental Sciences)	malaria > malaria, the best-studied health impact
E-18-231	A	17	1	17	1	Back to zero sum games and trade-offs - which is perhaps intrinsic to a decision analytic approach though contradicted in much of the rest of the chapter. (Jim Skea, University of Sussex)	New introduciton explains and clarifies trade-offs.
E-18-232	A	17	2	17	4	This citation to Schelling is gratuitous and out of date. The paper is about discounting and concludes after listing all the things omitted from the analysis that "any implications for greenhouse policy are limited accordingly". Hence it cannot be used to justify this statement here. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	The trade-off discussion improved and moved to the intro. It depends on time frame and level of aggregation. Schelling is a frequently quoted source.
E-18-233	A	17	5	17	7	This reference is hardly an adequate discussion of this issue although it clearly fits with the line of writing so far in this section: but is that the point of this assessment, to fit in with a predetermined line of argumentation. As Tol specifically points	Paragraph revised but not dropped because Tol is part of the relevant literature. The Stern Review is cited elsewhere in the chapter.

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						outin the paper this work does not address the subject of the paragraph_ trade off between expenditured. Drop it. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	
E-18-234	A	17	6	17	7	The point is that an infinity of local adaptations cannot compare in efficiency with overall emission reduction which targets the infinity of local climate impacts simultaneously. Moreover, some impacts cannot be adapted to at all, either because the limits to adaptation are exceeded or because no adaptation options can be found. (Rachel Warren, School of Environmental Sciences)	Added This implies that concern about increases in infectious diseases is not a valid argument for greenhouse gas emission reduction (there are of course other arguments for abatement).
E-18-235	A	17	7			Add the following new sentences at the end of this para: "More broadly, Goklany (2003, 2005a), based on results of the global impacts of climate change on hunger, malaria, coastal flooding, and water stress [as reported in Arnell et al.(2002) and a series of papers reported in Global Environmental Change, v. 14 (2004)] has shown that through the 2080s at least, efforts to reduce vulnerability to climate-sensitive problems that might worsen because of climate change would be far more cost-effective in reducing these problems than would any mitigation scheme, including the Kyoto Protocol and stabilization at 550ppm or 750 ppm. The fundamental reason for this is that through the 2080s at least, the contribution of climate change to these problems (as measured by the population at risk for these hazards) is usually small compared to the contribution of non-climate-change-related factors. Therefore, mitigation would address only the smaller portion of these problems – one reason for its low effectiveness -- whereas a program focused on reducing climate-sensitive vulnerabilities would address the entire (larger) problem. [Coastal flooding is an exception to this rule, but the costs of adaptation to coastal flooding are relatively modest to mitigation. Notably, this analysis does not assume any discounting.] Goklany (2003, 2005a), also notes that the additional funding needed to implement to Millennium Development Goals would provide substantially more benefits even in terms of reducing climate-sensitive problems than either a program strictly focused on climate-sensitive problems or any mitigation program." (Indur Goklany, US Department of the Interior)	Added More broadly, Goklany (2003, 2005a) shows that the contribution of climate change to hunger, malaria, coastal flooding, and water stress (as measured by the population at risk for these hazards) is usually small compared to the contribution of non-climate-change-related factors, He argues that through the 2080s at least, efforts to reduce vulnerability would be far more cost-effective in reducing these problems than would any mitigation scheme.
E-18-236	A	17	13	17	14	Add "but like cost benefit analysis, this analysis required conversion of many different damages to a common metric, and if that is through monetisation then inevitably subjective judgements about the values of very different benefits relative	Not true. Added Fankhauser and Tol only include those climate change impacts that affect economic

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						to each other, and differing opinions about the appropriate choice of a discount rate, and hence such analysis is controversial" (Rachel Warren, School of Environmental Sciences)	performance; they did not use monetisation techniques.
E-18-237	A	17	18		20	You should add a sentence to explain why this is the case. It's hard to take these statements on face value because they're not exactly intuitively obvious. (Susanne Moser, National Center for Atmospheric Research)	Added because the impact is small compared to the economy and because economic adjustment processes would dampen the impact.
E-18-238	A	17	22	17	36	While it is perfectly legitimate to cite this study, its limitaitons/assumptions should also be noted. Emission reductions costs are based on which scenario and at what rate of reductions? (John Drexhage, International Institute for Sustainable Development)	Weyant is not a study but a collection of studies, building on a long tradition. We also added a reference to Chapter 3 in WG3.
E-18-239	A	17	22	17	23	Barker et al, IMCP Edenhofer et al, Kohler et al, shows that there is a wide range of estimates of impacts on economic growth, not necessarily negative Terry Barker, Jonathan Köhler and Marcelo Villena (2002), The Costs of Greenhouse Gas Abatement: A Meta-Analysis of Post-SRES Mitigation Scenarios, Environmental Economics and Policy Studies, 5(2), pp135-166. Köhler, J., M. Grubb, D. Popp, and O. Edenhofer (2006). "The Transition to Endogenous Technical Change in Climate-Economy Models: a Technical overview to the Innovation Modeling Comparison Project." The Energy Journal Special Issue, Endogenous Technological Change and the Economics of Atmosperic Stabilization, 17-55. Edenhofer O., K. Lessmann C. Kemfert, M. Grubb and J. Köhler (2006). "Induced Technological Change: Exploring its Implications for the Economics of Atmospheric Stabilization Synthesis Report from the Innovation Modeling Comparison Project Models." The Energy Journal Special Issue, Endogenous Technological Change and the Economics of Atmosperic Stabilization, 57-107. (Jonathan Köhler, Tyndall Centre, university of Cambridge)	Added Note that FUND has somewhat high costs of emission reduction (cf. SAR), and also assumes a large impact of slowed growth in the OECD on the rest of the world. Note and IMCP citations added.
E-18-240	A	17	22	17	36	All this is based one one model with extreme end mitigation costs. This should be discussed in WGIII and not a one side litany presented in this chapter (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Added Note that FUND has somewhat high costs of emission reduction (cf. SAR), and also assumes a large impact of slowed growth in the OECD on the rest of the world..
E-18-241	A	17	22		22	These plain statements are just wrong. The counter examples are just too obvious. For example, investment in wind energy has created jobs, economic security and wealth. It's a growth industry of major proportions. So, just make this a bit more narrow and thus sophisticated if you insist, but in this general form, it's not true. (Susanne Moser, National Center for Atmospheric Research)	Added Although some industries may benefit

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E-18-242	A	17	34		35	Inconsistency with Chapter 17, which make the accurate point that development is not to be equated with adaptive capacity. This sentence in its simplicty overstates the connection, and does not acknowledge the constraints. (Susanne Moser, National Center for Atmospheric Research)	Added although the two are not the same
E-18-243	A	17	34			after "growth" insert: "This assumes that the measures taken to reduce emissions in developing countries entail net costs, and/or that a fixed proportion of national income is allocated to measures to reduce malaria, irrespective of the rate of growth of the economy" (Danny Harvey, Dept of Geography, University of Toronto)	Added unless health care expenditures are decoupled from economic growth
E-18-244	A	17	36			Append the following to the end of this para: “In fact, based on this contingency, Goklany (2000b) argues that aggressive mitigation that goes beyond “no-regrets” would run afoul of the precautionary principle (see also Goklany 2003, 2005a.” (Indur Goklany, US Department of the Interior)	Added Based on this contingency, Goklany (2000b) argues that aggressive mitigation would run afoul of the precautionary principle.
E-18-245	A	17	39	18	45	This section (18.4.3) on avoided damages is extremely weak as it is (and I believe biased in what it presents) but welcome in this chapter as it adds an interesting dimension to your discussion of adaptation and mitigation interactions. What is of interest is the interaction between policy choices (re adapation and mitigation mixes) and residual impacts. Missing in the discussion is: - acknowledgement that there are no common metrics for the measure of damages; it is now widely accepted even amongst analysts that montized estimates are incomplete -- Downing and Watkiss's work. Where estimates exist (i.e. market damages), a wide range of values are possible and valid given the normative assumptions that drive these (see Jacoby; Pitinni and Rahman from our 2004 OECD Benefits book). Overall the section does not discuss significant parts of the literature on these issues - e.g. a recent and growing literature on the avoidance of abrupt change; or the influence of low probability, high risk events on policy outcomes in various frameworks (e.g. cost-effective, economically optimal or optimal hedging strategies, twa/safe-landing). Another example is the path-dependency of certain types of impacts e.g. ecosystem change is sensitive to rates of change, which will vary with the pathway for mitigation. If the focus here is on adapatation/mitigation interactions, then you might want to take the 4 categories of key vulnerabilities outlined in Ch 19 and speak about these interactions for each to the extent they are covered in the literature. It would seem that market impacts and other social system are most relevant as it is here that adaptation could play a significant role. (Jan Corfee-Morlot, University College London & OECD)	Corfee-Morlot suggests that we discuss everything in every section. Most of the issues raised are in fact already discussed elsewhere. The literature on abrupt change is largely void of impacts. Included the proposed references.
E-18-246	A	17	41		51	The citation for Corfee-Morlot and Agrawala 2005 (should be 2004) and is generally inappropriate for this point. The example given here is not attached to	Corfee-Morlot and Agrawala, 2005 > see the literature review and papers in Corfee-Morlot

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						any literature as far as I know, yet there is a literature on social costs of climate. See recent reviews from Pearce, Tol, Watkiss and Downing, Hope -- also much more thorough and balanced review in Ch20/WGII (section by Chris Hope). (Jan Corfee-Morlot, University College London & OECD)	and Agrawala, 2005
E-18-247	A	17	43	17	43	reference to a Pigou tax is superfluous (Jim Skea, University of Sussex)	Removed
E-18-248	A	17	44	17	46	Substantiate or delete sentence about upward bias in grey literature. Quote figure not only for 5% but also 2% discount rate. Convert C into CO2. (Axel Michaelowa, Hamburg Institute of International Economics)	Added For instance, the 95%ile falls from $350/tC to $245/tC if estimates that were not peer-reviewed are excluded. for a 3% discount rate, this is $33/tC for a 3% discount rate, this is €7.10 per person. Left at C. Added updated material from Downing et al. 2006 and clarified in later sections that uncertainty in estimates is quite large.
E-18-249	A	17	48		49	Explain why (Susanne Moser, National Center for Atmospheric Research)	Thee calculus is simple, but the implications are problematic; EU example has been dropped.
E-18-250	A	17	50	17	50	EU aim is for what target year and relative to which baseline? I wonder whether a direct reference to a party to the convention is a good idea? It might be seen as too politically sensitive anyway. (Rachel Warren, School of Environmental Sciences)	Reference to EU has been dropped.
E-18-251	A	17	51	17	51	Not sure about the value of dividing damage costs incurred globally by the number of citizens in the EU (Jim Skea, University of Sussex)	Reference to EU dropped.
E-18-252	A	18	1	18	24	The author's ignore the fact that the diversity of studies in both Warren's and Hare's work (or Chapter 4 or Chapter 19 for that matter) actually are internally consistent. That many different studies, using many different methodologies coming up with a consistent set of thresholds is actually a strong argument for the point at which damages accrue. Furthermore, that there have been few studies countering these values but many more published onthly supporting them. That this evodence is	Changed: see E-18-253 Added a 3% discount rate. See E-18-248 This section is on the benefits of mitigation only.

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						MUCH stronger than the citation of a single author's estimate for damages (e.g., Tol in the paragraph above using an artificially high discount rate; note that Arrow and others have argued that there should be NO discount rate on ecosystem services or that is should be 1%, not 5%). Furthermore, there is a growing body of literature that show that neither adaptation, nor many types of mitigation CAN be used to preserve NATURAL ecosystems. Any attempt to adapt an ecosystem will be expensive and the proper mitigation is to avoid the damages (and this isn't accounted for adequately in Tol's or anyone elses models). So, staying below the thresholds mentioned in Warren, Hare or Chapter 4 or 19, IS the proper technique. The author's further misrepresent the work of Bakkenes (and others). Their offhand remarks that x species coming into an area offset the y species lost is in complete ignorance of how ecosystems actually work. While species may be lost in a short period of time (disturbance), colonization takes hundreds of years (for trees, based on paleo data). If a flaw in these studies is to be emphasized, that would be it - plant migration studies do NOT take into account the lag between extinctions and colonizations. The process can be speeded up (adaptation) but only by planting (at high cost). The author's make a further error in assuming that all ecosystems or components of ecosystems are equivalent and direct replacements of each other (not supported by any literature). This section is very important but it would seem that none of the author's of this chapter have the proper expertise to write it - at least for ecosystems. Furthermore, the author's cherry picking of the economic data (citing one paper of Tol) is of concern and gives the impression of a highly biased approach to the problem. Other author's have presented differing views (Arrow among them) and they should also be included. This section needs to be completely rewritten, preferably be a CA who has a better understanding of the issues and one who can take an unbiased look at all of the data. The author's will also need to take a hard look at the findings of the Stern Review of the Economic Impacts of Climate Change that will be published in a timeframe to allow them to do so in the final draft. (Jeff Price, California State University, Chico)	Discussion of Bakkenes was shortened to focus on avoided impact. See G-18-220. Tol is a meta-analysis. Stern is cited and a box on stabilisation scenarios from WGI and WGIII has been added
E-18-253	A	18	1	18	6	The argument is made that because the analyses of Warrem and Hare are based on many different studies that the results are unreliable. Does that mean that the results of a single IAM as has largely been used in this Chapter to date are in principle more reliable than a wide range of works? The answer is clearly no. If the IAM does not produce damages consistent with more complex models then there would be a greater chance of the IAM being wrong than all the other works combined. Finallly a number of the studies used by Hare adaptation measure are	See E-18-256. Changed to focus on uncertainty rather than reliability (which is a judgement that may assume the use of the estimate is known and that there is an a priori estimate of reliability; noted that the difference in impact may be due

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						included, not as well as could be now but there nevertheless+ (William Hare, Potsdam Institute for Climate Impact Research (PIK))	to a different warming scenario, but also due to differences in models, data, economic scenarios, and even subject and area of study
E-18-254	A	18	1	18	5	Replace with "Warren (2006) draws together a compendium of quantitative estimates of climate impacts drawn from a wide array of authors and journals published between x and 2005, which tog ether provide a compelling picture of how impacts escalate dramatically in human, natural and earth systems as temperature increases. Whilst the studies which it includes inevitably make different assumptions about adaptive capacity in human systems, the overall picture remains clear. Hare (2006) comes to similar conclusions. Both studies contain a detailed compendium of impacts upon ecosystems and the earth system where adaptive capacity is very limited or non-existent, and present a dramatic picture of how impacts accrue with rising temperatures." Note that the fact that the Warren and Hare papers are based on a wide array of literature mean that the implications are more robust to possible bias due to not taking all the literature into account, because some may have been missed in the literature search process, than the use of a single cost-benefit analysis model with a single set of assumptions, based on a selected set of literature. Therefore the suggestion that the method is not reliable because the estimates are taken from different studies is not true: it can be argued that it is much more reliable because it is based on many different studies. (Rachel Warren, School of Environmental Sciences)	Disagree. See E-18-253. Note that there is a preference for the discussion of avoided damages in this section to be limited to studies that consistently measured impacts with the same modeling framework under a baseline (unmitigated) and one or more mitigation scenarios. There are some problems even in this case (mitigation may divert society to a different development path). Taking the difference between impacts under 650 concentration from one study, then under 450 concentration under another and saying that the avoided damage is the difference is nonsense. However, the box on stabilisatiton and the use of various metrics (in section 18.5) are noted in the chapter.
E-18-255	A	18	1	18	10	Overall this paragraph seems to mix up the discussion of some very different types of studies. Impacts - why not include Warren and Hare study in discussion of ecosystems and their sensitivity to migitation? On latter point, it would be useful also to cite Leemans and Eickhout from OECD 2004. On water and health, this discussion needs to acknowledge the Parry et al 2004 work which uses SRES (hence addresses different development scenarios) -- the last sentence is wrong. If one compares high to low emission scenarios, and the change in impacts, there is an implied impact of mitigation. Or did the authors mean something else? (Jan Corfee-Morlot, University College London & OECD)	Integrated this paragraph with the one on Warren et al. Added reference to 18.4.2 where the effect of mitigation on impacts is discussed.
E-18-256	A	18	1	18	10	Not sure as to why this paragraph is in. It doesn't report any of the findings from the Warren and Hare studies but simply rubbishes their methodologies. Why include them at all if they contribute so little? (Jim Skea, University of Sussex)	Revised paragraph is simpler, notes some of the results (but leaves the longer catalogue of multiple indicators of damages to other chapters) and focuses on uncertainty in making these global estimates.
E-18-	A	18	6	18	10	It is not correct to say that the models underlying Parry et al (2001) do not account	The point is that the effect of mitigation on

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257						for adaptation. Parry (2001) does not appear in the reference list to the chapter and I suspect the athors mean Parry & Livermore (eds) 1999 special issue of GEC, or the Parry (ed) 2004 special issue which explores the implications of SRES scenarios for impacts, or Parry 2005 which summarises much of his work. Both includes studies of water stress by Arnell (where it is true that adaptation is not included, so it is correct to say that Arnell et al 2002 (and other Arnell work) does not include adaptation and this is clearly acknowledged by Arnell). BUT this is only 1 impact sector covered in these studies. The other sectors covered are agriculture, coasts and health, all of which consider adaptation. The agricultural impact work assumes three different forms of adaptation, such that adaptation levels vary between countries but not between SRES scenarios. Firstly, adaptation methods included in agriculture are: (a) "level 0" adaptation at zero cost at the farm level, by shifting planting dates and available crop varieties (b) "level 1" low cost adaptation at the farm level by methods such as choice of crop, variety, planting date, and irrigation : this is assumed applied 100% in developed countries and 75% in developing countries and (c) "level 2" adaptation involving some regional or national policy change resulting in major changes in planting dates, availability of new cultivars, extensive expansion of irrigation and increased fertilizer application (Parry 2005). These imply economic adjustements and are applied in developed countries only, based on current GDP. Although a single adaptation scenario was used in the Fast Track study, Rosenzweig and Parry (1994) did study the application of "level 1" versus "level 2" adaptation. They found that for CO2 doubling (which corresponded for the UKMO to a global temperature rise of 4.9C above 1990) that level 1 adaptations largely compensated for yield reductions seen in the developed world, but that developing countries were still unable to compensate for their losses. Overall, the authors found that level 1 adaptations had little influence on reducing the global impacts of climate change (Parry 2005). Level 2 adaptations, however, did significantly offset the impacts. Note that in the Parry 2004 work all three levels of adaptation are considered. Secondly, the Parry1999 and 2004 work includes work on coastal flood impacts, and this work includes several different scenarios for coastal protection involving "constant protection" or "evolving protection" of coasts. Finally the health work in these two special issues has an extensive discussion on vulnerability and regional differences in ability to adapt and the estimations of millions at risk takes account of where malaria is likely to be controllable (Figure 4,	adaptation is ignored. Clarified G-18-117.

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						van Lieshout et al, 2004). (Rachel Warren, School of Environmental Sciences)	
E-18-258	A	18	11			Insert the following new para on line 11: "Goklany (2005a), based on the results of Arnell et al (2002) and the papers underlying Parry et al (2001) and taking explicit consideration of the co-benefits resulting from efforts to reduce the vulnerability to climate-sensitive problems that might worsen with climate change, shows that such an approach is at least through the 2080s, superior to either the Kyoto Protocol or any other stabilization scheme." (Indur Goklany, US Department of the Interior)	This was added to 18.4.2, where it belongs.
E-18-259	A	18	12	18	22	This description of the Bakkenes study does not mention the fact the scenarios described involve the commitment to extinction of a large fraction of the European plant diversity (3-19%). This paragraph should be referred to Chapter 4 and the conclusions to be drawn completed changed; from the Bakkenes study it is clear that the lower the ultimate level of climate chaneg the lower will be the number of species suffering a risk of extinction. I can see from the rest of this section that this this not what the authors of it want to have said but it seems to be what the science is telling us. 550 and 650 according to Bakkenes would lead to major extinction losses. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Shortened the paragraph to focus on avoided impacts. See G-18-20
E-18-260	A	18	12	18	24	The paragraph seems to be attempting to summarise the benefits of mitigation for ecosystems using a few poorly selected examples. Instead a summary matching the ecosystems chapter of WG2 should be put in, or at least a range of examples used representative of Ch 6 info. I suggest that deleting the pgph may be best. It is not appropriate to discuss the results of Bakkenes in such enormous detail when the many other studies (e.g. reviewed in Warren 2006) also make similar comparisons between different stabilisation levels. Sure, Bakkenes is an example of such a study. I can suggest numerous other examples to make this paragraph more balanced: for example, Thuiller 2006 study of African mammals. I suggest if a discussion of ecosystems is required here that there should be a cross reference to the WG2 Ch 3 and its table of impacts at different degrees of temperature rise. "Jones reach a similar conclusion for the Great Barrier Reef" should be deleted since the situation is entirely different. Bakkenes is discussing how plant distributions change, and Jones is showing that the Barrier Reef is very sensitive to small temperature rises, so that very low stabilisation levels would be required to protect it, whilst higher stabilisation levels protect only small parts of it, whilst without mitigation reef ecosystems would be very likely to completely lost. In any case the use of "very stringent mitigation" is not appropriate since the meaning of	Shortened and integrated with previous paragraph. Note that the Bakkenes study it is one of the very few. This is the avoided damage discussion requested by the CoChairs.

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						this phrase is subjective. In fact most studies find huge benefits to ecosystems from mitigation, by implication from the way impacts accrue with rising temperatures. Moreover, WG3 Ch 3 has a section discussing the benefits of mitigation and it would be much better to cross reference to this and to the WG2 Ch 3 ecosystem impacts table. Whilst it is true that some areas will lose species and gain others there are very many examples of extinction risks and major ecosystem losses which accrue rapidly with temperature rise, as explained in Ch 3. The use of the 2 isolated examples, Bakkenes and Jones, is completely inappropriate. (Rachel Warren, School of Environmental Sciences)	
E-18-261	A	18	12		24	Why is there a whole para here on one regional ecosystem study? This should be a synthesis of the literarture -- presumably drawing on your sector chapters (note Ch 19 has done this for ecosystems and comes to a different set of conclusions) (Jan Corfee-Morlot, University College London & OECD)	Shortened and integrated with previous paragraph. Note that the Bakkenes study it is one of the very few. This is the avoided damage discussion requested by the CoChairs.
E-18-262	A	18	12		24	This paragraph runs the risk of meaning very little. It's not just about the net losses or gains of species, but about the disassembly and reassembly of species and consequent changes in internal ecosystem dynamics. THAT is what worries most ecologists, not just the numbers migrating in and out of an area. (Susanne Moser, National Center for Atmospheric Research)	Shortened and integrated with previous paragraph. Note that the Bakkenes study it is one of the very few. This is the avoided damage discussion requested by the CoChairs.
E-18-263	A	18	23	18	24	What work of Jones on the Great Barrier reef? This issue is discusses on pages 37 and 28 of Chapter 4 and once again indicates there are substantial benefits to limiting warming (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Deleted the reference to Jones, as this paper war rejected in peer-review. Warren makes the same point, but stronger.
E-18-264	A	18	26	18	27	This statement, as written, is complete nonsense! Sea level could potentially rise by 10-12 m if critical regional temperature thresholds over Greenland or West Antarctica (in the range of 2-6 C warming) are exceeded for long enough duration. It is still possible to avoid such changes through strong mitigative actions. Thus, the potential avoided impact is huge! Perhaps the avoided impacts are small because of the fiction of discounting catastrophic future events, but this practice is also complete nonsense - what the "discounted" future cost is does not mean anything to the people alive today, because they will not be alive when the impacts occur, and future generations will not exactly be impressed with the concern that we've expressed for their well being (and nobody seriously believes that we will invest the money not spent on mitigation, and that it will grow, untouched, at 3-6%/yr for several hundred years, so let's get real!)	Added at least over the 21st century

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						(Danny Harvey, Dept of Geography, University of Toronto)	
E-18-265	A	18	26	18	29	Avoided impacts are not small if you look further into the future. Further if you wish to prevent melt of Greenland ice immediate mitigation is necessary. Please cross reference WG3 Ch 3 and/or reference Corfee-Morlot and Hohne for benefits of mitigation in which it is stated that ... (Rachel Warren, School of Environmental Sciences)	Added at least over the 21st century
E-18-266	A	18	31	18	36	Why is only one study discussed here? What about the book on the subject Corfee-Morlot and S. Agrawala et al and the special journal issue. The study cited is so extreme that is hard to see what can be generalized from it, as the authors of this para attempt. Some impacts produce larger avoided benefits for lower temperature than others and others saturate or reach thresholds. The point about the 450 scenario actually increasing impacts is not really correct as it depends on the assumed sulphur emissions reference case and on ignoring the detrimental effects of sulphur deposition. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	Many papers in CM-A are not about avoided damages. And: the non-linearity of the damage functions, both in natural units and monetized, has been discussed in the literature for over 15 years. The Tol-Yohe analysis is a recent confirmation of this. Added: Note that other models also find that climate policy would reduce sulphur emissions to below what is required for acidification policy (e.g., Smith et al., 2005; van Vuuren et al., 2006).
E-18-267	A	18	31	18	36	This study is an outlier amongst studies of avoided damages, and is based on a single set of assumptions. Statements about this very important point need to cover a wide range of the literature. Cross reference to Wg 3 Ch 3. (Rachel Warren, School of Environmental Sciences)	The study is not an outlier, as it is the only available study of the sort. Added Note that other integrated assessment models have yet to produce comparable analyses.
E-18-268	A	18	31	18	36	This paragraph is extraordinarily problematic - and implies the unknown and probably highly deleterious impacts of permanently elevatinc co2 concentrations to above 850ppm are tolerable as long as we emit massive amounts of particulates with huge local air and regional air quality impacts - suggest this paragraph be struck, as its poorly explained in any case and fraught with potential for misunderstanding. (Henry David Venema, International Institute for Sustainable Development)	See E-18-266, 267, 269, 270, 271, 272
E-18-269	A	18	31	18	36	The claims in this paragraph contradict the claims made generally throughout this IPCC report and certainly contradict the vast majority of the science on this issue which would claim that 850 ppmv scenario would definitely not mean that most of the serious impacts of climate change would be avoided. In fact, the very opposite	Tol and Yohe is in fact from Exeter. See E-18-266, 267, 269, 270, 271, 272

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						is the case: many now believe that 2 degrees rise (estimated to be no more 400 to 450 ppmvs) would cause serious damages. The benefits of global dimming simply are not outweighed by the significant local health impacts. Suggest that this paragraph be entirely deleted. Or at the very least bring in other literature which takes on signficantly different claims. Suggestion: conclusions of last year's Exeter Conference. (John Drexhage, International Institute for Sustainable Development)	
E-18-270	A	18	31			delete the word "comprehensive", unless the authors think that we really understand the full ecological ramifications of causing a change in climate, in a human-dominated landscape, equivalent to the difference between an ice age and an interglacial climate, but 100 times faster than the transition from the last ice age. In fact, delete the entire paragraph, because the statements in the first part are indefensible from a scientific point of view. My advice is that the authors of this chapter read some of the other chapters of the WGII report, beginning with chapters 4 and 19 (pardon me if I sound a little impolite, but I am actually restraining what I say). With regard to reducing sulphur emissions resulting in greater impacts due to greater initial climatic change, this is an oversimplication of the science. Impacts depend on rates of change and absolute change - it is better to incur a short acceleration in warming now while absolute warming is still relatively small, rather than latter (at some point, sulphur emissions WILL fall). Also, negative forcing by sulphur aerosols does not offset positive forcing by GHGs in terms of impacts, because aerosols have a disporportionate effect in reducing precipitation over land compared to their effect on temperature (this is explained in: Harvey L D D 2006a Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications Clim. Change (accepted)). (Danny Harvey, Dept of Geography, University of Toronto)	Added Dropped the reference to comprehensive and all quantified impacts, emphasising that FUND is an the integrated assessment model that covers many impacts; Watkiss et al. (2005) discuss non-quantified impacts. Note that other models also find that climate policy would reduce sulphur emissions to below what is required for acidification policy (e.g., Smith et al., 2005; van Vuuren et al., 2006).
E-18-271	A	18	31		36	Again, this paragraph is rather dangerous as long as it does not acknowledge the limitations of FUND and any such aggregate studies. If you want a reality check DO read Chapter 17, all the case examples. This chapter is so dominated by economic studies that are fll of rather questionable assumptions (by necessity, as we know, but still far from reality!) and far from these on-the-ground realities, that the chapters begin to contradict each other's messages. It's important that there is some "tampering with realism" in this chapter! (Susanne Moser, National Center for Atmospheric Research)	Added Note the FUND represents impacts in reduced form, does not capture discontinuities or interactions between impacts, and models climate change as being smooth.
E-18-272	A	18	34	18	16	Link between SO2 emission reduction and 450 ppm scenario is unclear and should be explained, otherwise whole sentence should be deleted.	Added: Note that other models also find that climate

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						(Axel Michaelowa, Hamburg Institute of International Economics)	policy would reduce sulphur emissions to below what is required for acidification policy (e.g., Smith et al., 2005; van Vuuren et al., 2006).
E-18-273	A	18	38	18	44	These are very strong conclusions which are not supported by the literarture when one looks across the IA literature (beyond and even within CB studies). See discussion WGIII/Ch3, sections 5 and 6 (where some of your authors are also Las!!) WGII/Ch19 and 20's read of the literature would also not appear to concur with this finding. I agree it is a research priority, but I do not think we can conclude that avoidable impacts on ecosystems are small without also discussing avoidable impacts in other areas (e.g. lowering risk of abrupt geophysical change). (Jan Corfee-Morlot, University College London & OECD)	This conclusion is the same as in Corfee's recent book on this matter. Show > suggest Are > may be
E-18-274	A	18	38	18	38	The fact there are few studies is worth saying at the beginning of this section rather than at the end. (Jim Skea, University of Sussex)	Agree.
E-18-275	A	18	38	18	44	another completely indefensible and biased paragraph that should be deleted, and which implies a surprising lack of awareness of what the literature actually says. Suggested replacement: "Early cost benefit analysis, which either ignored entire categories of impacts or used questionable approaches to assign monetary value to vital and irreplaceable ecological assets, and then heavily reduced the assigned costs of such losses simply because they occur in the future, and which assumed limited and only costly opportunities to reduce GHG emissions, concluded that relatively little emission reduction is justified. This result is not surprising. More recent and more sophisticated CBA, taking into account risk and uncertainty (Roughgarden and Schneider, 1999), the possibility of abrupt and catastrophic changes (Mastrandrea and Schneider, 2001; Azar and Lindgren, 2003), equity related to the unequal distribution of impacts and of income (Azar and Sterner, 1996; Tol, 2001), and allowing for known cost-effective measures to reduce emissions (Keller et al., 2005) and especially taking into account 'learning-by-doing' (Grubb et al., 1995), have concluded that very significant emission reductions are justified. Indeed, with assumptions reflective of the risk-averse framework implicit in Article 2 of the UNFCCC, cost-benefit analysis leads to emission trajectories where fossil fuel CO2 emissions have reached zero by the end of the century or sooner (Keller et al., 2005)." REFERENCES: Azar, C. and Sterner 1996. Discounting and distributional considerations in the	Harvey has missed the entire point of the subsection, and wants to replace it with a rather peculiar summary of a literature on something else entirely. Added reference to 18.4.2, where cost-benefit analysis is discussed.

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						context of global warming. Ecological Economics 19, 169-184. Azar, C. 2000 Economics and distribution in the greenhouse. Climatic Change 47, 233-238 Azar, C. and Lindgren, K. 2003. Catastrophic events and stochastic cost-benefit analysis of climate change, Editorial. Climatic Change 56, 245-255. Grubb, M., Chapuis, T. and Duong, M.H. 1995. The economics of changing course. Implications of adaptability and inertia for optimal climate policy. Energy Policy 23, 417-432. Keller, K., Hall, M., Kim, S.-R., Bradford, D.F., and Oppenheimer, M. 2005 Avoiding dangerous anthropogenic interference with the climate system. Climatic Change 73, 227-238. Mastrandrea, M. and Schneider, S.H. 2001 Integrated assessment of abrupt climatic changes. Climate Policy 1, 433-449. Roughgarden, T. and Schneider, S.H. 1999. Climate change policy: quantifying uncertainties for damages and optimal carbon taxes. Energy Policy 27, 415-429. Tol, R.S.J. 2001. Equitable cost-benefit analysis of climate change policies. Ecological Economics 36, 71-85. (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-276	A	18	41		42	Careful! As long as you don't discuss what the very severe limits are of CBA, a statement like this is just unbelievably dangerous, and - if misused and quoted out of context - damaging. It will be abused if left like this. Adding the following sentence, you run the risk of making another really dangerous mistake, and that is to separate humasn from ecosystems and the services they provide - which are life-essential (see Millenium Ecosystem Assessment. (Susanne Moser, National Center for Atmospheric Research)	Show > suggest Added reference to 18.4.2 where CBA is discussed.
E-18-277	A	19	5	19	5	It is again implied in the absence of evidence that public budget allocations may lead to A-M trade-offs (Jim Skea, University of Sussex)	This is an introduction paragraph. Spending a dollar on mitigation from a given year's public budget, one cannot spend the same dollar on adaptation. The new introduction clarifies this.
E-18-278	A	19	14	19	14	"…incentives for forest conservation <add:> and increase of forest cover" (Martin Welp, University of Applied Sciences Eberswalde)	OK
E-18-279	A	19	17	19	21	A sentence should be added along the following lines: The stability of these sinks requires however further research. Effective monitoring is a further key challenge. (Martin Welp, University of Applied Sciences Eberswalde)	OK
E-18-280	A	19	23	19	33	P. 16 r. 11 Optimal policy mix. Coming back to your example on P. 2 r. 38 and 39, and P. 3 r. 7-20. Highest ancillary benefits from mitigation for developing countries	Ancillary benefits are not the issue here, other references cited in the preceeding paragraph.

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						are not health benefits from reduced outdoor air pollution but afforestation and similar practices with forestry. Despite all problems mentioned, linking adaptation and mitigation in such a way would reduce SCC and overall costs. Some other references other case studies on this issue?. Also p. 19 r. 23-33. (Juan Llanes-Reguerio, University of Havana)	No change.
E-18-281	A	19	23	19	23	Cite the "advocacy for decades"? (Jim Skea, University of Sussex)	What is it?
E-18-282	A	19	23	19	26	Can you give any example where such competition exists? (Youba Sokona, Sahara and Sahel Observatory (OSS))	Yes. Done.
E-18-283	A	19	29	19	30	This is a species-dependant ecosystem design and management issue - the wording is too categorical and ignores the many cases where afforestation vastly improves groundwater infiltration and hydrologic regulation. Urge the authors to consult a broader ecosystem management literature (Henry David Venema, International Institute for Sustainable Development)	Disagree, the three sentences depict a balanced picture. 26-28 points to the importance of geographic features, 28-29 lists many positive effects, 30 points to potential water resource implications. No change. Changed to reforestation, added species.
E-18-284	A	19	29	19	30	The water yield reduction depends on the type of trees planted. In regions with few, intense rainfalls and long spells of dry weather, forests increase average water availability. (Axel Michaelowa, Hamburg Institute of International Economics)	OK, special case added.
E-18-285	A	19	35	19	41	Since next pgph discusses potential conflicts of interest for water, suggest do same here for bioenergy - conflict of land use between bioenergy crops, food crops, and natural ecosystem conservation. A key question is whether bioenergy and food crops can be grown on existing agricultural land or not - hopefully this is addressed in the biofuels chapter in which case you could cross reference. (Rachel Warren, School of Environmental Sciences)	The point is not conflict over land use but implications of mitigation for adaptation. The text already states that the literature we found does not address these linkages. No change.
E-18-286	A	19	35	19	41	Environmental impacts/adaptation impliciations of bioenergy may be poorly documented at the global systems level, but many studies tackle local level impacts - for example" Pal, R. C. and Sharma, A. Afforestation for reclaiming degraded village common land: a case study. Biomass and Bioenergy 21:35–42, 2001. The concluding sentence should more accurately read: "limitation in scope characterizes virtually all bioenergy studies at the regional and sectoral scales, however as described in section xx a substantial literature on adaptation-relevant impacts exists at the project level (see section xx)." The sentence is inaccurately categorical as written.... (Henry David Venema, International Institute for Sustainable Development)	OK, cite and modify.
E-18-287	A	19	37	19	40	The text should note whether McDonald et al. (2006) investigate the consequences on global hunger and biodiversity, and report their results. As an aside, we note that	Not the issues here. No change.

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						any increase in world cereal prices would inevitably price people at the lower rungs of society worldwide out of the market and, therefore, add to hunger – unless of course these shortfalls are made up somehow (e.g., through safety nets, aid, economic improvements leading to greater purchasing power (see Goklany 1995, 1998). (Indur Goklany, US Department of the Interior)	
E-18-288	A	19	41	19	41	Can a study which does not suffer from this limitation be cited? (Jim Skea, University of Sussex)	No, see 285.
E-18-289	A	19	44		44	make that "small" hydropower. It's generally known that you can get significant CH4 emissions from major hydropower projects. (Susanne Moser, National Center for Atmospheric Research)	OK
E-18-290	A	20	2	20	15	I think a far more convincing case needs to be made that mitigation efforts in the energy sector will reduce adaptive capacity. (Jim Skea, University of Sussex)	It is explained that the relationship is indirect (via development). No change.
E-18-291	A	20	13			change "are" to "is" (the subject is "decline") (Danny Harvey, Dept of Geography, University of Toronto)	OK
E-18-292	A	20	14		15	Well, not quite. In Neil Adger's new book on Fairness in Adaptation, he and several of the contributoing chapters make the point that such changes do imply larger policy shifts, e.g., toward protection of the most vulnerable. That would be rather big! (Susanne Moser, National Center for Atmospheric Research)	Statement changed, book cited.
E-18-293	A	20	17	20	28	A sentence could be added at the end of this paragraph mentioning the additional risks of using genetically modified tree species (optimizing fast growth) (Martin Welp, University of Applied Sciences Eberswalde)	No literature found on this. No change.
E-18-294	A	20	17		28	There was an IPCC special report a few years back that discussed all this very carefully. Cite it. (Susanne Moser, National Center for Atmospheric Research)	It is cited (IPCC 2002), although not in the Ref list. Add to Ref list.
E-18-295	A	21	1	21	4	Can evidence be cited to support this? (Jim Skea, University of Sussex)	No but statement modified and explanation added
E-18-296	A	21	2	21	4	Is there a ref for this statement? Has it been calculated? (Rachel Warren, School of Environmental Sciences)	No but statement modified and explanation added
E-18-297	A	21	7	21	9	a reference is needed (Danny Harvey, Dept of Geography, University of Toronto)	OK
E-18-298	A	21	14	21	19	A further aspect that could be of interest here is that virtual water trade as an adaptation measure would increase energy use (longer distances for transport of agricultural products such as wheat). (Martin Welp, University of Applied Sciences Eberswalde)	No reference with estimates. No change.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-18-299	A	21	27	21	27	If the repercussions between adaptation and mitigation are marginal, was there as a need to spend 8 pages on it? (Jim Skea, University of Sussex)	This paragraph is on space heating and cooling and emphasizes the need for in-depth studies. No change.
E-18-300	A	21	28		28	"relatively little" - add specific numbers. During the 2006 heatwave, news reports suggested that energy demand rises by 1-2% for every degree above normal average seasonal temperature. That could add up to be quite a bit, and hence contradict your "relatively little".... Also in this paragraph, what about the cost of different levels of building insulation and retrofitting; there are cost studies for that in the energy design/building/energy use literature. (Susanne Moser, National Center for Atmospheric Research)	Relatively little is based on the literature cited. Plus a few days of heatwave is still a small fraction of the 365 days of heating/cooling energy. No change.
E-18-301	A	21	31	21	33	Is there a ref for this statement? Has it been calculated? (Rachel Warren, School of Environmental Sciences)	See the one cited, more will be added.
E-18-302	A	21	44	21	46	The text should note that water conflicts are an age-old problem, climate change would only modify some of the parameters. In some cases, it might add to these conflicts; in other cases it might relieve them (see, e.g., Arnell 2004). (Indur Goklany, US Department of the Interior)	History is not an issue here. No change.
E-18-303	A	22	3	22	11	This paragraph is quite helpful and could be placed earlier (Jim Skea, University of Sussex)	Perhaps, although it is more of a conclusion from the cases reported.
E-18-304	A	22	3	22	4	I wonder if it is not climatic risks or potential climate change impacts instead of climate change impacts? (Youba Sokona, Sahara and Sahel Observatory (OSS))	OK, Will change to: emerging and expected CC impacts – to emphasize preparatory adaptation.
E-18-305	A	22	7			Add a new sentence after the period (full stop) on line 7 that would raed as follows: "However, in many instances the additional costs may be minimal. For example, the cost of developing new methods to treat and prevent malaria and other climate-sensitive diseases such as a malaria vaccine, for instance, would be the same whether such a vaccine would be targeted toward malaria in general or malaria-caused-by-climate-change. Similarly, once drought resistant crops or crops that tolerate poor soil have been developed in principle to deal with numerous such situations that exist today, the costs of adapting them to specific locations to deal with the impacts of climate change might be more modest Goklany (2000a, 2003, 2005a)." (Indur Goklany, US Department of the Interior)	These are good examples of adaptation but seem to be unrelated to mitigation. No change.
E-18-306	A	22	9		11	ditto, check the relevant literature - there is more knowledge there than you acknowledge. Also, your claims have to be modified by the fact that there are path dependencies from past technology choices and infrastructure investments. (Susanne Moser, National Center for Atmospheric Research)	OK added path dependencies.
E-18-	A	22	13	22	30	In an assessment, I would have thought that one whole paragraph without a single	This is the summary parapraph or the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
307						reference should ring alarm bells, and this isn't the only example. (Jean Palutikof, Met Office)	assessment, if you like. It provides the conclusions based on the references discussed in the preceeding 4 pages. No change.
E-18-308	A	22	25	22	30	This is a serious mischarachterization of the mitigation-adaptation potential which you almost immediately recogninze in this section, when you go on to say "except the domains of land and water"…well the fact is those domains are extremely signficant and need to be recognized as such. First suggestion: need at least one full paragraph on the growing literature vis-a-vis adaptation-mitigation linkages in rural LDC settings and other developing and developed country rural contexts. Second suggestion: Delete sentence beginning with "The other and main..." and then follow with the following: "Particularly with respect to land and water activities, adaptation and mitigation linkages on the ground level can play a signficant role in developing sustainable development approaches and further research and practice would be useful in developing this." Rest of text to end of section should be deleted. (John Drexhage, International Institute for Sustainable Development)	Fully disagree. Except land and water, the studies reported in this subsection, basically the small number of studies that look at the A implications of M and M implications of A find small impacts for the other. SD linkages are beyond th scope of this section and addressed elsewhere in this chapter. No change.
E-18-309	A	22	26	22	28	The message and tone are incorrect: on p20, the text states, "these studies demonstrate intricate linkages from CC mitigation to adaptation, and also the relationshops with other environmental concerns, like water resources and biodiversity with profound policy implications" THIS IS CORRECT so why does this passage say, "except the domains of land and water, adaptation implications of any mitigation project is small". These two messages are completley inconsistent, and the use of "except" is illogical, given the correct messaging on p20. The policy implications of "the domains of land and water" are indeed profound as correctly noted on p20, particularly for the most vulnerable and most ecosystem-dependant populations of the world. Furthermore, this paragraph does not mention rural renewable electrification, which is an enormous unmet development challenge with huge emissions and implications (see for example the scenarios in World Energy Assessment: Energy and the Challenge of Sustainability. United Nations Development Programme, New York, 2000) and adaptation implications (see Venema and Cisse, 2004 cited in this chapter). (Henry David Venema, International Institute for Sustainable Development)	Intricate means complex but not necessarily major or very significant. See also 308. No change. Is rural renewable electrification a mitigation or adaptation activity? Neither: as the reviewer correctly notes, it is a development challenge. It can have both mitigation and adaptation implications but this does not make it an A-M link. See also 308. Included rural electrification earlier in the section.
E-18-310	A	22	27	22	30	This is in contradiction of your statement on page 14 from lne 37 to line 44 (Youba Sokona, Sahara and Sahel Observatory (OSS))	No, the linkages do exist but so far found to be marginal, except land and water. No change.
E-18-311	A	22	28	22	31	the "vice versa" phrase is probably valid, most strictly adaptation measures won't have large emissions implications - with the notable exception of air conditioning - and is also highly dependant on implementation details…..	This is the summary of the main findings, no need to repeat all possible exceptions and special cases. No change.

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						(Henry David Venema, International Institute for Sustainable Development)	
E-18-312	A	22	33	22	33	Line 33 onwards in general, I found section 18.5 to be quite essay-like and speculative. Many of the statements repeat points made earlier in the chapter, I expected there to be more examples and case studies in this section of specific actions motivated by mitigation or adaptation that had consequences in another sphere. (Jim Skea, University of Sussex)	Integrated with 18.4.1, more as an introduction than an assessment, examples are in an on-line annex
E-18-313	A	22	33	24	24	P. 22 Section 18.5 Very helpful. Suggest a box that summarise the options, co benefits and contradictions (or complementarities and differences) together with Fig. 18.3 (Juan Llanes-Reguerio, University of Havana)	Fig is better explained, table is meant to go with the figure
E-18-314	A	22	35	22	45	For a public choice analysis of stakeholder choice between mitigation and adaptation see Michaelowa, A. (2001): Mitigation versus adaptation: the political economy of competition between climate policy strategies and the consequences for developing countries, HWWA Discussion Paper No. 153, Hamburg (Axel Michaelowa, Hamburg Institute of International Economics)	Included
E-18-315	A	22	35	24	24	Too general and lack focus and tangible examples. (Youba Sokona, Sahara and Sahel Observatory (OSS))	Has been improved. see on-line annex for specific examples
E-18-316	A	22	49		50	But acknoweldge that climate many times is NOT a dominant or even relevant or considered decision motivation., (Susanne Moser, National Center for Atmospheric Research)	acknowledged
E-18-317	A	22	50			change "of a" to "times the" (Danny Harvey, Dept of Geography, University of Toronto)	Done
E-18-318	A	23	1		2	Delete the statement "Although this dichotomy is simplistic +citation" - Risk and uncertainty are different concepts, not a dic.hotomy. (Susanne Moser, National Center for Atmospheric Research)	Done
E-18-319	A	23	2			It isn't clear which dichotomy the authors are referring to. (Jean Palutikof, Met Office)	Clarified
E-18-320	A	23	4		4	add reference to (which makes that point as well): Moser, S.C. (2005). Impacts assessments and policy responses to sea-level rise in three U.S. states: An exploration of human dimension uncertainties. Global Env. Change 15: 353-369. (Susanne Moser, National Center for Atmospheric Research)	Added
E-18-321	A	23	9	23	13	There are two major problem with this paragraph: (1) in light of my own work (Harvey, 2006b) and the discussion provided in my comment pertaining to page 15, the importance of uncertainty is greatly overplayed here. (2) the latter part of the paragraph assumes a CBA analysis framework for deciding on the emission trajectory, rather than a fudiciary trust framework that is more consistent with	Clarified that this paragraph is about perception and risk and not CBA (covered earlier in chapter)

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						Article 2 of the UNFCCC. Whether or not one agrees as to which framework is more consistent with the UNFCCC, the point is that there ARE alternatives to CBA, but this paragraph is based on the assumption that CBA is the decision-making framework. REFERENCE: Harvey, L.D.D.: 2006b, 'Plausible resolution of uncertainties in global-warming science has no near-term practical implications for climate policy', Climate Policy (submitted). (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-322	A	23	31	23	32	This statement does not acknowledge the fact that initial abatement actions have to be taken NOW (or rather, should have been taken 20 years ago) in order to have a non-negligible chance of averting some of the early expected impacts of global warming (such as loss of coral reefs). (Danny Harvey, Dept of Geography, University of Toronto)	Clarified in merged section now 18.3, cannot be policy prescriptive
E-18-323	A	23	31	23	45	18.5.1:The emphases on climate change decision-making is embedded in a separate argument. It should receive increased emphasis and perhaps even a separate section. (P. H. Liotta, Pell Center for International Relations and Public Policy)	Partially done in merged section 18.3
E-18-324	A	23	35	23	39	Is this segment intended to lull the reader into a false sense of security? We no longer have the luxury to take our time, leisurely deciding if and when and how much emission reduction that we will undertake. Yes, we can and should begin with easy measures, but at the same time we should start with some of the harder measures (because they are hard and will therefore take time!), and we can set long term stringent targets now in order to allow long term planning by industry, urban planners, developers, and others. Also (and why is there such resistance to this idea?), there ALREADY exist many well documented low-cost alternatives in the energy sector (if, by energy sector, you include end use energy or at least passive uses of solar energy in buildings, which coudl be counted as energy supply) (you can reference Chapter 6, Section 6.4 of WG III, on the existence of low cost energy efficiency and renewable energy technologies and practices in the building sector) (the technologies also already exist for dramatic improvements in automobile efficiency, but they have been and continue to be directed to making cars more muscular rather than efficient) (Danny Harvey, Dept of Geography, University of Toronto)	Rewritten to better explain; not policy prescriptive but illustrating the changing nature of A-M linkages
E-18-325	A	23	36		36	"may initially begin" - it has already begun in that way (Susanne Moser, National Center for Atmospheric Research)	Accepted
E-18-326	A	23	40	23	51	the suggestion that we have the luxury of undertaking mitigation OR adapation, that they can somehow be substituted for one another, does not stand up to objective	Accepted; this paragraph is about scale in decision making not a conclusion as to what

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						quantitative analysis. The scientific evidence (summarized in probabiltity distribution functions for climate sensitivity and in the threshold of global mean temperature change causing significant harm) indicates that, even under very stringent emission reduction scenarios, key temperature thresholds will almost certainly be crossed and significant harmful impacts will result (Harvey, 2006a,b). Thus, we need to undertake the most vigourous possible emission reduction (beginning now) and contemplate significant adaptive responses (particularly with regard to assisting the natural adaptation of species and ecosystems, or at least, reducing non-climatic human stresses). REFERENCES: Harvey L D D 2006a Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications Clim. Change (accepted); Harvey, L.D.D. 2006b Allowable CO2 Concentrations Under the United Nations Framework Convention on Climate Change as a Function of the Climate Sensitivity PDF. Environmental Research Letters (submitted) [I will send notification of acceptance] (Danny Harvey, Dept of Geography, University of Toronto)	should be done; this material is taken up in the earlier section on trade-offs
E-18-327	A	23	40		41	"are likely to address current climate risks" - they already do just that. (Susanne Moser, National Center for Atmospheric Research)	accepted
E-18-328	A	23	51			At he end of the sentence ending on line 51, add Goklany (2000a, 2003, 2005a) as references. (Indur Goklany, US Department of the Interior)	Not accepted, references are for earlier section
E-18-329	A	23	51			Add a new sentence on line 51 (prior to “Resources”) that would read as follows: On the other hand on temporal scales, adaptation and mitigation may be seen as being complementary: in the short-to-medium term adaptation measures are seen as being more cost effective, particularly measures that would reduce vulnerability to climate-sensitive problems that are currently urgent and could be exacerbated by climate change, but in the longer term, mitigation could be unavoidable (Goklany 2003, 2005a, 2006a).” (Indur Goklany, US Department of the Interior)	Not accepted; point has been made earlier in chapter
E-18-330	A	24	18			change "link across" to "cross" (Danny Harvey, Dept of Geography, University of Toronto)	Accepted
E-18-331	A	24	31	24	32	Please add when electricity is produced from fossil fuel (Youba Sokona, Sahara and Sahel Observatory (OSS))	Done
E-18-332	A	24	33	24	34	How this will happen. Please be specific and explain with concrete examples (Youba Sokona, Sahara and Sahel Observatory (OSS))	Done
E-18-	A	24	37	38	24	considering both mitigation and adaptation in a national capacity building on	Accepted; the point is both are dealt with in

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333						climate change does not necessarily imply complementarity between the two. Here again refere to page 14 line 37 to 44 (Youba Sokona, Sahara and Sahel Observatory (OSS))	the same framework not that they are linked in quantitative or financial terms
E-18-334	A	25	7	25	9	WHAT? With the exception of a handful of north European countries and prehaps some isolated local communities, who else is taking a precautionary view of risk and accepting repsonsibility for reducing emissions? (Danny Harvey, Dept of Geography, University of Toronto)	Rewritten; many public bodies are making such decisions without using CBA or calculating optimal responses
E-18-335	A	25	12	33	15	This very long Section 18.6 is an attempt to relate the assessment of the literature to policy and decision-making. It's a very long section to have so few references, considering that this document should be primarily an assessment. Maybe it could be condensed somewhat, allowing more space for the literature assessment part of the chapter. (Jean Palutikof, Met Office)	Done.
E-18-336	A	25	12		17	move below Figure 18.3 (Susanne Moser, National Center for Atmospheric Research)	Done.
E-18-337	A	25	48	25	48	Line 48 onwards, again I found 18.6.1 to be quite repetitive in relation to previous sections. The paragraph p.26 l.40-48 effectively repeats the discussion in section 18.3 on response capacity and development pathways (Jim Skea, University of Sussex)	Repetition removed.
E-18-338	A	25	48	31	27	very well written (Rachel Warren, School of Environmental Sciences)	Thank you.
E-18-339	A	25				Section 18.6.1: This is the area where this is a need for definite coordination between the Chapter 17 and 18 authors on just where this material lies. There is certainly a need for this discussion of institutions in Chapter 18, and consideration of this aspect is the weakest part of Chapter 17. I would suggest that Chapter 18 covers 'institutions' from the point of view of formal institutions (as it largely does at present) and Chapter 17 draws out the relevance of institutions in a broader sense (including informal, 'the way we do things', etc). 'Mainstreaming' really warrants greater discussion than it is given in Chapter 18. This deficiency reflects the perhaps inevitable point that this chapter puts climate policy to the fore and then considers the link with sustainable development, rather than working from the broad principles of sustainable development back to climate policy. But I don't propose the authors respond to that point! (Mick Kelly, University of East Anglia)	Done.
E-18-340	A	25				Fig. 18.3 and Table 18.1 cover very similar ground. It would be advisable to combine it into a single entity?	Done.

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						(Jean Palutikof, Met Office)	
E-18-341	A	26	8		8	add "at present" after "and its KP are" (Susanne Moser, National Center for Atmospheric Research)	Done.
E-18-342	A	26	17	26	26	Strictly speaking, this paragraph may be correct, but it seems to lull the reader into a false sense of security or even of complacency. The fact of the matter is that we are already close to the threshold for significant negative impacts for some critical ecosystems or are already committed to reaching or exceeding these thresholds (such as 1-2 K warming for coral reefs, 2-3 K possible threshold for melting of the Greenland Ice Cap and disintegration of the West Antarctic Ice Sheet). There is not much that we can do to help most ecosystems adapt to climatic change (maybe we can keep a few polar bears alive in zoos). Also, the adaptation potential for ecosystems is already accounted for in the 2 K temperature limit suggested by many, so now to suggest that adaptation can substitute (!) for mitigation involves double counting (and even without double counting, this is an extreme statement to make). (Danny Harvey, Dept of Geography, University of Toronto)	Added "and until the limits of adaptation are reached".
E-18-343	A	26	17	26	26	Provide as references: Goklany (2000a, 2003, 2006a). (Indur Goklany, US Department of the Interior)	Done.
E-18-344	A	26	17	26	26	As a follow up to my previous comment on this segment, the reference to adaptation in Article 2 actually amounts to a GREATER or ADDITIONAL constraint on allowable GHG emissions, rather than allowing greater emissions (as the authors of this chapter so cleverly try to argue). The reason is given in Harvey (2006): "Article 2 of the UNFCCC, after declaring that the ultimate objective of the convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, goes on to state that, "Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner". By speaking of adaptation to climatic change, it is implied that the ultimate climatic change (related to the chosen GHG stabilization levels) is small enough and hence benign enough that adaptation is possible in the first place. The three subsidiary conditions (allowing ecosystems to adapt, maintaining food production, and enabling sustainable economic development) are restrictions on the rate at which non-dangerous greenhouse gas (GHG) concentrations are reached. They are related to that fact that climatic change that is not harmful (that is, sufficiently limited that adaptation is possible) were it to occur slowly, could be highly disruptive (harmful) if it were to occur too fast.	See comment E-18-342

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						These conditions thus set a constraint on rates of allowable GHG emissions, while the overall goal of capping GHG concentrations at non-dangerous levels largely represents a constraint on cumulative CO2 emissions." REFERENCE: Harvey L D D 2006 Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications Clim. Change (accepted) (Danny Harvey, Dept of Geography, University of Toronto)	
E-18-345	A	26	25	26	26	The article 2 does not imply in practice or in theory that adaptation can complement or substitute mitigation. Both are necessary and there implementation depends on specific conditions. (Youba Sokona, Sahara and Sahel Observatory (OSS))	Agree. No change required.
E-18-346	A	26	25	26	26	Specific comment. I considered very unlikely, practically impossible that the adaptation along, even in theory could substitute the mitigation in meeting the ultimate objectives of the UNFCCC. If you have more information please include. This statement could be use to decrease the importance of the mitigation necessity to cope with the consequence of the anthropogenic green house gasses emissions. (Avelino G. Suarez Rodriguez, Ecology and Systematic- Cuban Environmental Agency)	See comment E-18-342.
E-18-347	A	26	25	26	25	After "substitute" add "to a limit". We will not have a scenario where there will be a perfect substitution between adaptation and mitigation. (John Drexhage, International Institute for Sustainable Development)	Done.
E-18-348	A	26	30			Replace “be unable” with “may find it difficult”. (Indur Goklany, US Department of the Interior)	Done.
E-18-349	A	26	33		36	again, this was better expressed earlier (p.6) (Susanne Moser, National Center for Atmospheric Research)	No change required.
E-18-350	A	26	38	26	38	It also presents a problem in developing an appropriate framework and place for adaptation in discussions on a post 2012 global climate change agreement. This is more than just the organization of funding mechanisms (or ought to be). (John Drexhage, International Institute for Sustainable Development)	Relevant text added.
E-18-351	A	26	51	26	51	at end of first sentence of paragraph add "in isolation". (John Drexhage, International Institute for Sustainable Development)	Done.
E-18-352	A	27	4	27	4	Can the proposals be cited (Jim Skea, University of Sussex)	Done.
E-18-353	A	27	6	27	6	rural electrification should appear on this list in the M -> A column (Henry David Venema, International Institute for Sustainable Development)	Accepted
E-18-	A	27	6	27	7	Table 8.1 An interesting example of synergies in agricultural practices is: Read P.	Incldued

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354						and J. Lermit 2005. "Bio-Energy with Carbon Storage (BECS): a Sequential Decision Approach to the threat of Abrupt Climate Change" Energy 30, 2654-2671. (Jonathan Köhler, Tyndall Centre, university of Cambridge)	
E-18-355	A	27	11			Before the period (full stop), add he following references: Goklany (1995, 2000a). (Indur Goklany, US Department of the Interior)	This paragraph has been deleted.
E-18-356	A	27	17	27	27	Again repetitive (Jim Skea, University of Sussex)	Dealt with.
E-18-357	A	27	29	27	29	I think the expression "mainstreaming" should be defined. (Jim Skea, University of Sussex)	Done in Section 18.1.
E-18-358	A	28	7	28	8	Delete sentence as there is now a wealth of peer-reviewed articles on post-2012 strategies (see e.g. Michaelowa, Axel; Tangen, Kristian; Hasselknippe, Henrik (2005): Issues and options for the post-2012 climate architecture: an overview, in: International Environmental Agreements, 5, 1, p. 5-24 and other articles in the same journal issue (Axel Michaelowa, Hamburg Institute of International Economics)	Sentence changed and references added.
E-18-359	A	28	13	28	14	AOSIS is just as concerned with an effective mitigation regime for the post 2012 world, since they will be the first ones to know that only so much adaptation can take place without some sort of mitigation. I would suggest that AOSIS be replaced with "Most LDCs..." (John Drexhage, International Institute for Sustainable Development)	Done.
E-18-360	A	28	27		27	At end of this para need a reference (Susanne Moser, National Center for Atmospheric Research)	Done.
E-18-361	A	28	28			Somewhere roundabout this line it would be useful to havea heading 'Mainstreaming' to highlight your coverage of this important topic. (Jean Palutikof, Met Office)	Is now a separate box.
E-18-362	A	28	30	28	30	Suggest here and elsewhere in the text replacing "mainstreaming" with "integrating". The former term carries too much controversial baggage, particularly in the international cc negotiations. (John Drexhage, International Institute for Sustainable Development)	Disagree. It is known as "mainstreaming" in the literature.
E-18-363	A	28	43	28	44	Excellent point about the relevance of mainstreaming (re:integrating) for industrialised countries. We must break the misconception that cc integration in only a developing country issue, when it clearly is a global one. (John Drexhage, International Institute for Sustainable Development)	Thank you.
E-18-364	A	29	8	29	10	18.6.: Unclear how Keohane (who is not referenced in the citation list) usefully contributes to discussion. Either expand argument or delete citation regarding role of institutions. (P. H. Liotta, Pell Center for International Relations and Public Policy)	Paragraph deleted.

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E-18-365	A	29	19		19	add: land conservation, hazard management (Susanne Moser, National Center for Atmospheric Research)	Paragraph deleted.
E-18-366	A	29	21	29	20	Very pleased to see this paragraph here, which hopefully integrates well with Chapter 20; given the rate of emissions growth in the south, this message is extremely important particulary given the highest vulnerabilities in the south in the "land/water domains", compounded by energy deprivation. This A/M synergy link with SD relevant everywhere, but most profound in the south should be emphasized earlier in the chapter (Henry David Venema, International Institute for Sustainable Development)	Is now in Box 18.3
E-18-367	A	29	32	29	38	Very important point to emphasize in the SD context. (Henry David Venema, International Institute for Sustainable Development)	Thank you.
E-18-368	A	29	35		38	you should add - to be consistent with Chapter 17 - that many also are caught in the trend toward greater economic and cultural globalization and that this affects (enables and constrains) many mitigation and adaptation opportunities (cee references for this in Chapter 17). (Susanne Moser, National Center for Atmospheric Research)	Paragraph has been deleted.
E-18-369	A	30	3	30	5	Non-sentence (John Morton, University of Greenwich)	Corrected.
E-18-370	A	30	8		8	add full ref for Greco et al. (Susanne Moser, National Center for Atmospheric Research)	Done.
E-18-371	A	30	15		15	unclear for the non-experts what a water dependency ration of 90% is (Susanne Moser, National Center for Atmospheric Research)	Disagree.
E-18-372	A	30	19	30	24	Issues around the Manantali Dam and irrigation in the Senegal valley have been discussed in the cross-chapter case study on drought in the Sahel - a good deal less optimistically than here (John Morton, University of Greenwich)	Disagree that this text is optimistic.
E-18-373	A	30	27	29	30	NEPAD and AMCEN are not organisations. NEPAD is a program and AMCEN is a conference (Youba Sokona, Sahara and Sahel Observatory (OSS))	Corrected.
E-18-374	A	30	43			footnote: surely ECOWAS is the English acronym for CEDEAO (the last word being "States") and "inter-permanent" in the full form of CILSS cannot be right (John Morton, University of Greenwich)	Corrected.
E-18-375	A	31	1	31	15	This paragraph tends to address either adaptation or mitigation measures but does not draw out the linkages to any great degree (Jim Skea, University of Sussex)	Part of the paragraph has been deleted to make it more to the point.
E-18-376	A	31	3		7	these examples need references (Susanne Moser, National Center for Atmospheric Research)	This text has been deleted.

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E-18-377	A	31	5	31	5	I believe you mean "developing" country and not "developed" country….if not the context of this statement makes no sense in the rest of the paragraph and should be dropped. (John Drexhage, International Institute for Sustainable Development)	Deleted.
E-18-378	A	31	21		26	Maybe after this paragraph, also include some mention of anti-spral and regional transportation planning initiatives. (Susanne Moser, National Center for Atmospheric Research)	No literature on these issues in the context of A-M linkages.
E-18-379	A	31	25		26	this needs some more explanation and an example. Insufficient as is. (Susanne Moser, National Center for Atmospheric Research)	Added “For example”.
E-18-380	A	31	26		27	this needs some more explanation and an example. Insufficient as is. (Susanne Moser, National Center for Atmospheric Research)	See previous comment.
E-18-381	A	31	30	33	3	Does the fact that various institutions are considering both mitigation and adaptation explain the inter-relationships in practice between the two? This is too simplistic. (Youba Sokona, Sahara and Sahel Observatory (OSS))	Text has been rewritten.
E-18-382	A	31	32		34	Not clear how this is an example of mitigation AND adaptation. (Susanne Moser, National Center for Atmospheric Research)	Disagree.
E-18-383	A	31	36		37	This seems out of place, insufficiently discussed; it's an example of how many of the examples and mechanisms cited here require a more critical assessment of whether they actually are working. If sch assessments are not available, then you should say so and make it a research priority. You should also, overall, be far more careful in this section not to assume that every bit of development (for or from mitigation actions for example), will increase or help with adaptation. There are some examples where development diminishes adaptive flexibility and relevant know-how on how to adapt (see examples of changes in Inuit country cited in chapter 17 and other examples). (Susanne Moser, National Center for Atmospheric Research)	See previous comment.
E-18-384	A	31		32		Somewhere in this section, you should at least acknowledge that despite these few good examples, so many opportunities to develop with climate change in mind are currently missed. So much development is occurring without even a hint at climate change, even though the development will be around for YEARs. In recent discussions with folks in London, this point was made very clear. (Susanne Moser, National Center for Atmospheric Research)	New paragraph on Examples in the UK.
E-18-385	A	32	36	32	37	This paragraph needs to be expanded. The example (Mesoamerican Biological Corridor is good, but remains anecdotal. (Martin Welp, University of Applied Sciences Eberswalde)	Done.
E-18-	A	33	6	33	13	What is the purpose of this separate, tiny, section?	Deleted.

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386						(Jean Palutikof, Met Office)	
E-18-387	A	33	8		13	but also mainstreaming into EIS, planning, design etc - very much needed. (Susanne Moser, National Center for Atmospheric Research)	Deleted.
E-18-388	A	33	18	35	9	add need for cost benefit analysis to contain clear uncertainty anaylysis of use of valuation schemes, discount rates, and parameters taken from which literature on climate impacts making which assumptions. (Rachel Warren, School of Environmental Sciences)	Included; these caveats are explained elsewhere too
E-18-389	A	33	29		30	unclear what is meant here. Sounds like insider jargon to me…. (Susanne Moser, National Center for Atmospheric Research)	Rewritten
E-18-390	A	33	35	33	35	Why should it be necessary to document which stakeholders link adaptation and mitigation? Why this is important new research area? (Youba Sokona, Sahara and Sahel Observatory (OSS))	The behaviour of actors based on voluntary frameworks without compulsion or the presumption of optimal responses seems important to the authors
E-18-391	A	33	44		47	replace the example with emergent research questions from this research, since this is the section not on what is known, but on what is unknown (Susanne Moser, National Center for Atmospheric Research)	The issues raised are intended to be examples of areas where more research is required; the literature is rather sparse as to what are emerging research needs
E-18-392	A	33		33		Assessing stakeholders' interests and priorities with respect to adaptation and mitigation requires more research as is suggested in the text.There is furthermore need to develop analytical tools that can be used to depict stakeholders preferences and how stakeholders learn (e.g. Bayesian learning). (Martin Welp, University of Applied Sciences Eberswalde)	Accepted
E-18-393	A	34	6	34	16	The ecosystem services - human well being framework applied in Millenium Ecosystem Assessment is a logical basis for thinking about M-A links at the project and possible higher level scales…. (Henry David Venema, International Institute for Sustainable Development)	Accepted
E-18-394	A	34	7		9	it's interesting you make that point. You first suggest a framework (the decision analysis one, I assume), but don't include the role of different stakeholders in that, but discuss them rather separately, and now you say, there should be frameworks that integrate them. Maybe you should actually try that more seriously in this chapter. Integrate the discussion of decision analysis approaches with the role of stakeholders better. (Susanne Moser, National Center for Atmospheric Research)	Rewritten
E-18-395	A	34	16			give examples of the other drivers (Danny Harvey, Dept of Geography, University of Toronto)	Done
E-18-396	A	34	19	34	21	The statement again is made that the repercussion from mitigation for adaptation and vice-versa are mostly marginal. Two thoughts - shouldn't this point be in the	The statement applies to the quantitative linkages; however the review covers the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						executive summary - and doesn't this suggest that a more concise treatment of some of the issues might be appropriate? (Jim Skea, University of Sussex)	existing literature for the first time in coming to this conclusion which is still rather tentative
E-18-397	A	34	28	34	29	the emphasis should instead by on the near certainty that, even with stringent emission reductions beginning now, significant negative impacts of the globlal warming to which we are already committed can be expected, that significant adaptation efforts will be needed, and that significant ecological losses are now virtually unavoidable. In other words, will have to move into a damage-control or damage-minimization mode while undertaking strong emission reduction (compared to BAU). Much of this paragraph is mumble jumble. We don't need to know what the ultimate stabilization target should be in order to know that we need at least 20 years, and likely much more, of vigorous efforts to restrain and then reduce emissions. (Danny Harvey, Dept of Geography, University of Toronto)	Rewritten: the first point is already in the Executive Summary (and not part of this section on uncertainty and research needs); tried to clarify that the three elements of mitigation, adaptatiton and consequential damages are uncertain with quite large ranges of estimates that makes calculating an optimal policy rather difficult.
E-18-398	A	34	32		33	add here the lack of agreement on what constitutes dangerous climate change (Susanne Moser, National Center for Atmospheric Research)	Done
E-18-399	A	34	42	34	44	We are skeptical of the validity of the sentence that begins on line 42. SRES scenarios might well give great insight into the determinants of vulnerability and adaptive capacity (see Goklany 2005c and 2006a). (Indur Goklany, US Department of the Interior)	Rewritten
E-18-400	A	34	44	34	46	A lot if work has been done with respect food security in conjunction with the Millennium Development Goals. We would recommend looking at them. (Indur Goklany, US Department of the Interior)	Accepted
E-18-401	A	34	49		49	needs a reference after "portfolios" (Susanne Moser, National Center for Atmospheric Research)	Done
E-18-402	A	34	50		51	unclear what this sentence with world views and assessments means. (Susanne Moser, National Center for Atmospheric Research)	Rewritten
E-18-403	A	35				as in Chapter 17, this chapter needs a better conclusion. What are the prospects, the constraints, what are the risks of missing valuable opportunities to use climate mitigation and adaptation policies to move toward a more sustainable local, regional, and global future. Have a take home message! Go out strong. (Susanne Moser, National Center for Atmospheric Research)	This is not the conclusion, the ES does this; but the section has been revised to focus on the higher order research needs; Rewritten
E-18-404	A	36		43		Numerous references cited in text are missing from the bibliography, some references are cited wrong. For example, Hayhoe et al. (2004) has more than three authors (but 17). (Susanne Moser, National Center for Atmospheric Research)	Checked