

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
1	58163	17	0	0	0	0	General Comments on Chapter 17. Economics of Adaptation: The idea of this chapter is very impressive because it discusses the adaptation as an economic problem and the economic context for adaptation. This chapter presents the four definitions of eligible adaptation in Table 17-1 and the estimates of global costs of adaptation in Table 17-2. Also, the economic effects of adaptation measures & policies. The part of economic & related instruments to provide incentives and the costing of adaptation is impressive. The part 17-5 for risk sharing & risk transfer including insurance, incentive design, loans & public private finance partnership, payments for environmental services, improved resource pricing (water markets), innovation, R&D subsidies are prepared in high quality. Figure 17-2 for the illustrative example assuming homogenous protection at 180 cm above MSL and Figure 17-3 for the comparison of sectoral results in the costs of adaptation in developing countries are impressive too. (Mounir Wahba Labib, Third National Communication (TNC) Project)	The chapter team appreciates the positive comment.
2	59716	17	0	0	0	0	Some comments about the links of water payment with poverty are missing. It could be noted that in some low income context the loss of income should be counterbalanced by subsidization by area (not by crop production, it could increase negative environmental externalities). (Roger Cremades, University of Hamburg)	Subsidies and their shortcomings are discussed in 17.5.6 among the instruments that provide incentives for adaptation.
3	60063	17	0	0	0	0	Inconsistent referencing of Stern Review throughout the chapter: (Stern 2007). Review was released in 2006 and by HM Treasury in 2007. (AUSTRALIA)	This has been corrected.
4	61427	17	0	0	0	0	This chapter is on economics of adaptation. It highlights the difficulties and uncertainties of calculating costs and benefits of adaptation, especially in the light of uncertainties of climate change impacts. However, it does not include a section on the impacts of adaptation on employment. This should be included as it is an important part of adaptation strategies. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	Impacts on employment are directly addressed in Chapter 13 and indirectly in Chapter 12 in the context of livelihoods and income generating activities.
5	61428	17	0	0	0	0	General: Chapt. 17 on economics reinforces the role of economics in offering insights in adaptation policies. This is a step forward in comparison to AR4. The Chapt. Also makes a good job in contextualising the economics of adaptation into a broader scope for decision making. The chapter also touches the sensitive point of adaptation mainstreaming and financing. It proposes that although mainstreaming in existing activities mainstreaming is welcomed the financing should depend on eligibility. This can be done more intensively in order to make clear that climate adaptation should not an additional label for anyway needed action but for action that allows adaptation to unavoidable climate change (more concrete eligibility criteria). There is also a structured description of different methodologies, tools, approaches useful to calculate costs. This is welcomed and helps to understand the methodological details behind many of the cost estimates. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	The chapter team appreciates the positive comment.
6	65530	17	0	0	0	0	The chapter is very well written and provides an extensive overview of economic definitions and links these to adaptation. For an economist, it provides minimal new information (surface) and for a non-economist it might be a bit hard to digest. The chapter needs more focus on one or two aspects with more explanations and in-depth work on these, so that a broader audience can benefit from it. The chapter provides recommendations but does not really show how they should be applied. Perhaps one or two examples for application could be useful, so that these are taken as a point of departure for future studies. (Tamer Afifi, United Nations University Institute for Environment and Human Security)	More examples have been added in the chapter (see new figures that have been incorporated). The wider coverage of the chapter was intended to meet the minimum requirements in the Plenary approved outline.
7	65952	17	0	0	0	0	The whole chapter needs substantial restructuring, supply of further references, and coverage of crucial themes that are currently missing. Please consider the following crucial, recent and helpful review of this field: Heuson, C.; Gawel, E.; Gebhardt, O.; Hansjürgens, B.; Lehmann, P.; Meyer, V. & Schwarze, R. (2012) Fundamental Questions on the Economics of Climate Adaptation, Helmholtz Centre for Environmental Research (UFZ). (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We agree that there are several other themes that could be part of this chapter. The chapter has also been restructured to make it flow better, and additional references added. There was however a limit to what the chapter could cover given the page length constraints and the need to address current themes adequately.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
8	65953	17	0	0	0	0	This chapter needs a section on the international dimensions of adaptation with focus on adaptation finance. Last years appeared several important and insightful publications, e.g. Dellink, R.; den Elzen, M.; Aiking, H.; Bergsma, E.; Berkhout, F.; Dekker, T. & Gupta, J. (2009) Sharing the burden of financing adaptation to climate change, <i>Global Environmental Change</i> , 19, 411-421. Hof, A. F.; de Bruin, K. C.; Dellink, R. B.; den Elzern, M. G. J. & van Vuuren, D. P. (2009) The effect of different mitigation strategies on international financing of adaptation, <i>Environmental Science and Policy</i> , 12, 832-843. Eisenack, K. (2012) Adaptation financing in a global agreement: is the adaptation levy appropriate?, <i>Climate Policy</i> , 12, 491-504. Fankhauser, S. & Martin, N. (2010) The economics of the CDM levy: Revenue potential, tax incidence and distortionary effects, <i>Energy Policy</i> , 38, 357-363. Bowen, A. (2011) Raising climate finance to support developing country action: some economic considerations, <i>Climate Policy</i> , 11, 1020-1036. Müller, B., 2008, <i>International Adaptation Finance: The Need for an Innovative and Strategic Approach</i> , Oxford Institute for Energy Studies EV 42, Oxford, UK. Horstmann, B. (2011) Operationalizing the Adaptation Fund: challenges in allocating funds to the vulnerable, <i>Climate Policy</i> , 11, 1066-1096. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Without going into the details of international negotiation and the architecture of international funding sources, which is out of the scope of this chapter, we briefly address the issue of distribution of responsibilities for financing adaptation and burden sharing in 17.2.5. Space constraints also limited us from getting into detail. Additional references have been added when discussed from an economics perspective.
9	65954	17	0	0	0	0	This chapter need a section on the role of adaptation in international climate negotiations. Several economic publication on this issue appeared during the last years, e.g. Eisenack, K. und L. Kähler (2012) Unilateral emission reductions can lead to Pareto improvements when adaptation to damages is possible, <i>Oldenburg Discussion Papers in Economics V – 344 – 12</i> . Zehaie, F. (2009) The Timing and Strategic Role of Self-Protection, <i>Environmental and Resource Economics</i> , 44, 337-350. Ebert, U. & Welsch, H. (2012) Adaptation and Mitigation in Global Pollution Problems: Economic Impacts of Productivity, Sensitivity, and Adaptive Capacity, <i>Environmental and Resource Economics</i> , 52, 49-64. Barrett, S. (2008). <i>Dikes v. windmills: Climate treaties and adaptation</i> . John Hopkins University Discussion Paper. Benckekroun, H., Marrouch, W. and A. R. Chaudhuri (2011). <i>Adaptation Effectiveness and Free-Riding Incentives in International Environmental Agreements</i> . CentER Discussion Paper Series No. 2011-120. Ingham, A., J. Ma, and A. Ulph (2007). <i>Climate change, mitigation and adaptation with uncertainty and learning</i> . <i>Energy Policy</i> 35, 5354–5369. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Detailed discussion of the international climate change negotiations is outside of the scope of the discussion on the economics of adaptation and the outline of subjects that the author's received.
10	65955	17	0	0	0	0	This chapter need a section on the theoretical contributions on the economics of adaptation. Last years several crucial papers appeared, e.g. Ebert, U. & Welsch, H. (2012) Adaptation and Mitigation in Global Pollution Problems: Economic Impacts of Productivity, Sensitivity, and Adaptive Capacity, <i>Environmental and Resource Economics</i> , 52, 49-64. Callaway, J. M. (2004) Adaptation benefits and costs: are they important in the global policy picture and how can we estimate them?, <i>Global Environmental Change</i> , 14, 273-282. Eisenack, K. und L. Kähler (2012) Unilateral emission reductions can lead to Pareto improvements when adaptation to damages is possible, <i>Oldenburg Discussion Papers in Economics V – 344 – 12</i> . Eisenack, K. (2013) The inefficiency of private adaptation to pollution in the presence of endogenous market structure, <i>Environmental and Resource Economics</i> , DOI 10.1007/s10640-013-9667-6. Ingham, A., J. Ma, and A. Ulph (2007). <i>Climate change, mitigation and adaptation with uncertainty and learning</i> . <i>Energy Policy</i> 35, 5354–5369. Fankhauser & Soare (2013) <i>An economic approach to adaptation: illustrations from Europe</i> , <i>Climatic Change</i> , 118, 367-379. Osberghaus, D.; Dannenberg, A.; Mennel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, <i>Environment and Planning C</i> , 28, 834-850. Aakre, S. & Rübhelke, D. T. G. (2010) Adaptation to Climate Change in the European Union: Efficiency vs. Equity Considerations, <i>Environmental Policy and Governance</i> , 20, 159-179. Lecocq, F. & Shalizi, Z. (2007) <i>Balancing Expenditures on Mitigation of and Adaptation to Climate Change: An Exploration of Issues Relevant to Developing Countries</i> , <i>World Bank Policy Research Working Paper</i> , World Bank, 4299. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	These are useful references and some of them have been introduced in the discussion (especially in Section 17.3).
11	65956	17	0	0	0	0	Much literature on adaptation in integrated assessment models has appeared. This deserves an own section. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Space constraints limited the chapter's ability to write a section for this and other approaches seperately. 17.4 makes assesses methodological considerations, and also the consistencies of evidence generated using global and localised approaches.

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12	65967	17	0	0	0	0	The chapter should mention a crucial objective for further research: Beyond expected utility theory and stochastic processes there is little theoretical basis of decision making under uncertainty that is relevant for adaptation. It is highly questionable whether standard probability models are adequate for adaptation decision making. Some alternatives exist, but these are currently not sufficiently explored / tested. This comment refers to both practical decision making and to scientific research. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Section 17.3 lays out some basic principles for dealing with uncertainty in adaptation work - with particular reference to the principles of robust decision-making. Also see Chapter 2 for much more on decision-making paradigms for adaptation.
13	66153	17	0	0	0	0	This chapter is an assessment of method rather than an assesment of current knowledge outcome from the method. This makes it somewaht unusual amongst IPCC chapters. It was not what i expected it to be, and I fear that readers generally will have expected more on the state of current that has come from the application of the developing method, addressing Qs such as: What do we now know about the relative costs of adapation versus the benefits of avopided damage, for given smounts of effort/over given timescales, etc. An exception, in the chapter, is the evaluation of global costs of adaptation, where outcomes of current knowledge re ptesented. I wonder if the same can be done for a (small, given the time available) number of regional assessments of costs and benefits of adaptation, to illustrate aspects where there has been progress and aspects where there has not. The assessment of costs/benefits of flood barriers on the Uk's R. Thames, recently updated, would be a good example. One or two others, eg from Bangladesh, Australia, would provide more concrete evidence to the reader of what we know and what we do not know. (Martin Parry, Imperial College)	Some regional and national scale assessments are addressed in Table 17.4. Given space considerations a more complete treatment of these studies was not possible. Note that the examples chosen were designed to illustrate some elements of what might be considered best practice, consistent with the remainder of the chapter.
14	67882	17	0	0	0	0	Table 17.2 : Most of the data of Table 17. 2 is from World Bank report, which is not reviewed by any authorities. It would be preferable to describe World Bank report as gray literature. (JAPAN)	Yes, this is grey literature.
15	70565	17	0	0	0	0	The chapter is generally very interesting, but there is a tendency, perhaps, for it to be of a textbook summary nature in the first sections, i.e. 17.2 to 17.4. Some issues and terms could be linked better in the first sections, including adaptation deficit, costs, and residual damages and the links to development and socio-economics. Some of the references are quite old, which is fine as they often refer to key findings in the theoretical literature, but it would be interesting to include more references to the latest findings in the literature, particularly in the first sections of the chapter. In this way, the chapter would have less emphasis on presenting the textbook knowledge in the field and more on relating this to a summary and discussion of related key findings in the latest available literature. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	More references have been incorporated in earlier sections (17.2 and 17.3).
16	70773	17	0	0	0	0	A considerable number of references missing from References in the chapter (hard to find and check the material cited and its relevance) (Anni Huhtala, Government Institute for Economic Research )	The reference list has been updated and now complete.
17	73953	17	0	0	0	0	An important aspect of the chapter that is not emphasized is the interaction between adaptation and mitigation efforts. There is a brief section that considers it but the interchange between the two is not highlighted in the executive summary or in other key places throughout the chapter. Recommend that the section on adaptation and mitigation as competitive and complementary be moved up in the chapter (for instance, to page 5 in section 17.2.2) and fleshed out. In particular, how much adaptation society invests in today depends on when and how much mitigation takes place. See Agrawala et al (2011) in IRERE for a review of the recent literature and conclusions that can be drawn regarding how mitigation and adaptation interact. Also see, Calvin, Katherine, Marshall Wise, Leon Clarke, Jae Edmonds, Page Kyle, Patrick Luckow, and Allison Thomson. 2013. Implications of simultaneously mitigating and adapting to climate change: initial experiments using GCAM. Climatic Change 117(3): 545-560. (UNITED STATES OF AMERICA)	17.2.7.1 discusses the interactions between mitigation and adaptation, and includes other non-climate investments.
18	73954	17	0	0	0	0	Another issue that is not discussed in the chapter is the distinction between anticipatory or planned adaptation and reactive adaptation. Agrawala et al (2011) in IRERE discusses findings that it may actually be optimal to engage in reactive adaptation instead of planned adaptation because of the uncertainty about where impacts will occur at a local level. This is an interesting point worthy of discussion, particularly since it is the opposite of what one would expect under certainty. (UNITED STATES OF AMERICA)	We include the concepts implied by the content discussing the persistence of the adaptaion with references to an updated version of the Agrawala et al paper. This is done in the section entitled 17.2.4. Adaptation as a Dynamic Issue
19	73955	17	0	0	0	0	Chapter 17 is not well organized and comes across as a very fractured chapter - just a collection of disparate information. It is hard to see how topics discussed in the chapter relate to each other. The flow of paragraphs and sections is choppy or abrupt, to the point of hindering readability and clarity. A bit of a layout or "roadmap" at the front of the chapter would be extremely helpful, along with some effort to improve the flow and transitions between sections. (UNITED STATES OF AMERICA)	The section has been reorganized to improve the presentation of information. An introduction to the different sections of the chapter, or a roadmap, has been added to section 17.1.
20	73956	17	0	0	0	0	Make sure new terms being used include definitions for clarity. Terms like "dynamic maladaptation" and others may be industry standard, but their meaning may be unclear when the report is used internationally or outside of the economics sector. (UNITED STATES OF AMERICA)	We revised the wording to clarify the concept and removed dynamic maladaptation

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21	73957	17	0	0	0	0	Many sections of the chapter allude to barriers to adaptation. For example, section 17.2.1 indicates that barriers to adaptation arising from lack of resources (human, financial, technical, etc.) are a reason for public provision of certain adaptation measures. Section 17.2.2 alludes to some of the reasons adaptation cannot reasonably overcome all climate change effects. However, the chapter lacks a detailed discussion of the full array of barriers to effective adaptation and the insights the economics literature have gained about them. Specifically, there should be a discussion of scientific, financial, institutional, legal, cultural, technological, and political barriers. Some of these have been discussed, for example, in the U.S. National Climate Assessment (2013) that was just released for public comment. (UNITED STATES OF AMERICA)	Barriers are the main topic of Chapter 16 of the report, and are treated more completely there.
22	73958	17	0	0	0	0	On the plus side, the chapter usefully pulls together elements of the rather fragmented economics literature on different aspects of climate adaption. If the goal of the chapter is to review and synthesize this theoretical literature it does a reasonably good job (though the discussion is a bit hard going in places). If, however, the purpose is also to provide practical guidance for policymakers in the trenches needing to think through, and measure, the costs and benefits of alternative adaption policies, what instruments are needed and how they should be designed, and rank them in terms of which should go ahead first and when, the chapter is less useful. Probably the best way to increase the practical relevance for policymakers (if this is not covered in other chapters) would be to provide some country case studies - pick say four diverse countries (in terms of income and climate vulnerability), discuss some of the adaption opportunities in different sectors, what sorts of approaches and data sources might be used to assess benefits and costs, how projects should be ranked (given budget constraints), and whether there are any country-specific factors affecting policy choices. For example, to deal with sea level rises and increased storm intensity, how should policymakers think from an economic perspective about where to build sea level defenses, how strongly to build them, and at what point in time should the investment be made? How should policymakers decide which areas not to protect (and allow to be inundated)? And what are the implications for coastal development? Are corrective taxes needed if houses are built in coastal areas (thereby increasing the likelihood that defenses will be needed)? More generally, some discussion might be useful of steps that might be taken now to alleviate threats of increased water scarcity, to promote the development of flood-resistant or drought-resistant crops, and perhaps even to alleviate the possible spread of tropical disease or head off some of the potential pressures due to induced population migration. Addressing climate change involves a portfolio of different policies - mitigation, adaption, investment in last-resort technologies (to deal with catastrophes), research into new technologies, climate finance, scientific research, etc. It might be helpful to say a bit about the balance between adaption versus these different policies. most obviously, given that we are nowhere near where we should be in terms of pricing emissions, does that mean adaptation projects are even more pressing? It might be helpful to include a matrix or similar upfront listing some concrete examples of potential adaption projects across major sectors, and whether these projects should be left to the private sector as opposed to fully funded by the public sector. It might be useful to spell out more clearly the optimal timing of investment in climate adaption projects, which is a bit tricky given that benefits may be growing over time but we are also learning over time about the potential severity of climate impacts. (UNITED STATES OF AMERICA)	These are very useful suggestions. Section 17.4 attempts to make comparisons (see table 17.4) of methods used in different countries. We provided some case studies from different countries throughout the chapter. Because of the non-uniform application of methods across case studies at different levels, in different countries and for different purposes, the suggested approach is difficult. We also tried to avoid being prescriptive in terms of what methods to use in different scenarios, but rather focussed on what has been done, based on the available literature.
23	73959	17	0	0	0	0	The chapter does not do a good job of distinguishing between private or individual level adaptation (autonomous adaptation) that will happen as a natural response to climate change - an internalization of the private costs and benefits of taking some action to reduce the impacts of climate change - and actions that require government involvement because the private and social costs or benefits are not the same and individuals do not account for the social aspect when making private decisions. This very basic idea of a market failure is not well explained but should be the main principle around which a chapter about the economics of adaptation is organized. Sue Wing and Fisher-Vanden (2013) offer another categorization of adaptation responses - passive general market reactions vs. specific reactive adaptation investments vs. specific proactive adaptation investments - that may be useful to cite here. They also touch on the role for public investment. Ian Sue Wing, Karen Fisher-Vanden. 2013. Confronting the challenge of integrated assessment of climate adaptation: a conceptual framework. Climatic Change 117(3):497-514. (UNITED STATES OF AMERICA)	This was enhanced in the chapter in sction 17.2 and 17.3. The suggested reference was added

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24	73960	17	0	0	0	0	The chapter lacks any significant discussion of the important issue of maladaptation. The chapter needs more discussion about how adaptation strategies can have unintended consequences. It needs to synthesize insights already gained in the economics literature about the types of maladaptation that may occur, the ways in which they may occur, and the magnitude of the damages if they occur. This should also include a discussion of how actions to mitigate greenhouse gas emissions could inadvertently lead to maladaptation. (The chapter talks about the potential ancillary benefits of mitigation or adaptation strategies, but does not adequately discuss potential unintended consequences.) Similarly, adaptation strategies can inadvertently lead to increases in greenhouse gas emissions. (UNITED STATES OF AMERICA)	17.3 briefly discusses the risk of maladaptation, with more detailed treatment of maladaptation covered in Chapters 14 and 16.
25	73961	17	0	0	0	0	The chapter should have a separate section that outlines cost and benefit analysis methodology and considerations. The section could combine, streamline and strengthen discussions in Section 17.2.1.2. (Broad Definition of Benefits and Costs), Section 17.2.5.(Defining What Constitutes the Cost of Adaptation), Section 17.2.6 (methodological considerations), and Section 17.3.6 (Economic Decisionmaking with Uncertainty). (UNITED STATES OF AMERICA)	This is attempted in the section 17.4.1 in the revised version of the chapter, while avoiding a textbook approach to methodological presentation.
26	73962	17	0	0	0	0	When a key question is what are the benefits/costs of investing in adaptation now vs. waiting to invest this calls to mind a real options framework that weighs the risk of not taking action as well as the cost of guessing wrong (that the risk you invest against does not occur). Some discussion of this framework would be useful for thinking about adaptation. Anthony Fisher has a paper that discusses this in the context of climate change - though not specifically adaptation - as do others Pindyck, Blythe et al. (UNITED STATES OF AMERICA)	Real options considered in the revised chapter (see p4 line 15-23).
27	77508	17	0	0	0	0	The role of Ch.17 (in conjunction with Ch.10 and 2) should be thoroughly reviewed. Some aspects are completely missing and neither taken up in Ch.10 or 2. Examples are economic modelling of CCI/AV, needs for model development due to numerous gaps, differences between IAM and genuine (full scale) economic models, the need for and challenges of stochastic baselines (when wanting to include effects of extreme events that may occur now and then). References: (1) Kuik, O., Buchner, B., Catenacci, M., Gorja, A., Karakaya, E., Tol, R. (2011), Methodological aspects of recent climate change damage cost studies, Integrated Assessment Journal, Vol. 8, Issue 1, pp. 19–40; (2) A. Leiter, H. Oberhofer, and P. Raschky (2009), Creative disasters? flooding effects on capital, labour, and productivity within european firms. Environmental and Resource Economics, 43:333-350; (3) Watkiss, P. and Hunt, A.(2012), Reviewing the Economic Coverage of the Climate Change Risk Assessment, submitted to the Committee on Climate Change Adaptation Sub-Committee, June 2012; (4) Perrels, A., Veijalainen, N., Jylhä, K., Aaltonen, J., Molarius, R., Porthin, M., Silander, S., Rosqvist, T., Tuovinen, T., Carter, T. ja Fronzek, S. (2010). The implications of climate change for extreme weather events and their socio-economic consequences in Finland. VATT Research Reports 158, June 2010. (5) Rosqvist T., Molarius R., Virta H. & Perrels A.: Event tree analysis for flood protection—An exploratory study in Finland, Reliability Engineering & System Safety, Volume 112, April 2013, Pages 1-7, ISSN 0951-8320, doi: 10.1016/j.res.2012.11.013. (6) A. Perrels, A. Simola, T. Rosqvist, H. Virta, and J. Honkatukia (2011), Quantifying direct and induced economic costs of climate change. NCCR Conference Bern, 16 - 17 June 2011 (Adriaan Perrels, Finnish Meteorological Institute FMI)	Thank you for the additional references. In 17.1, we provide the starting point of the chapter and its linkages to Chapter 2. The economic costs of climate change are covered in greater detail in Ch10 while we focus on adaptation.
28	79020	17	0	0	0	0	Both very balanced, comprehensive and clear (partly table overloaded, but text clear) (Reimund Schwarze, Helmholtz Leipzig)	Thank you for the positive comment.
29	79606	17	0	0	0	0	The draft chapter on the economics of adaptation brings together a huge volume of literature in a very concise chapter. At a number of points there was a need to give the reader more information for referenced statements to make full sense. I found myself having to dive into the references just to follow the text. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We tried to make the points more explicit in the revised chapter, within the space limits that we have.
30	79607	17	0	0	0	0	The chapter at points felt disjointed and jumped between sub-sections without it being clear to the reader what the linkages are. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We have reorganised the chapter, and moved sections and sub-sections around to make the flow smoother.
31	79608	17	0	0	0	0	Adaptation as a dynamic issue is clearly important but also is our ability to learn about adaptation from spatial variation in climate. This is only picked up at the end of the report (e.g. Ricardian analyses etc) (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We agree, and we pick the dynamic aspect in 17.2.4 and keep the Ricardian perspective in the new 17.4 (see table 17.4)
32	80458	17	0	0	0	0	This chapter should be more aggressive in providing assessment rather than justification for the use of economics in the assessment of adaptation. While the authors make it clear that economics can be useful, they often shy away from using the economics literature to emphasize clear examples of what economics has shown. (Robert Heilmayr, Stanford University)	We have attempted to do this through providing more examples and case studies in the revised chapter.

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33	81045	17	0	0	0	0	There are some missing/ incorrect citations in the chapter. These discrepancies have been highlighted in the ref check document for chapter 17 and is available in the supporting material web page. Chapter team may wish to rectify these errors before starting to work on SOD revisions and FGD preparation. (Monalisa Chatterjee, IPCC WGII TSU)	Reference inconsistencies and gaps have been addressed.
34	82744	17	0	0	0	0	1) Overall -- The chapter team has strengthened the assessment in its 2nd-order draft. In the final draft, the chapter team is encouraged to continue its prioritization of compact and rigorous assessment, high specificity, and clear writing. (Katharine Mach, IPCC WGII TSU)	The comment is appreciated.
35	82745	17	0	0	0	0	2) Coordination across Working Group II -- In developing the final draft of the chapter, the author team should continue to ensure coordinated assessment, both in the chapter text and at the level of key findings. In particular, the coverage of and handoffs among the adaptation chapters should continue to be refined. Where cross-references are made, they should ideally refer to specific sections of other chapters and/or their assessment findings, reducing overlaps and harmonizing assessment. (Katharine Mach, IPCC WGII TSU)	We have attempted to make references to other chapters and to WGI and WGII as much as possible in the chapter.
36	82746	17	0	0	0	0	3) Harmonization with the Working Group I contribution to the AR5 -- In developing the final draft, the chapter team should also ensure all cross-references to the Working Group I contribution are updated, with discussion of climate, climate change, and climate extremes referencing the assessment findings in that volume. (Katharine Mach, IPCC WGII TSU)	We have attempted to make references to other chapters and to WGI and WGII as much as possible in the chapter.
37	82747	17	0	0	0	0	4) Attention to figure suggestions received in the review -- If reviewers of the chapter identify potential graphics that would complement the text of the chapter and enhance the assessment, the chapter team is strongly encouraged to consider them. (Katharine Mach, IPCC WGII TSU)	The chapter has added more figures to illustrate what is in the text.
38	82748	17	0	0	0	0	5) Characterization of future risks -- In assessing the economics of adaptation, the chapter team may wish to consider risks of climate change for what can be considered two eras. Some risks become relevant in the next few decades, during which time projected temperatures do not vary substantially across socioeconomic/climate scenarios. These coming decades can be considered an era of climate responsibility, and adaptation can be considered a primary means of reducing risks during this time. In contrast, mitigation choices made now and in the coming decades will be important in determining the level of climate change realized in the 2nd half of the 21st century and beyond. This longer-term period can be considered an era of climate options. Mitigation and adaptation are both relevant for risk reduction over this time frame. (Katharine Mach, IPCC WGII TSU)	Material was added on the eras and degrees of climate change in the section 17.2.4. Adaptation as a Dynamic Issue
39	82749	17	0	0	0	0	6) Informing the summary products -- To support robust and insightful summary products report, the chapter team is encouraged to maximize nuance and traceability in its key findings, continuing to use calibrated uncertainty language effectively. In addition to nuanced consideration of future risks, the chapter team is encouraged to consider themes emerging across chapters, for example the importance of extreme events in understanding adaptation deficits and vulnerabilities to date, as well as future risks and potential responses, the role of limits to adaptation and transformation, the relevance of multidimensional inequality in the context of climate change, understanding of adaptation experience to date, the costs of adaptation versus economic/avoided damages and mitigation costs, and the nature of interactions among mitigation, adaptation, and sustainable development. (Katharine Mach, IPCC WGII TSU)	We have attempted to integrate the cross-chapter issues as much as possible, for example through consideration of adaptation and mitigation interactions, the narrowing of the adaptation space (figure 17.1 and 17.2).
40	82750	17	0	0	0	0	7) Structure of the chapter -- In preparing the final draft, the chapter team should consider merging some subsections to avoid overly short subsections in some cases. Additionally, the chapter team should consider which parts of the chapter are working best and perhaps further emphasize these aspects. For example, some portions of the chapter seem to be working well as a "tools" introduction--is it possible to characterize more fully, with balance, how different approaches are relevant and where and where not they are best applied? Also, while global adaptation costs are understandably highlighted in the executive summary, it seems there is further opportunity to provide more substantive information on costs of adaptation at finer scales. Beyond this, is there opportunity to further discuss private and autonomous adaptation costs, which may be substantial, beyond the public costs? (Katharine Mach, IPCC WGII TSU)	We have reorganized and consolidated several sections, particularly 17.2.6. Most of the studies in the former section 17.6 (now 17.4) reflect both public and private costs. There is also an attempt in section 17.4 to characterize which approaches to economic analysis are best supported. Finally, there is a new figure which more clearly distinguishes between autonomous and planned adaptation, including "free" autonomous adaptation
41	82751	17	0	0	0	0	8) Comprehensive, traceable assessment -- For all statements in the chapter, this chapter team should ensure robust referencing is provided, building from its comprehensive consideration of relevant literature. Referencing in all chapter paragraphs should be as dense as possible, leading to a rich and insightful assessment throughout the chapter. (Katharine Mach, IPCC WGII TSU)	We have improved our referncing in the chapter, making it easier to attribute statements to sources.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
42	82752	17	0	0	0	0	9) Report release -- The chapter team should be aware that the final drafts of the chapters will be posted publicly at the time of the SPM approval, before final copyediting has occurred. Thus, the chapter team is encouraged to continue its careful attention to refined syntax and perfected referencing. (Katharine Mach, IPCC WGII TSU)	The chapter has worked on referencing to improve it.
43	84526	17	0	0	0	0	GENERAL COMMENTS: I congratulate the author team for all their work on the SOD. Please see my detailed comments for suggestions related to ES findings and their traceable accounts, cross-chapter coordination, refining figures and tables, calibrated uncertainty language, and various specific clarifications. I have one general comment. Particularly in the executive summary, but also in the chapter text, the focus is often on discussion of types of approaches and analytical methods, as well as identifying the potential of economics to provide insights, but with less of a focus on the actual insights gained from use of those approaches and methods and their limits. In some cases, it is unclear to what extent discussions are theoretical and identifying possible applications or extensions of existing methods that have not actually appeared in the literature, as opposed to discussions of existing applications of methods which can be evaluated as part of the chapter assessment. In the preparation of the FGD and revisions of the executive summary, please consider ways to more clearly present not just categories, but also conclusions that communicate the author team's evaluation of both the methods and results from their application. Likewise, consider ways to communicate not only types of policy options but also insights from study of the implications of existing or proposed policies. My specific comments try to point out opportunities to do this. (Michael Mastrandrea, IPCC WGII TSU)	The positive comment is appreciated. We have tried to bring the ES to a practical level, while in some cases, the scarcity of practical evidence in climate adaptation limits the ability to make specific conclusions for adaptation.
44	84527	17	0	0	0	0	SUMMARY PRODUCTS: In preparing the final draft of your chapter and particularly your executive summary, please consider the ways in which your chapter material has been incorporated into the draft SPM and TS. For chapter 17, this includes presentation of principles for effective adaptation in section B.ii and adaptation costs in section D.i. Are there opportunities for presenting chapter findings and material in a way that further supports broad themes highlighted in the summary products and that facilitates additional cross-chapter synthesis in specific findings or figures/tables? Do the existing summary product drafts suggest additional coordination that should occur between Chapter 17 and other chapters at LAM4? (Michael Mastrandrea, IPCC WGII TSU)	We have tried to link the content of the chapter with the summary products as much as possible. In most cases, the contents of the TS and SPM have been updated as the chapter progressed, and based on the ES.
45	85217	17	0	0	0	0	It goes on forever. Who cares? (Vincent Gray, Climate Consultant)	We do not understand the meaning and context of this comment.
46	63238	17	1	1	42	0	Chapter 17 provides a good overview of the economics of adaptation. A selection of options for estimating costs and benefits are presented. It provides a well balanced description of the use of economics, acknowledging also the limitations. One topic that is missing is the option of ecosystem-based adaptation. It is subject to current research and can provide cost effective solutions at larger scales building also on local knowledge, which is of relevance in particular in developing countries, where the majority of human population lives. In a comment below I provide several references that is relevant for this topic. The chapter would benefit if this topic would be taken into account. I am happy to contribute a paragraph on this topic to the chapter if this would be helpful. Not all references that are cited in the chapter are also listed in the references. There are also inconsistencies in the citation format. Unfortunately I did not have the time to check the original literature for making sure that the information provided in the text is also consistent with the original. However, where possible, I provided appropriate references that can benefit to the overall scientific credibility of the chapter. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	We agree on the importance of ecosystem-based adaptation. There is limited scientific literature that is specific to the economics of ecosystem based adaptation (see 17.4). Thank you for the offer to contribute to the chapter. At this point, we are struggling with space limits. The economics of ecosystem services is touched on while discussing economic instruments to provide adaptation incentives (17.5)
47	80936	17	2	0	4	0	The ES seems to be largely conceptual and lacks much quantitative reporting (with the exception of lines 45-49). Is there a reason why this is the case? Does this accurately reflect the quantitative results of the literature? Additionally, are there any case studies that can be highlighted in the ES? The ES conceptually is all about the future as if adaptation measures (and the economic implications underlying them) have not taken place. But undoubtedly this is not the case. How can the ES better represent the current state of the economics of adaptation? (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	Most of the available quantitative literature is on the cost of adaptation (covered in 17.4), while other economic aspects have limited quantitative material specific to adaptation.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
48	82753	17	2	35	0	0	Executive Summary -- Throughout the executive summary, the chapter team should consider further communicating not only the potential and the strengths of various economic approaches but also their limitations. This type of full, nuanced assessment is provided for estimates of adaptation costs and could be relevant to other parts of the executive summary. Additionally, it would be helpful to clarify where the applications mentioned are potential applications as compared to usages already seen. This could be achieved by providing more specific examples, insights, and results of economic approaches mentioned. For potential applications, the chapter team should further specify where given methods or tools would work best and where they would work less well. (Katharine Mach, IPCC WGII TSU)	Where practical evidence exist, we have tried to communicate some examples, but these are mostly in the sections that the ES refers to. In the main text of the chapter, the team has put effort to provide some examples.
49	61429	17	2	35	4	14	Executive summary. For each of the points here on the level of 'confidence' is noted, I would like to see the level of agreement and evidence for each of the points brought out here. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	Especially in the costing of adaptation, the ES has tried to provide the basis for the confidence level on the basis of the level of agreement and availability of evidence.
50	65957	17	2	35	4	14	The executive summary contains a lot of statements that are not supported by the literature referenced later in the chapter. Some other statements are only based on theoretical considerations. Please check carefully. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We have linked the executive summary to the chapter sections as far as possible in the revised chapter.
51	65434	17	2	37	2	37	Are the policy goals "alternative", or simply "other policy goals"? (John Hay, University of the South Pacific)	We have clarified this in the text to "multiple" policy goals.
52	62714	17	2	37	2	38	The description "In the presence of limited resources and a range of goals, adaptation implies trade-offs between alternative policy goals (high confidence)." is not well understood for me even after reading the text in Chapter 17. From my view, there will be many synergies between adaptation and alternative policy goals but some trade-offs between adaptation and alternative policy goals. This sentence should be revised. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	We have clarified this in the text to "multiple" policy goals. The intention of the statement is to emphasize the need to make choices where resources are limited. We agree that there will be a lot of synergies, which enables adaptation and policy goals to be pursued without additional costs.
53	73963	17	2	37	2	38	This summary statement is so broad that it is not particularly useful. Resources are always limited, so all decisions are ultimately about evaluating trade-offs. Adaptation is no different. (UNITED STATES OF AMERICA)	The chapter team also considered that in some cases, there would be synergies between adaptation and other goals, in which case trade-offs do not exist in principle.
54	64808	17	2	37	2	40	The full text of Ch.17 suggests that adaptation implies "synergies" between alternative policy goals, rather than "trade-offs." For instance, 17.4.1 and 17.4.3 explicitly describe synergies and/or possibility for synergies. 17.3.2, 17.3.3 and 17.3.4 discuss the issue of implementation difficulties, which is far from "trade-offs." The two sentences (p.9 L.10 "Some studies show higher growth rates raise hurricane vulnerability (Bjarnadottir, 2011)."; p.9 L.52 "However, development can also lead to increased vulnerability, for instance through urbanization of flood-prone areas (Hanson et al 2011).") indicate trade-offs between development and vulnerability due to the effect of increased assets (under the assumed fixed adaptive capacity), and they don't imply trade-offs between adaptation and alternative policy goals. In order to maintain the consistency between Executive Summary and body text, "p.2 L37-40" should be revised. Specifically, p.2 L37,38 "In the presence of limited resources and a range of goals, adaptation implies trade-offs between alternative policy goals (high confidence)." offers the opposite implication. (Junichiro Oda, Research Institute of Innovative Technology for the Earth (RITE))	This point of the Executive Summary is mostly derived from sections 17.2. and 17.3 that discuss trade-offs. 17.2 in the revised chapter also discusses co-benefits, which speak to synergies as pointed out in the comment.
55	69239	17	2	37	2	46	Add paragraph 17.4 as a reference (NETHERLANDS)	17.4 has now been moved to 17.2 (it's now 17.2.3.1)
56	63654	17	2	37	4	14	The executive summary of ch. 17 too much concentrates on the status and capacity of "economics of adaptation". Additionally it should offer more (and more differentiated) major results of research and state of knowledge (e.g. adaptation costs for specific regions, sectors,...). (GERMANY)	The executive summary has now been revised to focus less on the role of economics.
57	84528	17	2	38	2	40	Here is the first example of what I had in mind in my general comments. These sentences state that economics offers insights into tradeoffs and explains differences between potential and actual achievement, but provides no examples or broader conclusions. What tradeoffs have been identified? Do studies of the identified constraints on adaptation suggest principles for effective adaptation? Please consider conclusions that can be drawn. (Michael Mastrandrea, IPCC WGII TSU)	In revising the executive summary, the chapter tries to bring a mix of what economic methods offer and some practical economic tools that have been used in adaptation or in other fields.
58	69240	17	2	39	2	40	There is a statement "... a function of costs, barriers, behavioral biases, and resources available. [17.3.2, 17.3.3, 17.3.4]". However, the main reference text 17.3.2 only talks about "market barriers" while "barriers" often include market barriers, technological barriers, institutional barriers, cognitive barriers, etc. (NETHERLANDS)	The revised referencing now reflects the sources of the points in the executive summary.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
59	84529	17	2	40	2	46	What effect has the described broadening of economic analyses of adaptation had on results of these analyses? What effect has the recognition of the importance of impacts on the distribution of income and wealth and on ecosystems had on the results of economic evaluations? Please consider ways to communicate not just how methods are evolving but what that means in terms of the insights provided by application of those methods. (Michael Mastrandrea, IPCC WGII TSU)	By using more examples in the revisions, the chapter team tried to go beyond just description of methods.
60	60657	17	2	43	2	43	Suggest removing "the notion of" as it implies that the application of risk management may only be hypothetical. Risk management is currently used broadly in practice to manage safety, health and environment risks. (Haroon Kheshgi, ExxonMobil Corporate Strategic Research)	This phrase has been removed from the text.
61	80059	17	2	48	0	0	additional insight: potential barriers to efficient public adaptation through the lens of political economics/public choice theory; see eg Gawel, E., Heuson, C., Lehmann, P., 2012. Efficient public adaptation to climate change: An investigation of drivers and barriers from a Public Choice perspective, UFZ Discussion Paper No. 14/2012. Helmholtz Centre for Environmental Research – UFZ, Leipzig. (Reimund Schwarze, Helmholtz Leipzig)	Reference appreciated. It's included in the chapter.
62	80061	17	2	48	0	0	another additional insight: there is a fastly growing literature dealing with the strategic role of adaptation in terms of international negotiations and possible agreements on mitigation. This topic is certainly of major interest and thus should be mentioned in this chapter. For instance, a recent survey on the economics of adaptation gives a broad overview on this topic (chapter 6): Heuson, C., Gawel, E., Gebhardt, O., Hansjürgens, B., Lehmann, P., Meyer, V., Schwarze, R., 2012a. Fundamental questions on the economics of climate adaptation: Outlines of a new research pro-gramme, UFZ Reports No. 05/2012, Helmholtz Centre for Environmental Research – UFZ, Leipzig. (Reimund Schwarze, Helmholtz Leipzig)	The chapter does not discuss the international negotiations in detail, but summarises the key issues raised in the literature concerning the negotiations, from the point of view of adaptation (17.2.5)
63	57656	17	2	48	2	48	Economics is great, say economists (high confidence) (Richard S.J. Tol, Vrije Universiteit Amsterdam)	We understand this comment to say economists should also consider the shortfalls of economics, and the role of non-economic considerations, which we do when we discuss the role of non-economic factors in adaptation decision making (see FAQ 17.2)
64	69241	17	2	48	2	51	"economics offers estimation of the distributional consequences of adaptation and its impact on poverty": is this statement of high confidence or not? In the main text 17.2.1, there is only one reference to Jacoby et al, 2011, is about income distribution and poverty. The main text 17.2.7 says nothing about equity and poverty. Therefore, we should not say this statement is true with high confidence. (NETHERLANDS)	This part has been revised, with the level of confidence pertaining to the range of techniques that can be used to make decisions under uncertainty.
65	84530	17	2	48	3	8	In line with my general comments, this bullet list identifies categories and states that economics offers insights in these categories, but then does not present what those insights are. The focus should be on the insights rather than the categories. Does the last bullet of the list imply that all the other bullets are aspirational/theoretical applications, rather than existing applications? (Michael Mastrandrea, IPCC WGII TSU)	We provide the tools that can be used for decision-making under uncertainty.
66	65958	17	2	48	3	16	Please be much more modest about the potential of cost-benefit analysis in the field of adaptation. In particular, the estimation of benefits (p 2   49, p 3   5-8) is highly problematic in terms of discounting over very long time scales, of uncertainties and of mentization of non-tangible damages. First, these problems should be mentioned. Second, as they are not likely to be resolved in the near future (if at all), it should be mentioned that there is a need for decision criteria that are alternatives to cost-benefit analysis. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	While these issues will not be resolved, the BCA framework is flexible enough to reflect uncertainty - we have tried to more fairly balance these considerations in the revised chapter, and also moved the discussions of key methods issues next to the discussion of studies that employ the best supported methodologies
67	69242	17	2	50	2	50	Reference paragraph 17.3.7.3 does not exist, should be 17.3.6.3 (NETHERLANDS)	This has been corrected.
68	69243	17	2	51	2	51	Add paragraph 17.3.5 as a relevant reference (NETHERLANDS)	The referencing has been corrected.
69	69244	17	2	53	2	54	"The types of adaptation that will occur without centralized actions (autonomous or private adaptation)...". The main text 17.2.1 says nothing about types of autonomous adaptation. It is better if authors cite another relevant references or explain types of autonomous adaptation in more detail in 17.2.1 (NETHERLANDS)	This part has been revised, and no longer discusses the types of adaptation.
70	69245	17	3	2	3	2	Add also reference paragraphs 17.2.1, 17.2.3 and 17.3.6.1 to this statement (NETHERLANDS)	The referencing has been revised.
71	69246	17	3	3	3	4	Add paragraph 17.2.6.4 as a relevant reference (NETHERLANDS)	The referencing has been revised.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
72	63655	17	3	5	3	8	The message that the theoretical basis and concepts/ methods for economic evaluation of adaptation are already existing seems to optimistic. There are also open questions and research needs on this level (e.g. as for estimation of adaptation costs, cp. line 45-52), and not only as for practical application of existing approaches to adaptation problems. The present capacity of economics should be explained more differentiated and realistically. (GERMANY)	In the revisions, we also discuss the limits on the use of economic approaches alone for decision-making (see p2 line 48 - p3 line 5).
73	68281	17	3	5	3	8	The statement that the theoretical basis for economic evaluation of adaptation options would be clear, is wrong. The theoretical basis is contested. The chapter assumes the economics of adaptation to be based on optimality concepts, e.g. the maximization of net benefits of adaptation (cf. Mendelsohn, 2006). This becomes apparent at multiple occasions, for instance in the statement that for assessing adaptation strategies "we need to judge whether the benefits outweigh the costs, with benefits and costs broadly defined" (p.4 lines 38-39) and the notion that equity or environmental targets were non-economic goals (p.4 line 40). Optimality concepts have been frequently criticized in the economic profession. It has been argued that optimality concepts for collective issues are "based in a misplaced interpretation of policy for a complex climate-economy system as being analogous to individual inter-temporal welfare maximization" (van den Bergh, 2004:385). Many research traditions within economics such as Public Choice, New Political Economy and Institutional Economics suggest that collective decision-making is better understood as the dynamic interplay of various interdependent actors (e.g. Buchanan 1959, Paavola/Adger 2005). Based on this theoretical foundation optimality concepts seem to provide incomplete economic evaluations of adaptation options, as they risk to omit emerging conflicts, power inequalities and transaction costs, and as they tend to ignore further relevant dimensions of "successful adaptation" such as legitimacy and procedural fairness (Adger et al. 2005). As a consequence, this raises important questions about institutional environments of adaptation decision-making, e.g. about who has voice in assessments of (the benefits and costs of) adaptation, which procedures are followed and which methods used to which purpose, how economic assessments are used and how individual benefits and costs of adaptation are aggregated in collective decision-making. The importance of these institutional and procedural aspects of economic evaluations of adaptation is briefly mentioned in section 17.1 (p.4 lines 27-33) and related question are occasionally raised (e.g., p. 7 lines 18-23). However, answers to these questions are rarely given. Moreover, language in the main sections of chapter 17 (sections 17.2.-17.6.) repeatedly lacks clarity on these issues (e.g., p.4 lines 38-41; figure 1). References: - Adger, W.N., Arnell, N.W., Tompkins, E.L., 2005. Successful adaptation to climate change. <i>Global Environmental Change</i> 15, 77-86. - Buchanan, J.M., 1959. Positive economics, welfare economics and political economy. <i>Journal of Law and Economics</i> 2, 124-138. - Mendelsohn, R., 2006. The role of markets and governments in helping society adapt to a changing climate. <i>Climatic Change</i> 78, 203-215. - Paavola, J., Adger, W.N., 2005. Institutional ecological economics. <i>Ecological Economics</i> 53, 353-368. - Van den Bergh, J.C.J.M., 2004. Optimal climate policy is a utopia: From quantitative to qualitative cost-benefit analysis. <i>Ecological Economics</i> 48, 385-393. (Christoph Oberlack, University of Freiburg)	In the revised chapter (p2 line 48 -p3 line 5), the team also highlights the shift in economic analysis away from efficiency, market solutions and cost-benefit considerations).
74	69247	17	3	5	3	8	"There is little experience of practical application of this approach to adaptation problems". There is a limited number of global and regional adaptation cost assessments performed over the last few years, based on only a few climate change scenarios. However, the quantity of local studies varies by region and by sector and is not per se little in amount. (NETHERLANDS)	We conclude that there is a rapidly growing literature just in the last several years. The studies listed in Table 17.4 scratch the surface and attempt to illuminate the best-supported methodologies to support adaptation decision-making.
75	69248	17	3	7	3	7	We do not understand what authors mean by "other contexts" when reading both executive summary and the main text 17.6.1 (NETHERLANDS)	This no longer features in the revised executive summary.
76	82754	17	3	10	3	10	It would be preferable to specify what the "important inputs" are rather than just indicating that they exist. (Katharine Mach, IPCC WGII TSU)	This part has been removed from the revised chapter.
77	69249	17	3	10	3	16	The first two sentences "Approximate approaches .....to existing uncertainties" are totally relevant to the paragraph topic but have no references. The third sentence " There are methodologies....ethical considerations" is not really relevant to the pharagraph topic and its content already mentioned in page 2 line 50, 51. The source [17.2.6.1, 17.2.6.4, 17.3.5, 17.3.7] is ambiguous. 17.2.6.1 speaks of a lack of data, therefore this reference should be put at the end of the first sentence. 17.3.5 emphasises the importance of considering equity but does not recommend any methodologies to deal with. Therefore, 17.3.5 is not enough to say that "there are methodologies that are able to capture... distributional impacts and ....." . (NETHERLANDS)	The revised sections referenced for this point discuss some specific methodologies.
78	69250	17	3	10	3	16	Reference paragraph 17.3.7 does not exist (NETHERLANDS)	References have been corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
79	84531	17	3	10	3	16	Here is another place where there is an opportunity to focus more on insights deriving from economic approaches and methods. What important inputs to the evaluation and ranking of adaptation options does economics provide? This is not clear in the bold sentence. What insights can be drawn from applications of the approaches, tools, and methodologies mentioned in the nonbold sentences? (Michael Mastrandrea, IPCC WGII TSU)	The revised text now provides some specific tools, but does not go into their applications. The intention here is to highlight those techniques.
80	82755	17	3	14	3	15	Are there limitations to these methodologies for capturing non-monetary effects and distributional impacts that should be mentioned? (Katharine Mach, IPCC WGII TSU)	The focus has been to highlight those methodologies to inform decision-making with uncertainty. Discussion them in detail i.e. strengths and weaknesses, would be more theoretical and text-bookish.
81	69251	17	3	18	3	25	Reference paragraph 17.4.4 does not exist (NETHERLANDS)	We have corrected the references.
82	80925	17	3	20	3	20	I believe that "...co benefits" should be written as "co-benefits", i.e., with a hyphen. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	We have corrected this to "co-benefits."
83	65959	17	3	21	3	21	Delete „ancillary effects may be a source of market failure“. I know of no study that shows this, and I also can't find on later in this SOD. I only know of many examples where climate change will or may amplify existing market failures (e.g. Eisenack, K. (2013) The inefficiency of private adaptation to pollution in the presence of endogenous market structure, Environmental and Resource Economics, DOI 10.1007/s10640-013-9667-6. Osberghaus, D.; Dannenberg, A.; Menzel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, Environment and Planning C, 28, 834-850.). (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	This statement is no longer present in the revised chapter.
84	84532	17	3	25	3	25	17.4.4 should be 17.4.1 here. (Michael Mastrandrea, IPCC WGII TSU)	Section referencing has been corrected.
85	70732	17	3	27	3	27	I would say 'are leading' if there is evidence. Otherwise, the message seems to be: the incentives exist, but will only have an effect in the future (Willem Pieter Pauw, German Development Institute (DIE))	The part referred to in the comment has been removed from the Executive Summary.
86	70733	17	3	27	3	30	Maybe add that adaptation is a long-term process, whereas the private sector usually operates on the shorter term. (Willem Pieter Pauw, German Development Institute (DIE))	The part referred to in the comment has been removed from the Executive Summary.
87	69252	17	3	27	3	31	Even though the statement is correct, the reasons for public action are not explicitly presented in the main text. (NETHERLANDS)	The reasons for public action are now included in the revisions.
88	57657	17	3	27	3	34	You're too timid. Public action also includes removing subsidies and barriers to trade, migration, investment. (Richard S.J. Tol, Vrije Universiteit Amsterdam)	We have integrated the suggestion on "overcoming barriers" among other public actions that we cite.
89	58288	17	3	27	3	34	The conclusion that existing incentives will lead to private adaptation actions is not reasonable. Through several economic incentive method, including public capital such as credit listed in report, can result to ambiguous easily. I suggest present incentive method by the way of neutral method rather than inference. The report should delete the word of biases lie in page 3 line 29. (Juqi Duan, National Climate Center, Chinese Meteorological Administration)	The part referred to in the comment has been removed from the Executive Summary.
90	63656	17	3	27	3	34	There is no scientific evidence that public private partnership in general can reduce vulnerability and improve adaptation. But there are strong interest groups that promote the privatization of public goods and services (e.g. public water supply) to raise the gain of private companies. The IPCC should stay strictly on scientific proven arguments and not communicate particular cases with certain national conditions (e.g. Thames River Barriers) as general rule for international generalization. (See also comments on P3 L31 and P3 L39 and chapter 17.5) (GERMANY)	The part referred to in the comment has been removed from the Executive Summary.
91	78036	17	3	27	3	34	This statement is confusing and seems to conflate many disparate ideas: 1. Much adaptation is a private good and, in the absence of other market failures, will be invested in at optimal levels by individuals acting in their own self interest, 2. Public adaptation is justified in many areas because of other market failures, 3. Insurance and risk sharing can help reduce the impact of climate change. These should be separated into their own paragraphs for clarity, or at the very least, ideas 1 and 2 should be separated from 3. (Frances Moore, Stanford University)	We now address (3) separately from (1) and (2).
92	84533	17	3	27	3	34	This paragraph provides a long list of economic instruments, but no indication of what is known about how to employ these instruments to provide incentives, what approaches have worked and not worked, lessons learned, etc. This is the kind of information that could be presented, in addition to categories of approaches. Some of this is done in the third FAQ, in fact. (Michael Mastrandrea, IPCC WGII TSU)	We have now changed this part of the Executive Summary, and it no longer lists the instruments. However, the comment is valid.
93	69253	17	3	28	3	28	Please rephrase "the public goods nature of knowledge". (NETHERLANDS)	This has been removed from the text.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
94	82756	17	3	29	3	31	For this statement, it may be preferable to specify more explicitly the benefits and limitations of economic instruments in fostering adaptation. (Katharine Mach, IPCC WGII TSU)	The new point that discusses instruments now talks about their limitations.
95	80926	17	3	31	0	0	You could write instead, "Such instruments include ..." unless this list is truly exhaustive. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	We now provide examples of instruments in the revised text (page 3 line 39-49).
96	63657	17	3	31	3	32	Delete: "loans including public private finance partnerships" Rationale: in 17.3 are no arguments given, that this Instrument is providing additional incentives on adaptation (compared with public investments). There is no evidence given and therefore no high confidence possible. (GERMANY)	We have now separated loans from public-private partnerships.
97	65960	17	3	31	3	34	Please concretize „norms and regulations“ as these words are understood quite differently. I would claim that it is important to consider (i) technical norms and standards, (ii) adjustment of environmental and market regulation, (iii) review of liability rules. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We now provide some examples of these in 17.2.2
98	80927	17	3	32	0	0	I find it odd to read "loans including public private..." -- is there supposed to be an "and" in between these loan types? (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	This has now been corrected to separate "loans" from "public private partnerships."
99	73964	17	3	32	3	32	It is not just water prices that need to be fixed. Energy price subsidies have a huge effect on carbon emissions. See 2013 IMF paper: <a href="http://www.imf.org/external/np/pp/eng/2013/012813.pdf">http://www.imf.org/external/np/pp/eng/2013/012813.pdf</a> (UNITED STATES OF AMERICA)	Water is just used as an example here, with the main concept being that of "resource pricing."
100	73965	17	3	33	3	33	"Norms" is not a particular instrument. Here and elsewhere in the chapter, the terminology use is a bit sloppy. (UNITED STATES OF AMERICA)	The examples provided in 17.2.2 illustrate how norms are applied.
101	69254	17	3	33	3	34	Changing norms and regulations are similar to institutional innovations. Also, the main text 17.5 does not say about institutional innovations but R&D subsidies. Therefore, we suggest to change "institutional innovations" by "R&D subsidies". (NETHERLANDS)	The new text no longer contains institutional innovations.
102	65435	17	3	36	3	36	Risk financing has to be affordable if it is to enhance resilience; it also has to be effective when pay outs are triggered (John Hay, University of the South Pacific)	we agree with the comment.
103	69255	17	3	36	3	43	Paragraph 17.4 is not relevant (NETHERLANDS)	This has been corrected.
104	79609	17	3	37	3	39	The reference to 'global risk pools' in the exec summary and in the body of the chapter (page 14, line 48-49) doesn't name any specific global risk pools. It lists a number of regional initiatives. Could it either name the global risk pools it refers to, or delete the reference to 'global'. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We have removed "global" from the text because we do not provide examples that are adaptation-related, but kept it in the executive summary.
105	80928	17	3	38	0	0	The term "kinship networks" is definitely outside of my vernacular. Is this something you could describe parenthetically? (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	This term has been removed from the chapter.
106	80929	17	3	39	0	0	Same with the term "global risk pools". It sounds really interesting but I have no idea what this term means. I guess defining this term will depend upon your audience, however, I think most people will not know what this refers to. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	Risk pools are discussed in 17.5.1 in detail.
107	63658	17	3	39	3	41	Delete sentence: "With considerable ...last resort (high confidence)". Rationale: 1. there is no robust evidence given in the chapters, that PPP are a global "norm". 2. That PPPs may increase resilience is not proven. No evidence given in 17.3-17.4 (GERMANY)	We have removed the level of confidence assigned to this statement.
108	69256	17	3	39	3	41	Paragraph 17.5.1 on risk sharing and insurance does not mention public private partnership. Paragraph 17.5.3 on public private partnerships (PPPs) mentions only that PPPs have been widely used in large infrastructure projects, so we cannot infer that PPPs are the norm rather than the exception. (NETHERLANDS)	Text has been revised for clarity.
109	68107	17	3	45	3	49	The total financial need for adaptation was mentioned to be 75-100 Billion US Dollars. It is suggested to assess the funding needs of developing countries for adaptation as much as possible, which should be reflected in Line 1-29, Page 54 in the TS as well. (CHINA)	It was difficult to find scientific sources that have data specific to developing countries at global levels.
110	69257	17	3	45	3	49	Most recent estimate of global adaptation costs, as shown in table 17.2, is that from World Bank 2010. This source states that in 2050 annual adaptation costs range from 70 to 100 USD billion. Not from 75 to 100 USD billion. (NETHERLANDS)	Thank you - this was corrected in the revised chapter.
111	69258	17	3	45	3	49	No reference in the main text of chapter 17 underpins the statement '., and important shortcomings in the data and methods available for costing adaptation suggest the low end of this range could be substantially lower.' (NETHERLANDS)	This statement has been revised in the revised chapter.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
112	73966	17	3	45	3	49	It is unclear whether these are costs of pro-active adaptation only or also residual damages not averted, or whichever is lower cost (adaptation to prevent a loss or incurring a loss). (UNITED STATES OF AMERICA)	We have added a new figure in the text to attempt to better identify the relationships among these concepts.
113	84534	17	3	45	3	49	The low confidence assignment should be moved directly after the numerical range ("...global by 2050 (low confidence)."), as the author teams appears to have high confidence in the last statement about omissions and shortcomings (which should also be stated), thus with low confidence about the numerical range. (Michael Mastrandrea, IPCC WGII TSU)	Agree - this was done.
114	73967	17	3	45	3	53	Estimates of adaptation costs for tourism need to be made because of the importance of this economic sector. Look again for studies on this. Alternatively - and perhaps more appropriately - the authors should reference the section in Ch 10 relating to the adaptation costs associated with the tourism sector. (UNITED STATES OF AMERICA)	There are estimates from tourism, and other sectors could also be added to Table 17-4. In the interest of space we chose to highlight a relatively small number of studies which exemplify certain methodological elements which appear well suited to supporting local decision-making.
115	84535	17	3	46	3	47	It is not clear where the \$75 billion comes from. Table 17-2 provides a range of 70-100 billion for the 2010 World Bank study, is that the intended range? Or is this a range that seeks to synthesize across studies in Table 17-2? Please clarify the scope. In addition, the chapter text in 17.6.1 states "more than \$100 billion" rather than "\$100 billion" as the upper end of the range. Please reconcile. (Michael Mastrandrea, IPCC WGII TSU)	This was corrected in the revised version.
116	78035	17	3	47	3	47	This states that the cost estimates are for adaptation globally. In fact all these estimates are for the cost of adaptation in developing countries. Moreover, these estimates are almost entirely public costs of adaptation (although methodologies vary between sectors). (Frances Moore, Stanford University)	This was corrected in the revised version. Further, it is not clear that all these costs are public costs - many of the agriculture sector adaptation costs, for example are private costs, and some of the coastal sector adaptation cost are also private costs.
117	82757	17	3	47	3	49	The confidence assignment here should be carefully considered. It seems the chapter team may actually have higher confidence in the 2nd half of the sentence, not low confidence, whereas the low confidence assignment seems to pertain to the 1st part of the sentence and its cost estimates. The author team should consider moving the parenthetical "low confidence" to after "by 2050." (Katharine Mach, IPCC WGII TSU)	This was corrected in the revised version.
118	61430	17	3	50	3	50	It's unclear why estimates would depend on value judgements. This statement should be substantiated. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	Value judgements would include estimating the cost of adaptation in the coastal zone assuming that decisions are made primarily to protect property rather than ecological values.
119	63239	17	3	50	3	52	Uncertainties and challenges related to economics are well presented in this part but also in other parts of the chapter (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	The comment is appreciated.
120	69259	17	3	50	3	52	Reference paragraphs 17.3.10 and 17.3.11 do not exist (NETHERLANDS)	Referencing has been corrected.
121	73968	17	3	50	3	52	The benefits and costs are also difficult to quantify on an aggregate basis because adaptation is often pursued on a very local scale. (UNITED STATES OF AMERICA)	We agree, and that is reflected in our discussion on "consistency between localised and globalized analysis" (17.4.3).
122	84536	17	3	51	3	52	What consequences for adaptation funding are meant? Please specify. (Michael Mastrandrea, IPCC WGII TSU)	We have taken off this point in revising the text.
123	70566	17	3	54	3	54	The term or concept "adaptation deficit" is used for the first time here. Acknowledging that it appears in the glossary, it would be beneficial to briefly introduce the concept in the body of the chapter. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We have deferred defining the term to Chapter 15 (AR5WGII).
124	70735	17	3	54	4	1	I would write "more fully UNDERSTOOD AND taken into account. Adaptation needs and costs are already hard to estimate; estimating the adaptation deficit is even more challenging because it could (depending on the detail of the analysis) question the current state of development of a country. (Willem Pieter Pauw, German Development Institute (DIE))	This part has been removed from the revised text of the Executive Summary.
125	84537	17	4	3	4	9	This material is somewhat implicit in the comparison presented in section 17.6.3, but is not discussed directly. Please add these topics to the discussion in the chapter text. (Michael Mastrandrea, IPCC WGII TSU)	This part has been removed from the revised text of the Executive Summary.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
126	73969	17	4	7	4	9	The listed reasons are of much lower importance than the high degree of uncertainty over local changes in climate associated with global climate change. The range of differences in projected local effects across the large number of competing climate models is enormous. (UNITED STATES OF AMERICA)	We agree with the point on the role of uncertainty in local climatic changes. Uncertainty is discussed in more detail separately (p4 line 15-23 in the revised chapter), but its influence on costing adaptation is also discussed in 17.4.1 and 17.4.4).
127	84538	17	4	13	4	14	Do some studies achieve all these objectives? Do those provide any particular insights or specific results that warrant presentation here? (Michael Mastrandrea, IPCC WGII TSU)	These characteristics are derived from different studies, and there are differences in the extent to which existing studies capture these i.e. not all studies include these characteristics.
128	71525	17	4	17	0	0	Section 17.1 Here (and in the remainder of the chapter) some important adaptation measures are not given enough room: adaptation can not only mean to reduce or avoid damages but also to exploit benefits from climate change. (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	This section is brief because of page limits and because of extensive treatments in chapters 14 and 15 plus in AR II and IV. We have now said that. The only reason we include this is to provide broad examples and to show different private and public roles
129	69260	17	4	22	4	22	Adger et al., 2007 not in reference list --> should be Adger et al., 2003 or Adger et al., 2006 (NETHERLANDS)	we added the 2007 item to which we were referring which is Adger, W.N., S. Agrawala, M.M.Q. Mirza, C. Conde, K. O'Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi, 2007: Assessment of adaptation practices, options, constraints and capacity. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 717-743.
130	80937	17	4	22	4	24	This makes it seem as if there was a chapter in AR4 on the economics of adaptation, which is confusing. Why not simply state that this chapter did not exist in AR4. Then organize the entire chapter in two sections: 1) what we know, and 2) what we need to know/future research goals. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	Text adjusted to reflect the true content of AR4
131	80938	17	4	22	4	24	"A key economic message from this literature is that the benefits of early action are greater than the costs of inaction." This was the most poignant statement of the entire chapter. It should be an entire section. As it is included here, it is completely unsupported and should be greatly expanded upon with case studies, the general body of literature, and quantitative analyses. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	this wording was deleted
132	65453	17	4	23	0	24	I find this sentence confusing, because of i) it is not clear to me, whether "this literature" only refers to the literature on adaptation policies or whether the literature on other policy measures (such as mitigation or geonegineering) is meant as well (put differently, what does "action" refer to?); ii) it is not clear to me what exactly ' benefits of action' (avoided climate damage costs or avoided climate damage costs minus costs of action?) and 'costs of inaction' are (damages that could have been avoided or that are expected to be avoided by the action?). Furthermore, the way the sentence is written seems to claim that the 'message' is valid for all cases/circumstances/actions. Please specify and provide references. (Nicole Glanemann, University of Hamburg)	this wording was deleted
133	65961	17	4	23	3	24	„Benefits of early action are greater than the costs of inaction“: Please provide references! (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	this wording was deleted
134	58619	17	4	23	4	24	This "key message" is not clearly formulated. Benefits of early action are not easily comparable to costs of inaction. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	this wording was deleted
135	61431	17	4	23	4	24	The statement that the benefits of early action are greater than the costs of inaction is not necessarily well substantiated. More importantly, this message is not explicitly presented in the SPM. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	this wording was deleted
136	73970	17	4	23	4	24	Please provide a source(s) for this statement. (UNITED STATES OF AMERICA)	this wording was deleted

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137	82758	17	4	23	4	24	This statement should be clarified. If it is indicating that the benefits of early adaptation action are greater than the cost of inaction, the statement should be made a key finding in the executive summary, including calibrated uncertainty language and line-of-sight references to supporting chapter sections. (Katharine Mach, IPCC WGII TSU)	this wording was deleted
138	84539	17	4	23	4	24	Does this key economic message pertain to mitigation, or also to adaptation actions? If the latter, is there a reason why it is not discussed in the chapter and a key finding in the executive summary? (Michael Mastrandrea, IPCC WGII TSU)	this wording was deleted
139	73971	17	4	23	4	25	The concept that the benefits of early action outweigh the costs of inaction should be made more precise and also be tied to the concept of adaptation. First, what is meant by cost of inaction? This phrase is used in policy discussions but isn't terribly helpful or precise since some action has clearly already been taken. It would be more useful to compare the costs of taking early action to a baseline in which either no further action is taken, or action is delayed until a later date. Both are legitimate interpretations of the phrase. Second, this concept ties into the notion of planned or anticipatory adaptation vs. adaptation that is forced by circumstances (which is delayed adaptation, not literally doing nothing in response to some sort of extreme weather event). (UNITED STATES OF AMERICA)	this wording was deleted
140	65962	17	4	24	4	25	„The literature also ... by risk and uncertainty.“ If I understand the sentence correctly, it primarily refers to mitigation. Please clarify or delete. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	this wording was deleted
141	63240	17	4	30	4	32	Assumptions involved in economic valuation are well presented and critically reflected (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	thank you
142	73972	17	4	32	4	33	What is meant by the starting point is that adaptation is a given need? If this is a chapter about adaptation, then the better way of stating this is how much adaptation can be justified by weighing costs and benefits is a question in which economics can prove helpful - though certainly there are other considerations outside of economics (not the focus of this chapter) - but that it is important to account for the potential complementarity/substitutability between adaptation and mitigation when making this assessment since it can directly affect the assessment of benefits and costs. See Agrawala et al (2011) in IRERE for a useful discussion. (UNITED STATES OF AMERICA)	this wording was deleted and the starting point wording redone
143	78037	17	4	32	4	33	This statement that adaptation and mitigation are connected but that the need for adaptation will be taken for granted is obfuscatory and confusing. More helpful would be to lay out a framework through which the tradeoffs between adaptation and mitigation understood. Even just simple conceptual economic frameworks would be helpful. For example, the figure on p. 405 of the Stern Review showing that adaptation can reduce the net damages from climate change, and that this is the relevant damage function to consider when comparing against the costs of mitigation. Or that, in the presence of a limited budget, equating marginal benefits from mitigation and public adaptation investments would be economically efficient (with of course the caveat that these things are hard to calculate). Sections 17.2.3 and 17.2.4 could easily be subsumed into an overarching framework describing how economic theory treats the relationship between mitigation, adaptation and residual damages. (Frances Moore, Stanford University)	this wording was deleted and the starting point wording redone
144	61432	17	4	36	0	0	Section 17.2 Adaptation as an economic problem. Should include a short section on private adaptation. Currently it rather gives the impression that adaptation is a public good and that there are no costs and policies/incentives associated with private adaptation. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	we took the suggestion and reworked the section to be about private and public parties
145	79610	17	4	36	4	41	Is social welfare maximisation not an economic concept? It would seem to me that equity/environmental values etc would fall under this. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	we took the comment and reworded the section to draw sharper distinctions
146	70568	17	4	36	5	39	The sub-sections are dominated by very abbreviated bullet lists that may not do justice to the areas covered. A specific example is that in the last line, a reference is made to section 17.2.1.2. explaining that the words 'costs' and 'benefits' will now be used broadly as discussed in that section. But a discussion is not really undertaken. It would be wonderful with some more in-depth discussion to boost the value added of the chapter/section (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	Page limits preclude elaboration thus we reference the literature and cross reference sections

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147	73973	17	4	36	9	54	In this entire section, it is important to note that adaptation is discussed more in the context of intervention. For example, page 5 line 38 states that adaptation will not be able to overcome all climate change, when in reality people will adapt to climate as it changes - in one way or another. In an economic sense, what is being stated is that intervention will not be able to overcome all effects of climate change. Some small changes in wording will help to clarify the text, maybe as simple as adding a statement up front about how adaptation is defined or considered within this report. Maybe this exists in another chapter, but should be repeated here. (UNITED STATES OF AMERICA)	We have reworked the section and chapter to reduce this bias, and has been considered for other parts.
148	58621	17	4	38	0	0	If maladaptation is meant as the increase of vulnerability as a result of adaptation, the argument is too narrowly described. Actions on behalf of one actor may in general harm some other party, not only the adaptation position. This is reason for government activity. See Osberghaus, D., Dannenberg, A., Mennel, T., & Sturm, B. (2010). The role of the government in adaptation to climate change. <i>Environment and Planning C: Government and Policy</i> , 28, 834–850. doi:10.1068/c09179j (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We took the comment and reworded the section plus included the reference
149	58620	17	4	38	4	41	Costs and benefits shall be considered in a broad sense. If the dimensions if this broad sense are to be explained, one should not only tackle the time dimension, but also refer to costs and benefits in the total economy (external effects on other sectors than the implementing sector, or effects on other countries than the implementing country) (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We have a section in the paper on just this issue 17.2.3. Broad Definition of Benefits and Costs
150	65963	17	4	38	4	41	This para is mostly redundant and also neglects the critical discussion about the cost-benefit of adaptations. May be deleted. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	this is only an introduction and we feel merits inclusion
151	73974	17	4	38	4	41	The phrase "as are efforts to achieve goals at highest net benefit or lowest net cost" is not a non-economic goal - the sentence is poorly written. Also this paragraph would be much more clear if the chapter first set up the notion of cost effectiveness and tied the concept of net benefits (or costs) to tradeoffs and the evaluation of different policy options. Economics is a tool to help decision makers understand these trade-offs while establishing priorities and distinguishing between several possible paths forward. trade-offs in efficiency or cost-effectiveness also need to be weighed against other considerations such as equity (which are not non-economic - they just don't fit neatly within the benefit-cost framework), legal, regulatory, political, and other considerations. (UNITED STATES OF AMERICA)	we take the comment and rewrote the section dropping wording non economic.
152	78038	17	4	38	4	41	This is a very cursory introduction to the idea of adaptation as an economic problem. It is important in this section to lay out the economic framework of analysis of adaptation. I believe helpful concepts would include the private nature of many adaptation benefits, understanding market failures that mean not all efficient adaptations will be undertaken privately, the role of insurance and risk-sharing and the relationship with mitigation. An important reference for this overarching framework is Mendelsohn, R. (2000). <i>Efficient Adaptation to Climate Change</i> . <i>Climatic Change</i> , 45, 583–600. (Frances Moore, Stanford University)	the section was rewritten with the private role more prominent and we included the reference
153	82759	17	4	44	0	0	Section 17.2.1. More citation should be provided for all statements in this section and its subsections. (Katharine Mach, IPCC WGII TSU)	Citations were added where there were applicable ones to points we felt were in need of support
154	58622	17	4	44	4	3	This section is relatively brief, given the high relevance and broad literature of the role of the government in adaptation. One could - inter alia - elaborate more on the degree of governmental intervention in the mentioned cases (up to which degree should the government provide adaptation goods?). Other topics could be the governance level in federal states. Finally, the list of intervention reasons includes many reasons which does not follow typical neoclassical economics: Barriers to adaptation, divergent personal and societal perceptions and preferences... It would be helpful to understand which perception of the general role of the government underly the proposed action in adaptation policy. See Osberghaus, D., Dannenberg, A., Mennel, T., & Sturm, B. (2010). <i>The role of the government in adaptation to climate change</i> . <i>Environment and Planning C: Government and Policy</i> , 28, 834–850. doi:10.1068/c09179j and Gawel, E., Heuson, C., & Lehmann, P. (2012). <i>Drivers of and barriers to public adaptation to climate change – An investigation of drivers and barriers from a Public Choice perspective</i> . Leipzig, Germany. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We think the broader set of reasons are appropriate and don't have the space to greatly elaborate. We did cull out what we thought were the omissions pointed out and included language on them plus added the citation



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155	73975	17	4	44	5	5	This section is too brief and lacks the economic framework that is essential for setting up the rest of the chapter, namely the notion of which aspects of adaptation are private in nature and which are public goods and therefore not factored into individual decisions? Government action that doesn't cause more harm than good should be predicated on the notion of market failure. Some of the items listed here are not in and of themselves sufficient for justifying government action and also are hard to verify - for instance differences in risk aversion and risk perception between society and individuals may be due to many things, only some of which merit government action. Likewise the difference between private and social discount rates is only a manifestation of behavior - some of which could be completely justified (for instance hidden costs or heterogeneity). A recent survey by Allcott and Greenstone (2012) as well as Huntington (2010) do a good job of explaining these concepts in the context of the energy efficiency paradox. (UNITED STATES OF AMERICA)	We took the comment and completely redid this section strengthening the public private distinction. We do find ourselves in agreement on the characterization that the items do not justify government action and have maintained most of the content. For example we think a lower social discount rate for whatever reason can justify undertaking some projects that otherwise would not have been developed. We also think a higher belief in climate change risks coupled with higher social risk aversion could lead to action. we rewrote these to be more explanatory. We did not find the references to add enough to be worth the space their inclusion and discussion would have used from our limited budget.
156	65964	17	4	46	4	46	Please do not use „autonomous“ and „planned“ here. First, these concepts are not well defined (see e.g. Eisenack, K. & Stecker, R. (2012) A framework for analyzing climate change adaptations as actions, Mitigation and Adaptation Strategies for Global Change, 17, 243-260). Second, they are not congruent with „private“ and „public“. I think the latter two are meant here in a precise sense, so please use the latter two. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We agree with the lack of definitions but everyone else is using them and we must be consistent with the literature We try to transition away from those terms in the text.
157	61433	17	4	46	5	0	when presenting the reasons for public intervention on adaptation, the positive (and/or potentially negative) externalities of adaptation are not explicitly mentioned. That is, adaptation investments can be public goods (i.e. dikes). We believe this is also a reason for public intervention. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	we added this to the list of items
158	70567	17	4	46	5	3	Public goods: Consider defining what they are or make sure a definition is included in the glossary (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We are trying but the glossary is restricted to cross chapter items. We are suggesting them again and did include a brief definition in our text.
159	70441	17	4	47	4	47	Insert text as follows: "...organization etc. Such global public goods would for example include the breeding of highly drought-resistant cultivars (see Michaelowa et al. 2012). Full reference: Michaelowa, A.; Köhler, M.; Butzengeiger-Geyer, S. (2012): Market mechanisms for adaptation - an aberration or a key source of finance?, in: Michaelowa, A. (ed.): Carbon markets or climate finance?, Routledge, Abingdon, p. 188-208 (Axel Michaelowa, University of Zurich)	We cover the idea but did not reference as this is well known and are short on available space
160	70734	17	4	47	4	49	Is the 'low confidence' for both the estimates on the high end and the low end of the cost calculations? (Willem Pieter Pauw, German Development Institute (DIE))	We redid the wording to better express our confidence. Also we think this page number is wrong and this addresses a later section
161	73976	17	4	51	4	51	See the following reference: "More appropriate discounting: the rate of social time preference and the value of the social discount rate" <a href="http://www.degruyter.com/view/j/jbca.2013.4.issue-1/jbca-2012-0008/jbca-2012-0008.xml">http://www.degruyter.com/view/j/jbca.2013.4.issue-1/jbca-2012-0008/jbca-2012-0008.xml</a> Moore, Mark A. / Boardman, Anthony E. / Vining, Aidan R. (UNITED STATES OF AMERICA)	The divergence between social and private rates is very well known in economics and we think the point stands without need for additional referencing. We did add slightly more to the text for clarity.
162	65965	17	4	51	5	3	Please supply the bullet points with examples and references. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We took the point and increased reference plus wording for the points we think merit elaboration
163	65971	17	4	51	5	3	A further bullet point should refer to the regulation of long-lived critical infrastructure, and one to the issue of high fixed costs (e.g. Eisenack, K. (2013) The inefficiency of private adaptation to pollution in the presence of endogenous market structure, Environmental and Resource Economics, DOI 10.1007/s10640-013-9667-6, Lecocq, F. & Shalizi, Z. (2007) Balancing Expenditures on Mitigation of and Adaptation to Climate Change: An Exploration of Issues Relevant to Developing Countries, World Bank Policy Research Working Paper, World Bank, 4299). (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We added the point to our list and included the first published reference
164	65972	17	4	51	5	3	A further bullet point should refer to reasons in relation to international adaptation funding, e.g. Horstmann, B. (2011) Operationalizing the Adaptation Fund: challenges in allocating funds to the vulnerable, Climate Policy, 11, 1066-1096. Oberlack, C. und K. Eisenack (2012) Overcoming barriers to urban adaptation through international cooperation? Modes and design properties under the UNFCCC, CEN Paper 03-2012, Constitutional Economics Working Paper Series, University of Freiburg, Germany. There should be much more literature on this. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	we added the concept under equity bullet

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
165	73977	17	4	51	5	3	"under provision of information on future climate risks" should be included (UNITED STATES OF AMERICA)	we added a new bullet with the point
166	65966	17	4	54	4	54	I guess you mean „externalities“ here. Please use this term for precision. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	we adjusted the text accordingly
167	70569	17	5	0	0	0	Figure 17-1: Nice figure but it does not really add much to the text and could be left out if there is a challenge with the overall length of the chapter (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We think it is valuable and choose to keep this
168	70774	17	5	6	0	20	Should "international agreements" be mentioned here? (Anni Huhtala, Government Institute for Economic Research )	We followed the comment and Added this thought to the initial phrasing
169	65968	17	5	6	5	16	There are so much different categorizations of adaptation that currently exist. It might be better to refer to one of them. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We have provided many references to such characterizations and considered deleting the section but rather we decided to keep the section to allow broad characterization for the non economist and also illustrate public private distinctions
170	73978	17	5	6	5	16	While the list of adaptation strategies seems fine, it is too brief and it combines private and government adaptation actions in a way that is not useful. See other comments on the importance of differentiating between these two types of adaptation. It might be useful to select a couple of areas where there has been a fair amount of study - sea level rise and agriculture come to mind - and then develop a table that discusses private or autonomous adaptation that is likely to occur; and what types of adaptation will not autonomously occur. It is this last category that is the focus of economic analysis: how much planned adaptation should occur? (UNITED STATES OF AMERICA)	We followed the spirit of the comment and added the public private distinction
171	80930	17	5	6	5	16	These bullet points were very helpful for understanding as a non-economist. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	We kept this section to support non economic readers but augmented it based on other comments
172	78039	17	5	6	5	33	I'm not clear why these sections should fall under the heading of "Reasons fo Public Provision of Adaptation". They seem as though instead they should fall under "Adaptation as an Economic Problem". Especially when they include private adaptations such as "Changes in Individual Behavior". (Frances Moore, Stanford University)	We followed the suggestion and retitled the section plus added private public distinction
173	80216	17	5	8	8	21	It is problematic that the broad categorization of adaptation strategies is done almost completely in "economic terms". This is problematic for many reasons and this short section needs revision to consider these points. (Koko Warner, United Nations University - Institute for Environment and Human Security)	Adaptation strategies are covered extensively in the other references, chapters and report and a longer treatment would be redundant here. We added to the cross chapter and literature references
174	65970	17	5	14	5	14	In the brackets, I would add technical standards, regulation of grids/networks/utilities, environmental regulation. 'Institutional adaptations' might be the more appropriate headline for all this. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	we followed the suggestion and added more items but did not change headline as we felt the original one was sufficient
175	79611	17	5	18	5	20	should possible displacement of other (non-adaptation) investment opportunities be acknowledged here? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We introduced this point into the text
176	73979	17	5	23	5	34	This type of bulleted list of benefits and costs is not particularly useful when unaccompanied by discussion. Aside from the first and second to last bullets (which are about distributional impacts), all of the other things in the bulleted list can be incorporated into BCA. Also economics is not a comparison of costs and revenues. It isn't some sort of financial accounting or a "Reason for Public Provision of Adaptation." This is an awkward and incorrect characterization. Benefit cost analysis is a way to formally evaluate changes in welfare - both positive and negative - associated with a given action. What constitutes a cost or a benefit is much broader than what is connoted here. (UNITED STATES OF AMERICA)	We renumbered this section and reworded it. We separated the BCA and typically non BCA items and introduced the complexity idea. We added a closing sentence to make the basic point.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
177	80217	17	5	23	8	35	Section 17.2.1.2 does a little bit better in bringing in non-economic aspects, but it still makes those seem marginal in comparison to market-related adaptation and related costs and benefits. This appears to be a serious oversight in these two short sections. You cannot understand adaptation to potential climate impacts until you understand value. Discussions about adaptation to climate impacts are really discussions about value. This is because how we understand "negative" climate impacts (that threaten us with loss and damage), as well as how we measure it, depends on how we value those things which will be lost or damaged in relation to climate change. Money is frequently considered to be the most convenient means of representing the relative values that society places on goods and services. However, under a number of circumstances, money values (prices) determined by supply and demand are limited in their ability to accurately reflect value. Yet there are different kinds of value: use value, indirect use value, and symbolic value. These values can be hard to measure and accurately assign a money-based worth. However, they are important because they play a role in social organization. For example, indirect use values play a role in sustaining other community functions which are clearly of use value, but which are not linked to the generation of profit. Certain cultural practices of conflict management are important for maintaining a peaceful society, but if lost can contribute to social stress. Symbolic value is the kind of value that a material good has when people assign symbolic importance—such as a flag which may be associated with national values or identity. The loss of symbolic value is a kind of non-economic loss that happens when a market price of some material good does not synchronize with the value people assign to that thing. Non-economic adaptation practices are those material goods and immaterial services which are ignored in the practices of valuation described by formal economics which focus on assets which can be bought, sold, and replaced. Adaptation in terms of non-economic activities may be some of the most important, yet chapter 17 (particularly section 17-2-1-1) largely overlooks them because they pose challenges for measurement and may go unnoticed or unaddressed by policy. Karen O'Brian talks about these kinds of issues in her writings. (Koko Warner, United Nations University - Institute for Environment and Human Security)	We reworded this with adoption of the central essence of the comment
178	61434	17	5	25	5	33	This section suggests to provide a definition which is then later referred to, yet none is found. The headers and text need to be reconciled. Overall there seem to be quite some loose ends in the chapter (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	We reworked the wording and tried to improve the definition and bring it to a point
179	69261	17	5	27	5	27	Jacoby et al., 2011 not in reference list (NETHERLANDS)	The reference was added
180	69262	17	5	28	5	28	Fankhauser and Tol, 1995 not in reference list (NETHERLANDS)	need to add
181	69263	17	5	30	5	30	Hallegatte and Dumas, 2008 not in reference list (NETHERLANDS)	The reference was added
182	79612	17	5	38	5	39	some adaptation options will be too costly today but this may change over time as risks we face change. So there is a question here on when it is optimal to adapt. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	we agree timing is important and moved the dynamic section up so it proceeds this
183	78040	17	5	38	5	53	This section and the related figure are extremely confused. The first paragraph seems to be making a distinction between adaptation options that can not be adopted because they are "too costly" from adaptation options that can not be adopted because of a "scarcity of resources". Those seem to be the same thing. The figure is confusing because it is unclear what kind of adaptation options could exist in the "Adaptation Space" but outside of "Technical and Physical Limits". The paragraph describing the figure seems to refer to five nests that do not match onto the four nests shown in the figure. Moreover, impracticability due to technical constraints becomes confused with impracticability due to economic constraints. I believe a conceptual figure like 17-1 could help but the distinctions between each circle should be clear: 1. Technical and Physical limits describe the suite of possible adaptation options 2. Values and priorities combined with economic constraints define the suite of desirable adaptation options 3. Implementation constraints define the suite of possible adaptation options. (Frances Moore, Stanford University)	The discussion has been revised and is hopefully clearer now. Our figure follows your description, but adds the adaptation space. The difference between the adaptation space and the technical limits of adaptation represent the impacts that cannot be avoided even with infinite resources (e.g., it is technically impossible to cancel the loss of outdoor comfort in hot countries).
184	73980	17	5	38	5	54	Some of what is discussed here seems to be more relevant to mitigation than adaptation. Where mitigation is discussed, the authors should be careful to state the actions significance to adaptation as well. (UNITED STATES OF AMERICA)	This section is explicitly about adaptation, even though mitigation reduces the need for adaptation. Mitigation is only discussed in passing.
185	73981	17	5	41	5	41	"complete adaptation" is a subjective goal. Suggest to revise the language. (UNITED STATES OF AMERICA)	We do not use this term anymore.
186	69264	17	5	47	5	53	Figure 17-1 is described via a summation of 5 stages. However, the figure shows only 4 stages. (NETHERLANDS)	This has been corrected.
187	69265	17	5	47	5	53	Figure 17-1 should be re-drawn. The text should be bended to fit within the circle (NETHERLANDS)	This has been corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
188	73982	17	5	53	5	53	"adoption" should be "adaptation." (UNITED STATES OF AMERICA)	This has been corrected.
189	73983	17	5	53	5	53	The chapter should also mention limitations of current technology and willingness and ability to pay the costs now to avoid uncertain future losses that may affect others (UNITED STATES OF AMERICA)	The revised version mentions these limits.
190	73984	17	5	53	5	53	This explanation de-emphasizes the importance of political economy and power relationships that allow some to shift private costs to the public sector. (UNITED STATES OF AMERICA)	These issues are discussed in Section 17.3.
191	80460	17	6	0	0	0	Section 17.2.2.2 as well as other discussions of eligibility and implementation (Table 17-1) seem more suitable for Chapter 15. (Robert Heilmayr, Stanford University)	Agreed, section 17 has been revised to discuss the dynamic nature of adaptation, rather than project based adaptation.
192	78041	17	6	2	6	11	A discussion in this section of the Le Chatelier principle and its relevance to long-run versus short-run adaptations is important. Additional references that discuss timescales at which long-run equilibria will be reached following a climate shock include Hornbeck, R. (2012). The Enduring Impact of the American Dust Bowl: Short and Long-Run Adjustments to Environmental Catastrophe. American Economic Review, 102(4), 1477–1507 and Kelly, D., Kolstad, C., & Mitchell, G. (2005). Adjustment Costs from Environmental Change. Journal of Environmental Economics and Management, 50(3), 468–495. doi:10.1016/j.jeem.2005.02.003 (Frances Moore, Stanford University)	We have added more references to this concept but are not fully sure what you are thinking about on the Le Chatelier principles we have discussed widening the production possibilities set. Regarding Hornbeck: we have tried to limit the literature review to those specifically addressing economics and adaptation to climate change. Otherwise, the scope of relevant articles would become endless.
193	73985	17	6	5	6	5	Fundamentally adaptation is a long-term transitional process, with Bayesian updating of actions based upon newly-acquired information. (UNITED STATES OF AMERICA)	We took the comment and wrote more on updating plus referenced to a later section. Noted and stated in the section 17.2.4 entitled "Adaptation as a dynamic issue"
194	73986	17	6	7	6	7	Long-lasting is a relative term, and sea walls do not last long in geological or ecological time terms. (UNITED STATES OF AMERICA)	"decadal to century time scale" has been added to clarify what is meant by longer term here
195	60648	17	6	11	0	0	Further, the increased intensity, frequency, and duration of extreme events, as climate change becomes more extensive, means that adaptation based only on recent experience or extrapolation of historical trends could be largely ineffective. [15.3.2.2] (George Backus, Sandia National Laboratories)	Perhaps this comment is meant for chapter 15?
196	73987	17	6	14	6	46	How to define adaptation and funding are completely separate issues. It is odd to find a definition of adaptation here. Also, questions of funding are not really economics. Funding of projects seems inappropriate for inclusion in this chapter. It seems a very logistical and political topic. In particular, the notion of what is "eligible" should be struck and left for individual governments and international agencies to decide. In fact, if put into an economic framework, the concept of what is or is not considered would not be such an issue. For instance, co-benefits of adaptation actions would be included (benefits associated with non-climate related problems). What is arguably more relevant is the point that most impacts will occur in developing countries, which have the lowest adaptive capacity, which therefore requires the attention of the international community regarding financing. (UNITED STATES OF AMERICA)	The section on funding project based adaptation has been removed and more accurately taken up here as an issue of adaptation as a dynamic issue with consequences for timing of investments.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
197	63241	17	6	16	6	17	This is a generalisation which needs more scientific credibility. Mainstreaming adaptation into existing activities is certainly a logical starting point. However, the existing activities fall short in tackling many environmental problems. Why should they be more efficient in allowing effective climate change adaptation? There is the need also for alternative practices. For example the past decades are characterised by investments into grey (built) infrastructure which is often expensive. Therefore it can only be an option for adaptation in more developed countries and is rather the exception (e.g. building higher dams which are expensive). However, cost-effective adaptation is needed by the majority of global human population with most of them living in developing countries. Hence also alternative activities are needed that are cost-effective and can cope with this challenge at a scale that is relevant to the majority of human population, and which can be implemented by developing countries themselves at rather low cost. Ecosystem-based adaptation (e.g. investment into green infrastructure) is a topic which is currently explored and is focus of ongoing research. Re-insurer companies are also looking into the potential of ecosystem-based adaptation in particular in relation to protection from natural hazards, e.g. coastal protection by mangroves. This should be mentioned or pointed out. The option of ecosystem-based adaptation should be discussed in this chapter in more detail. This topic could deserve a section in itself, the same as e.g. section 17.5.4. on PES. The following paper published in Nature supports investing into green infrastructure as a cost-effective option that is needed for coping with issues like water security in particular in developing countries: Vörösmarty C. J., McIntyre P.B., Gessner M.O., Dudgeon D., Prusevich A., Green P., Glidden S., Bunn S. E., Sullivan C.A., Reidy Liermann C., Davies P. M. (2010) Global threats to human water security. Nature, vol 467: 555-561. Further literature on ecosystem-based adaptation include: Cartwright, A., Blignaut, J., De Wit, M., Goldberg, K., Mander, M., O'Donoghue, S., Roberts, D., 2013. Economics of climate change adaptation at the local scale under conditions of uncertainty and resource constraints: the case of Durban, South Africa. Environment and Urbanization 25, 139–156. Munang, R., Thiaw, I., Alverson, K., Mumba, M., Liu, J., Rivington, M., 2013. Climate change and Ecosystem-based Adaptation: a new pragmatic approach to buffering climate change impacts. Current Opinion in Environmental Sustainability 5, 67–71. Roberts, D., Boon, R., Diederichs, N., Douwes, E., Govender, N., McInnes, A., Mclean, C., O'Donoghue, S., Spires, M., 2011. Exploring ecosystem-based adaptation in Durban, South Africa: “learning-by-doing” at the local government coal face. Environment and Urbanization 24, 167–195. Wertz-Kanounnikoff, S., Locatelli, B., Wunder, S., Brockhaus, M., 2011. Ecosystem-based adaptation to climate change: What scope for payments for environmental services? CLIMATE AND DEVELOPMENT 3, 143–158. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	Agreed, the discussion of implementation modalities of adaptation and its governance has been more fully addressed in Chapter 15 and so removed from this chapter so as to remain within the scope of the chapter and allow for more detailed discussion on issues focussing on economic principles.
198	84540	17	6	16	6	17	This discussion should cross-reference discussions of mainstreaming in other chapters of the report, particularly the other chapters on adaptation. (Michael Mastrandrea, IPCC WGII TSU)	The sentence on mainstreaming has been deleted and this whole sub-section rewritten.
199	69266	17	6	17	6	17	"(needs a reference)" --> remember to put a reference here (NETHERLANDS)	sentence has been deleted
200	70570	17	6	17	6	17	Regarding the need for a reference, many are available in the grey literature, including from UNDP, UKcip technical reports, etc. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	sentence has been deleted
201	82760	17	6	17	6	17	The missing reference must be supplied. (Katharine Mach, IPCC WGII TSU)	sentence has been deleted.
202	80931	17	6	18	0	0	In this context, I am unclear what multilateral and bilateral adaptation funds are. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	discussion of funds has been removed
203	80932	17	6	20	0	0	It would be useful to describe this term 'adaptation deficit' or at least make a cross-reference to another location within AR5 where it is defined. (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	the term has been removed and instead described along with a reference
204	73988	17	6	24	6	26	The wording of this question is problematic. Perhaps the authors are using shorthand, but adaptation isn't expected to reduce the risks of climate change or climate variability. Climate change will occur without change unless mitigation occurs. Perhaps what the authors mean is adaptation can reduce the impacts associated with potential risks resulting from climate change. And any benefit of investing in adaptation measures (measured as a reduction in impacts) will be a function of both the magnitude and probability that a given climate-related event occurs. This slip occurs in other places throughout the chapter as well. (UNITED STATES OF AMERICA)	These two questions have been deleted.
205	79613	17	6	24	6	27	I don't find these 'central questions' particularly informative. Why would we want to ignore natural climate variability if there are risks involved? Why would we want to ignore measures where adaptation is only one of several benefits? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	These two questions have been deleted.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
206	70571	17	6	35	6	46	It would be interesting if references to literature analysing experience from current practice could be included. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	The issue of eligibility for funding has been removed from the chapter. Issues of implementation are covered in chapter 15.
207	69267	17	6	46	6	46	Agrawala, 2008 --> should be Agrawala and Fankhauser, 2008 (NETHERLANDS)	corrected
208	68108	17	6	49	7	31	It is suggested to change the title of 17.2.2.3 to "International Support on Adaptation". Furthermore, as noted by UNFCCC, "Acknowledging that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions". It is suggested to reflect the principles of common but differentiated responsibilities and respective capabilities when assessing the regimes of shared responsibilities for adaptation. (CHINA)	The issue of international funds has been removed
209	69268	17	6	51	6	51	Stern, 2006 (NETHERLANDS)	corrected
210	73989	17	6	51	6	52	The notion that developing countries are not major contributors to the climate change problem is not accurate given current and projected emissions of countries such as China and India. (UNITED STATES OF AMERICA)	The phrase has been revised and clarified to "historically and generally"
211	73990	17	6	54	6	54	Does "and capability" belong here? The previous sentence did not discuss capability. (UNITED STATES OF AMERICA)	"and capability" has been deleted for clarity
212	69269	17	6	54	7	1	Statement needs reference (NETHERLANDS)	this sentence was deleted
213	68109	17	7	1	7	1	"Polluter pays" is not the principle of UNFCCC adaptation fund, but it is only a proposal by some parties to UNFCCC" (FCCC/SBI/2012/29,2012; UNFCCC,1992), It is rational to delete the "the polluter pays principle". (CHINA)	Agreed, discussions of international funding principles and structures has been removed
214	73991	17	7	1	7	3	Please provide a reference for these sentences. (UNITED STATES OF AMERICA)	paragraph has been deleted
215	73992	17	7	1	7	7	Can you put this into economic terms? Highly vulnerable countries that did not contribute to climate change experience an externality from others' actions. The US and Europe did not account for the impact of their actions on other countries when emitting carbon into the atmosphere. This is a classic case of market failure and a powerful reason for coordination on mitigation and adaptation internationally. (UNITED STATES OF AMERICA)	the section was removed not to confuse discussion on externalities from the causes of climate change and the effects of climate change and required adaptation
216	68110	17	7	8	7	9	According to UNFCCC, the parties should be divided into developed country and developing country. Therefore, "The United Nations Framework Convention on Climate Change (UNFCCC) contains various provisions for financial support from industrialized countries to vulnerable developing countries..." should be replaced by "The United Nations Framework Convention on Climate Change (UNFCCC) contains various provisions for financial support from developed countries to developing countries...". (CHINA)	discussion of international negotiations was removed
217	73993	17	7	8	7	31	Provisions for financial support and funding are interesting and relevant to the notion of adaptation but seem outside the purview of a chapter on the economics of adaptation. Recommend this section be cut or moved to another chapter. (UNITED STATES OF AMERICA)	Agreed, the section was removed. Implementation, including financial governance, is taken up in Chapter 15
218	79614	17	7	8	7	42	This section tends to imply the only way for funding available for adaptation activities come from international channels. Suggest inclusion of a line that recognises that funding for adaptation activities can be drawn from a variety of sources including domestic, international, private and public channels. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Agreed, the section was removed, and Implementation, including financial governance, is taken up in Chapter 15
219	79615	17	7	9	7	14	'but adaptation became really important in the UNFCCC negotiations only in 2001 when the... unfccc established 3 funds for adaptation' – this is a political opinion, not a fact. Also it implies that the importance of adaptation equates to the creation of financial funding mechanisms. This is not the UK's opinion – given we agreed to 'adaptation' being a part of the founding convention, we would consider all parts of the convention to be really important from the start. Suggest deletion of the rest of the paragraph following '... vulnerable developing countries'. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Agreed. Section deleted.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
220	68111	17	7	11	7	23	The conclusion reached here that “However, the rights and obligations related to adaptation funding were not clearly defined in the UNFCCC” does not echo with Article 4 of the Convention, which clearly defines in its Clause 4 that “The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.” It is suggested to make relevant modifications pursuant to Article of the Convention and add “The obligations related to adaptation funding were clearly defined in the UNFCCC, such as Article 4.4”. Accordingly, Line 17-23 should also be modified according to Clause 4.4 of the Convention. (CHINA)	Agreed, discussion on financial governance is taken up in chapter 15.
221	80062	17	7	17	0	0	another important question in terms of international (adaptation funding) is "which mode of funding to choose". To date, different modes of funding are proposed in terms of the transfer payments' appropriation. Recent reserach shows that the mode of funding plays a crucial role in 2 ways. 1st, it gives rise to strategic behaviour of countries involved. 2nd, some modes of funding are not capable of sustainably generating financial means. For more details see: Heuson, C., Peters, W., Schwarze, R., Topp, A.-K., 2012b. Which mode of funding developing coun-tries' climate policies under the post-Kyoto framework? UFZ Discussion Paper No. 10/2012, Helmholtz Centre for Environmental Research – UFZ, Leipzig. (Reimund Schwarze, Helmholtz Leipzig)	Discussion on financial governance has been removed and is taken up in chapter 15.
222	80933	17	7	17	7	23	Another question: What degree of oversight is conducted, from deployment to decommissioning, of internationally-funded adaptation programs and who is responsible for monitoring and evaluating their short- and long-term efficacy? (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	This is beyond the scope of this chapter.
223	79616	17	7	18	7	19	As currently phrased this line suggests the only way to raise money in the funds (nb. It should be a plural – there are 4 different adaptation funds, including one named the Adaptation Fund), is by someone/some country paying into it. This ignores the market based mechanism levied on the issuance of Certified Emissions Reductions under the Kyoto Protocol's Clean Development Mechanism which raises funding for the Kyoto protocol's Adaptation Fund. Suggest rephrasing to 'Through which channels are funds raised and how much is adequate' (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Discussion on financial governance has been removed and is taken up in chapter 15.
224	73994	17	7	18	7	23	This list ignores the fact that a lot of adaptation costs are going to be borne by individuals and the private sector without external funding. (UNITED STATES OF AMERICA)	the reference to external funding was removed and the role of both public and private actors is now covered in section 17.2.1
225	79617	17	7	29	7	31	reference to adaptation in one country being more costly than in another. What about the corresponding benefits? Could refer instead to benefit-cost ratios as being more costly does not necessarily mean it is less worthwhile. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	the paragraph has been deleted
226	79618	17	7	30	7	30	As noted in the previous comment, 'the adaptation fund' should be referred to in plural. Suggest it reads '... and the relevant adaptation funding channels are unable to provide sufficient resources to meet all justified claims'. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	the issue of financial governance has been taken up by chapter 15
227	71526	17	7	34	0	0	Section 17.2.3 The relationship of mitigation and adaptation is very relevant to the formation of international environmental agreements. Refer to: Barrett, S. (2008): Dikes v. Windmills. Climate Treaties and Adaptation. John Hopkins University Discussion Paper. Buob, S. And S. Siegenthaler (2011): Does adaptation hinder self-enforcing international environmental agreements? In Proceedings of EAERE 2011 conference. Ebert, U. and H.~Welsch (2012): Adaptation and mitigation in global pollution problems: Economic impacts of productivity, sensitivity, and adaptive capacity. Environmental and Resource Economics. Zehaie, F. (2009): The timing and strategic role of self-protection. Environmental and Resource Economics. (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	The discussion of negotiations of international financing arrangements has been removed from the chapter as space and scope does not allow for a full discussion of the issues, and falls outside of a focussed discussion on economics. From an econmics perspective, the issue was retained here in section 17.2.7 in terms of tradeoffs between different types of investments, including between adaptation and mitigation as well as with development decisions.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
228	80063	17	7	34	0	0	Section 17.2.3 entirely neglects the dimension of political economics in terms of allocating scarce resources between adaptation and mitigation purposes. Obviously, many actors and stakeholders are involved in this decision process, representing very heterogeneous interests. All these actors/groups obviously have incentives to influence the (political) decision process to their own benefit. This certainly has a major impact on the final mitigation-adaptation mix and thus should be mentioned in Section 17.2.3. See e.g. Gawel, E., Heuson, C., Lehmann, P., 2012. Efficient public adaptation to climate change: An investigation of drivers and barriers – from a Public Choice perspective, UFZ Discussion Paper No. 14/2012. Helmholtz Centre for Environmental Research – UFZ, Leipzig or Michaelowa, A., 2001. Mitigation versus adaptation: the political economy of competition between climate policy strategies and the consequences for developing countries. Discussion Paper 153, Hamburg Institute of International Economics. (Reimund Schwarze, Helmholtz Leipzig)	We included the concept and the recent citation
229	69270	17	7	38	7	39	Should be specified which adaptation strategies compete with mitigation and food production (example) (NETHERLANDS)	We augmented the example in the text to specify this.
230	61435	17	7	39	7	42	A good and important point on mitigation reducing the need for adaptation and possibly the costs of climate change. Would like to see more discussion on this and some of the results brought out. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	We elaborated the discussion some but are limited by space considerations
231	68115	17	7	41	7	42	It is suggested to add the view that "Certain adaptation actions avoid the risk caused by large emissions, thereby reducing the pressure on emission reduction" after the sentence "Also mitigation reduces the uncertainty and magnitude of future changes in climate, making adaptation cheaper and thus more efficient (Hallegatte et al., 2010)." (CHINA)	We incorporated this concept into the text
232	79619	17	7	41	7	42	This final sentence needs elaboration with respect to the making adaptation cheaper and more efficient argument. If damages are lower won't the benefits (i.e. Avoided costs) of adaptation fall? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We changed this to indicate it reduced need for adaptation investment
233	73995	17	7	42	7	42	After the Hallegatte et al. citation, consider adding: "Felgenhauer and Webster (submitted June 2012) examine mitigation and disaggregated types of adaptation in a policy portfolio, and argue that reducing uncertainty about the effectiveness of adaptation actions may affect mitigation decisions to a different degree than the converse." The citation is: Felgenhauer, T. and M. Webster (submitted June 2012). "Multiple Adaptation Types with Mitigation: A Framework for Policy Analysis." Global Environmental Change. (UNITED STATES OF AMERICA)	We added some discussion but since the de Bruin et al and Wang and McCarl papers use the DICE model and reach the same conclusions we did not add this paper mainly because of its publication status
234	71527	17	7	45	0	0	Section 17.2.4: It would be helpful if a meaningful connection between the studies were made and their relevance in a broader context was shown. The figure given (figure 17-2) does not link physical adaptation to adaptation costs, therefore it shows little without further information. Also refer to: Tulkens, H. and V. van Steenberghe (2009): "Mitigation, Adaptation, Suffering". In search of the right mix in the face of climate change. Tech. Rep. Nota di Lavoro 79.2009, Sustainable Development Series, Fondazione Eni Enrico Mattei. (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	This figure has been replaced by a more theoretical figure that makes the point in a more obvious manner.
235	65969	17	7	45	7	52	There is more literature that helps disentangling residual damage costs and adaptation costs, e.g. Tulkens, H. & van Steenberghe, V. (2009) "Mitigation, Adaptation, Suffering": In Search of the Right Mix in the Face of Climate Change, CESifo Working Paper 2781. Eisenack, K. (2013) The inefficiency of private adaptation to pollution in the presence of endogenous market structure, Environmental and Resource Economics, DOI 10.1007/s10640-013-9667-6. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We believe the concept is well enough discussed and did not feel a need for more references
236	57467	17	7	45	8	13	Adaptation cost should be considered in view of damage cost according to B/C. Japanese government counts B/C for investment for infrastructures for flood protection. Kazama et al. (Evaluating the cost of flood damage based on changes in extreme rainfall in Japan, Sustainability Science, Vol.4, Iss.1, pp.61-69, 2009.) calculated the damage and investment amount using hydraulic model and the annual expenditure of flood protection in future is similar to annual payment for current flood management. This means Japan should continue on the payment. Almost developed countries shift from hard infrastructures for disaster risk to soft countermeasures such as early warning system, hazard map distribution and so on. (So Kazama, Tohoku University)	We believe the concept is well enough discussed and did not feel a need for elaboration and more references
237	70572	17	7	45	8	13	The distinction and relationship between "residual damage" and "adaptation deficit" (see comment 17; 3; 54; 3; 54) is unclear and no relation between the two concepts made in the chapter. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We reworded the discussion on these points to clarify
238	73996	17	7	48	7	52	There is no inconsistency between the World Bank term "residual damage" and the NAS term "potential impacts". They are different things. (UNITED STATES OF AMERICA)	We eliminated the potential impacts wording and simplified the section



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
239	80939	17	8	0	0	0	Another section that should be included here is sources of uncertainty. Explain why, at this point in time, it is difficult to assess adaptation costs (and costs if adaptation does not occur). (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	Space limitations prevent us from adding the suggested text, which would also require additional explanation to be included in the text.
240	79620	17	8	1	8	3	How does this relate to the previous discussion on residual damages and the optimal trade-off between adaptation and damage? In the context given only the extremes of no adaptation and complete adaptation are given. E.g. In context of Hallegate et al (2011) how much sea defence is optimal? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	This figure has been replaced by a more theoretical figure that makes the point in a more obvious manner.
241	73997	17	8	1	8	13	More detail on the specifics of these studies would be helpful here. (UNITED STATES OF AMERICA)	This figure has been replaced by a more theoretical figure that makes the point in a more obvious manner.
242	73998	17	8	10	8	10	This should be De Bruin et al. (2009b) -- the modeling paper (UNITED STATES OF AMERICA)	We fixed this
243	73999	17	8	10	8	13	This paragraph is presented as though the idea that you would choose action where marginal benefits are just equal to marginal costs is somehow strange, but this is a typical starting point for the evaluation of efficiency in economics. It should be connected to the concept of adaptation as an economic problem. If the economic framework is explained sufficiently earlier, then this won't come across as so strange or unique. It will naturally flow from the BCA framework. (UNITED STATES OF AMERICA)	We eliminated the wording at question
244	79621	17	8	10	8	13	This raises the question - raised later on page 9 - of whether appropriate patterns of macro-economic development can be seen as a form of adaptation by the economy's expose to climate impacts and thus the nature and cost of residual damages. Though the paragraph on page 9 lines 49-54 indicate that evidence or studies exist which highlight how these broader patterns of overall development in an economy can be a form of adaptation, the potential for avoiding residual damages is not raised. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We included this point in the section 17.2.7.2 Adaptation, Poverty, Equity, and Development
245	80934	17	8	10	8	14	This paragraph lacks the depth and detail of the rest of the chapter. I would eliminate the words "...study them..." and instead just write "...Wang and McCarl (2012) show that higher degrees of ...." (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	We followed the wording suggestion and otherwise clarified the section
246	74000	17	8	12	8	12	Insert before the Parry sentence: "Other modeling efforts disaggregate adaptation into flow and stock sub-types and examine the role of different adaptation lifetimes (Agrawala et al. 2010, Agrawala et al. 2011, de Bruin 2011, Felgenhauer and Webster submitted January, 2012)." The relevant citations are: Agrawala, S., F. Bosello, et al. (2010). Plan or React? Analysis of Adaptation Costs and Benefits Using Integrated Assessment Models. OECD Environmental Working Papers, Organization for Economic Cooperation and Development; Agrawala, S., F. Bosello, et al. (2011). "Plan or React? Analysis of Adaptation Costs and Benefits Using Integrated Assessment Models." Climate Change Economics 2(3): 175-208; de Bruin, K. C. (2011). Distinguishing Between Proactive (Stock) and Reactive (Flow) Adaptation. CERE Working Paper, Centre for Environmental and Resource Economics (CERE); and Felgenhauer, T. and M. Webster (submitted January 2012). "Modeling Adaptation as a Flow and Stock Decision with Mitigation." Climatic Change. (UNITED STATES OF AMERICA)	We cover this under the dynamics section and have included the agrawala references
247	58631	17	8	16	0	0	Section 17.2.5: In this paragraph, there are some considerations which are better located in a paragraph on the definition of adaptation itself (e.g. the additionality, and the fulladaptation vs. appropriate adaptation discussion). After defining the adaptation amount, one could go the step further and discuss costs and benefits. This sequence is not clear. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We have rewritten this for clarity
248	58634	17	8	16	0	0	Section 17.2.5: The aspects discussed here and in the following section 17.2.6 all refer also to benefits, not only to costs. This could be stated at the beginning and clarified also by the title of the sections. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We have rewritten this for clarity and moved the following section toward the end so it fits better
249	58635	17	8	16	0	0	Section 17.2.5: The presentation of bottom-up- vs. top-down approaches is formulated in a way that suggests that the former is better. If both strategies are presented here, it should be done in a more comprehensive and balanced way, including the strengths and weaknesses of both. In the cited World Bank project, respective publications are available and cited. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	This section is not meant to be about top-down versus bottom-up approaches, but about challenges in achieving comprehensive cost estimates. In the final chapter, this text has nonetheless been re-worked in section 17.2.6 to clarify.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
250	58636	17	8	16	0	0	Section 17.2.5: The challenge of additionality of an adaptation project is raised here. Hence, it would be helpful to present available literature proposing how to deal with that (e.g. econometric analyses - see studies on energy demand or agricultural production techniques; or by system models like DIVA for coastal adaptation) (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We added a littmeore defining the term and added references to its evaluations.
251	71386	17	8	16	0	0	Section 17.2.5: This subsection examines the conceptual issues when defining the cost of adaptation, which relate to 17.2.1.2 on dimensions of costs and benefits of adaptation. However, defining the benefits of adaptation in the meantime equally raises conceptual issues. And actually the text in this subsection touches on both costs and benefits. So suggest renaming the title to "Defining what constitutes the cost and benefit of adaptation" and modifying the text accordingly. (CANADA)	This was done and the discussion was expanded to include benefits
252	71528	17	8	16	0	0	Section 17.2.5: The definition of adaptation costs should be discussed earlier, at least before section 17.2.4. Mention the difficulty of separating adaptation costs from damages. Also refer to adaptation that does not only reduce damages but exploits benefits from climate change. (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	We take the comment and have adjusted the text
253	78042	17	8	16	8	34	This discussion of what constitutes the cost of adaptation could be fleshed out substantially. For example, in the first paragraph "all appropriate adaptation actions" is extremely vague and could easily encompass the second definition given. Instead it is worthwhile describing what straightforward economic theory states adaptation costs are (i.e. the integral under the marginal adaptation cost curve up to the point where marginal benefits equal marginal costs), then perhaps contrasting that with the approach taken in defining adaptation costs by the World Bank (i.e. the costs of actions needed to restore welfare to levels in the absence of climate change). This section could evaluate this approach with respect to economic theory rather than simply describing it - adaptation investments are likely to be greater than the efficient level. Moreover, integrating this section with 17.2.2.2 and particularly 17.6 would be helpful. (Frances Moore, Stanford University)	We have rewriten for clarity but not extended greatly due to page limits and the overall review nature of the chapter. We have better integrated items in this version.
254	58632	17	8	18	8	20	These two sentences refer to top-down vs. bottom-up approaches. It would be clearer if these keywords would be mentioned. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We are unsure of the meaning and reference point of this comment and are not trying to get into bottom up and top down approaches
255	74001	17	8	20	8	24	The World Bank definitions seem incorrect at least as phrased here. Are the authors are trying to get at is the difference between equivalent valuation and contingent valuation? Basically, the willingness to pay to forgo the damages (i.e. return to your previous utility level) vs. willingness to accept the damage (i.e. accept a lower utility level), but this is really the idea of what is your reference point and how do you attempt to measure changes in welfare. One would attempt to measure individual WTP and then sum them to get a societal measure, but this isn't unique to adaptation - it is a broad concept and brings with it a whole host of discussions about how to measure WTP or WTA for a non-market good - which seems well beyond the scope of this chapter. It is also a marginal (small changes) concept and as such isn't likely to be measured relative to a pre-climate level. Somewhat separately, it doesn't speak directly to the larger issue of how much adaption is ultimately chosen - the chapter would benefit from reminding readers of the difference between efficiency and cost effectiveness. In the first case, economics would help a decision maker order possible policy options based on their relative costs and benefits to determine which are most vs. least efficient. Efficiency is achieved when benefits - costs is maximized (or where MB=MC). On the other hand, if a government or international body decides based on a variety of criteria what their goal is (whether that is pre-climate or something else like 2 degrees C) then economics can help decision makers order possible policy options according to their cost of meeting that objective. In this case, there is no need to evaluate the benefits since the goal is predetermined. (UNITED STATES OF AMERICA)	These sentences have been removed, and the whole section rewritten to define adation costs and residual impacts.
256	84541	17	8	21	8	23	How is "appropriate" defined in the first definition here? Is it different from what is expressed in the second definition? Please clarify. (Michael Mastrandrea, IPCC WGII TSU)	These sentences have been removed, and the whole section rewritten to define adation costs and residual impacts.
257	79622	17	8	22	8	23	How does point 2) sit with residual damages? It may not be an appropriate use of resources to get ourselves back to pre-climate change levels through adaptation (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	These sentences have been removed, and the whole section rewritten to define adation costs and residual impacts.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
258	61436	17	8	22	8	24	The chapter raises the important point of the definition what constitutes adaptation costs. The discussion is actually not closed and therefore the chapter leaves a lot of room for further discussion, i.e. is a new hospital an adaptation to health problems or an infrastructure investment? We believe there is a mistake on page 8, line 22: Here the report refers to the World Bank stating that adaptation costs are "full range of costs incurred to restore economic welfare to incurred to restore economic welfare to pre-climate change levels". To our knowledge WB 2010 mention as adaptation costs those which are incurred to restore economic welfare from a world with "severe" climate change to a world with "little" climate change. Pre-climate change levels points to pre-industrial levels. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	These sentences have been removed, and the whole section rewritten to define adation costs and residual impacts.
259	58633	17	8	23	8	24	The consideration of opportunity costs does not depend on the decision whether to use a top-down- or bottom-up-approach. Opportunity costs can be included in both. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We are unsure of the meaning and reference point of this comment and are not trying to get into bottom up and top down approaches
260	74002	17	8	30	8	31	What project would be implemented in the absence of climate change seems incorrect as adaptation does not affect climate change but rather the costs one faces as a result of its consequences. The question should really be: what is the opportunity cost of using resources to adapt to climate change vs. using them for some other purpose (for instance, education or health care) given that climate change is occurring? (UNITED STATES OF AMERICA)	These sentences have been removed, and the whole section rewritten to define adation costs and residual impacts.
261	70440	17	8	31	8	31	Insert text as follows: "...project. In the context of project-based mitigation market mechanisms, baseline setting has been elaborated and is routinely applied (see Michaelowa 2005). However, the regulatory treatment of additionality determination in the context of the Kyoto Protocol's Clean Development Mechanism has the character of a "cat and mouse race" between project developers and regulators (Michaelowa 2009). " Full reference: Michaelowa, A. (2005): Determination of baselines and additionality for the CDM: a crucial element of credibility of the climate regime, in: Yamin, Farhana (ed.): Climate change and carbon markets. A handbook of emission reduction mechanisms, Earthscan, London, p. 289-304. Michaelowa, A. (2009): Interpreting the additionality of CDM projects: Changes in additionality definitions and regulatory practices over time, in: Freestone, David; Streck, Charlotte (eds.): Legal aspects of carbon trading, Oxford University Press, Oxford, p. 248-271 (Axel Michaelowa, University of Zurich)	We took the comment as a need for more on additionality and added to the discussion
262	74003	17	8	31	8	31	Replace additionality with "incremental costs". Additionality has a different meaning in climate change mitigation and emissions trading credits. (UNITED STATES OF AMERICA)	Text has been revised for clarity.
263	69271	17	8	34	8	34	Dessai and Hulme, 2007 not in reference list (NETHERLANDS)	This has been added.
264	64890	17	8	35	8	35	please add: the economic consequences of failure effect of autonomous adaptation of millions of marginal farmers in developing countries are large. This loss accelerates food insecurity and could ultimately lead to human insecurity, which could be exacerbated by the effects of climate change (Younus, 2010). (Md Younus, Lecturer, School of the Environment, Flinders University, Research Fellow, Adelaide University, South Australia)	We have deferred this to the chapter on Food Security.
265	58638	17	8	37	0	0	Section 17.2.6: Instead of only naming methodological challenges, it would be helpful to mention also some ways how to deal with them (as it was done with regard to discount rates). One example is scenario analyses for capturing socio-economic uncertainties. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	The revised chapter has been reorganized so that this text on methodological issues is followed by a set of potential practices to address these key challenges as well examples of studies that address some of these challenges.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
266	74004	17	8	37	9	36	There are three methodological considerations that are not mentioned in this section, but should be: 1) Climate impacts and adaptation costs are scenario and model dependent. From a modeling perspective this is a relatively modest problem, because our little electronic actors inside the model have perfect foresight. In real life, decision-makers do not know what scenario and model they are living inside, and have to make the best of an uncertain world. Real decision-makers can't adapt as efficiently as model decision makers. 2) Climate adaptation costs are much more location-sensitive than climate models. For example, climate models generally agree that that the Northwest United States will see increased precipitation and the Southwest will receive reduced precipitation. From a global modeling perspective, it makes very little difference exactly where the border between Northeast and Southwest runs. From an adaptation perspective, the San Francisco and Los Angeles metro regions are profoundly sensitive to precipitation on the Sierra Nevada Mountains in general, and even particular watersheds within those mountains. Within a given scenario, but depending on the model, the NE/SW border runs north, south, or through the middle of the Sierra Nevada, leaving California water managers with an insolvable quandary. 3) The benefits of adaptation action are probabilistic and lie in the future, and neither risks nor outcomes are well defined. The northeastern United States has been struck by two hurricanes in successive years, one of which had a uniquely high storm surge in the harbor of the biggest city in the country. As a consequence, private and public bodies are investing heavily in hardening infrastructure against various kinds of risks identified in the aftermath of the recent storms. These investments will yield large public and private benefits if the Northeast experiences another hurricane. But no one can say, with or without climate change, whether another such storm will occur next fall, in five years, or in twenty years. If the climate scientists could tell us the probability distribution of Northeastern hurricanes, it would be possible to make a better estimate of the expected value of the future benefits of the current investments. However, even with a probability distribution, the actual outcome of the investment depends on the actual storm history, which we can only know after the fact. Unfortunately, actual storm frequency is not knowable in advance, and the climate scientists can't tell us about the probability distribution either, so neither actual benefits nor expected benefits can be known with much precision. (UNITED STATES OF AMERICA)	The revised chapter has been reorganized so that this text on methodological issues is followed by a set of potential practices to address these key challenges as well examples of studies that address some of these challenges. One of the key challenges is the scenario dependence issue, another is acknowledging that robust decision-making can assist policy makers in dealing with deep climate uncertainty, which the authors believe is one of the more innovative ways to address the points made by the commentor.
267	77509	17	8	37	9	36	The section on methodological considerations should be elaborated by also discussing the difficulties to include all kinds of deviations from standard assumptions in commonly used policy models (e.g. Kuik et al 2009; Watkiss and Hunt 2012). Various of these matters are discussed (as theoretical topic) in 17.3. It would be better to shift the methodological section after 17.4 (so as to capture also ancillary benefits in the methodology and model discussion). (Adriaan Perrels, Finnish Meteorological Institute FMI)	The authors addressed the first point by reorganizing the chapter to better link theoretical issues and practical solutions and examples. The reorganization the commentor suggested was adopted and is an effective way to address the key points of the commentor..
268	58637	17	8	39	0	0	Section 17.2.6.1: An interesting example for poor data availability is the scarcity of adaptation cost estimates in the agricultural sector - while benefits are better researched here. See the works of the EU ClimateCost project. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We disagree that there is a scarcity of adaptation costs in the agriculture sector - as several of our citations suggest, the agriculture sector is one of the best studied. This is elaborated in some detail in section 17.4
269	80935	17	8	39	8	47	I would take a more current conceptual approach here to describing "Data Quality and Quantity". (Rebecca R. Hernandez, Stanford University / Carnegie Institution for Science)	We have modified this section consistent with the comment.
270	74005	17	8	41	8	41	Data gaps apply to benefits as well as costs of adaptation. (UNITED STATES OF AMERICA)	We agree and note this elsewhere in section 17.4
271	74006	17	8	41	8	47	Some of these are general data gaps that are challenges for quantification of benefits of taking action to improve environmental quality generally - they are not unique to climate change. What is missing from this discussion is that data which could inform both the risk (probability) and magnitude of potential impacts is important for understanding the effectiveness of different adaptation measures in reducing these impacts. (UNITED STATES OF AMERICA)	Thanks you for the comment. We argue in the later parts of section 17.4 that probability represents a deep uncertainty and therefore scenario analysis is most appropriate.
272	84542	17	8	46	8	47	Please provide a reference for this statement. (Michael Mastrandrea, IPCC WGII TSU)	We added references wherever possible, or deleted text.
273	69272	17	8	47	8	47	Recreational fishing seems to be too specific to be the most relevant example here. More relevant one could be biodiversity. (NETHERLANDS)	The recreational fishing example was deleted. Other examples could not be added due to space limitations.
274	70573	17	8	50	9	11	Are more studies/references available? (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We added references wherever possible, or deleted text.
275	70776	17	8	52	0	54	What about learning from sophisticated and complex marine models that have been used for management of ecosystems long before complex climate models? (Anni Huhtala, Government Institute for Economic Research )	The recreational fishing example was deleted. Other examples could not be added due to space limitations.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
276	69273	17	8	52	9	3	There are only two sentences that support the title "costs and benefits are location-specific" but the contents of each is not really relevant to the title. (NETHERLANDS)	We reorganized this section of the chapter to better match section titles with content.
277	74007	17	9	1	9	4	Local governments may want to assess: if the event occurs, how effective is this project in mitigating risk? If the event does not occur, what is the cost of being wrong (basically, what return did you have to forgo in alternative investments?) This is a real options framework, which seems like a useful addition to framing decisionmaking in this chapter. (UNITED STATES OF AMERICA)	The later discuss of robust decision-making includes specific references to decision making paradigms in Chapter 2 of the report. Space limitations in Chapter 17 prevent us from doing justice to the real options framework.
278	84543	17	9	2	9	3	Please provide a reference for this statement. (Michael Mastrandrea, IPCC WGII TSU)	We added references wherever possible, or deleted text.
279	70439	17	9	3	9	3	Insert text as follows: "...countries. Also, valuing impacts on human life and disease load is difficult (Michaelowa et al. 2012) They propose to differentiate metrics of adaptation into 1) wealth saved from destruction through climate change impacts, and 2) disability-adjusted life years saved (DALYs), which are widely used in public health policy analysis." The full reference is: Michaelowa, A.; Köhler, M.; Butzengeiger-Geyer, S. (2012): Market mechanisms for adaptation - an aberration or a key source of finance?, in: Michaelowa, A. (ed.): Carbon markets or climate finance?, Routledge, Abingdon, p. 188-208 (Axel Michaelowa, University of Zurich)	Space limitations prevent us from adding the suggested text and citation, which would also require additional explanation to be included in the text.
280	74008	17	9	6	9	12	Where does this fit in? This seems out of context and not at all clear. What is the point? Suggest deleting. (UNITED STATES OF AMERICA)	We reorganized this section of the chapter to address the comment.
281	69274	17	9	8	9	8	"It is sometimes assumed that climate will change but society will not" -> This statement is not true and opposite to the title "Costs and benefits depend on socio-economics" (NETHERLANDS)	We reorganized this section of the chapter to better match section titles with content.
282	63242	17	9	8	9	9	"Mechler and Bouwer, 2013" is not mentioned in the list of references (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This citation was added.
283	69275	17	9	8	9	9	Mechler and Bouwer, 2013 not in reference list (NETHERLANDS)	This citation was added.
284	79623	17	9	8	9	11	Are their possible compounding effects of accounting for both climate change and socioeconomic effects (i.e. Greater than the sum of controlling for them individually?) (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The question does not clearly relate to the general point being made - that climate change impacts and adaptation options is undeniably context dependent, including socioeconomic context.
285	84544	17	9	8	9	11	Are there results that illustrate the points being made here? Please unpack this discussion. (Michael Mastrandrea, IPCC WGII TSU)	We reorganized the text to address this comment.
286	74009	17	9	9	30	36	It is not necessarily appropriate to use a median value of alternative discount rates in an analysis based on a single discount rate. It may be preferable to conduct sensitivity analyses using multiple discount rates to see if the choice of the discount rate affects the recommended options. Again, this discussion on discount rates is not treated comprehensively or accurately here; and should be pared significantly. In its place, the authors should refer the reader to the appropriate sections of the WG3 report (e.g., Ch 3) (UNITED STATES OF AMERICA)	We significantly reduced the discussion of discount rates in the text.
287	58639	17	9	14	0	0	Section 17.2.6.4: the relatively broad discussion on the appropriate discount rate would be better located in another section (e.g. on intertemporal decision making in the context of climate change), since it tackles problems which are beyond the specific challenges for adaptation evaluation. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	We significantly reduced the discussion of discount rates in the text.
288	71387	17	9	14	0	0	Section 17.2.6.4: When considering discount rates, suggest taking into account the time frame of analysis as well. (CANADA)	We significantly reduced the discussion of discount rates in the text.
289	61437	17	9	14	9	36	Section 17.2.6.4 on discounting could benefit from some examples. Currently it is rather as an abstract decription and comparision of various discount rates (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	We significantly reduced the discussion of discount rates in the text.
290	63659	17	9	16	9	36	The specific link of discount rate and adaptation (costs, policy decisions) should be explained more extensively. (GERMANY)	We significantly reduced the discussion of discount rates in the text.
291	68112	17	9	16	9	36	The value of discount rate makes a big difference to the cost estimation of climate change adaptation. Developing countries feature a high discount rate due to their rapid economic development. It is suggested to add information on the comparison of discount rates between developed and developing countries in this section, indicating the difference made to the calculation of adaptation costs by different values of discount rate. (CHINA)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
292	69276	17	9	16	9	36	Additional and up-to-date reference on the issue of discount rates can be made to Gerlagh R. and M. Liski (2012), "Carbon Prices for the Next Thousand Years", CESIFO WP No. 3855 (NETHERLANDS)	We significantly reduced the discussion of discount rates in the text.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
293	74010	17	9	16	9	36	Unless there is some discount rate literature that is specific to adaptation (e.g., anything that speaks to whether the discount rate for adaptation projects should be intergenerational or not), this chapter should refer the reader to the framing chapter in WGIII CH 3 on discounting for a discussion of the issue. There are also some inaccuracies in the way it is currently written - e.g., Heal (2009) is really focused on the pure rate of time preference, not the social discount rate. Also, it does not discuss the notion that the discount rate used to evaluate climate change should be consistent with what is used to evaluate other intergenerational projects, it is not climate or adaptation specific. It also seems overly prescriptive at least in terms of the way sentences are phrased - for example that a low discount rate is "needed" for far distant damages "to matter." Perhaps what the authors mean is that damages in the far distant future are a smaller portion of the damages in a present value calculation the higher the discount rate used. However, it is an open question how much this matters for adaptation (vs mitigation). Most adaptation measures are not permanent and are designed to guard against damages in the near term. See Agrawala et al (2011) in IREERE for a discussion of this point. (UNITED STATES OF AMERICA)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
294	69277	17	9	17	9	17	Baum, 2009 not in reference list (NETHERLANDS)	We corrected this omission.
295	69278	17	9	17	9	17	Beltratti, Chichilnisky and Heal xxx --> should be Chichilnisky, Beltratti and Heal, 1998 (NETHERLANDS)	We corrected this error.
296	63243	17	9	19	9	19	Please provide reference to the Stern Review (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	We corrected this omission.
297	69279	17	9	19	9	19	The estimates in the Stern review are high not only in relative, but also in absolute terms. (NETHERLANDS)	We agree but space limitations prevent us from including a full critique of the Stern review.
298	82761	17	9	19	9	23	A proper citation should be provided for the Stern review referenced on lines 19 and 23. (Katharine Mach, IPCC WGII TSU)	We corrected this omission.
299	74011	17	9	21	9	22	It is not undisputed that the social rate of time preference is the appropriate discount rate, rather than the opportunity cost of capital. It is also not clear that a social rate of time preference discount rate would be 0.1-2.5%. (UNITED STATES OF AMERICA)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
300	79624	17	9	21	9	22	The discount rate should also be specific to the country or wider region to which it is applied. Is the 0.1 to 2.5% range a global estimate and, if not, can the country or region to which it applies be stated? The rates seem low for many low income developing countries. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
301	74012	17	9	21	9	28	This paragraph is pithy and needs a bit more development "ethical issues" -- What ones? "Allowing environmental services to enter consumption" -- this is economics shorthand and a bit more explanation would be helpful. (UNITED STATES OF AMERICA)	We removed the referenced text.
302	79625	17	9	21	9	28	care needs to be taken to distinguish between the social discount rate (which, say, UK treasury takes as social time preference rate - STPR) and the rate of time preference (one element of the STPR). Nordhaus refers to it the 0.1% of Stern as the actual time discount rate. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
303	69280	17	9	23	9	23	Stern --> should be Stern (2006) (NETHERLANDS)	We corrected this omission.
304	70777	17	9	26	0	36	The use of declining discount rates by the UK Treasury is repeated in rows 26-27 and again in rows 35-36. (Anni Huhtala, Government Institute for Economic Research )	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
305	69281	17	9	26	9	26	Reference not correctly stated (NETHERLANDS)	We corrected this error.
306	69282	17	9	26	9	26	Guesnerie (2004) not in reference list (NETHERLANDS)	We corrected this omission.
307	60064	17	9	26	9	28	It would be useful if there was a table (or figure) which shows the rate at which the UK Treasury suggests discount rates should decline over time for long term projects. (AUSTRALIA)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
308	60065	17	9	28	9	28	The reference (Arrow et al 2012) is not consistent with that listed in the reference. Should this be 1996? (AUSTRALIA)	We corrected this error.
309	69283	17	9	28	9	28	Arrow et al., 2012 not in reference list (NETHERLANDS)	We corrected this omission.
310	70574	17	9	28	9	28	The Arrow et al. 2012 reference is missing in the references. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We corrected this omission.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
311	84545	17	9	28	9	28	This should be Arrow et al 1996. (Michael Mastrandrea, IPCC WGII TSU)	We corrected this error.
312	70778	17	9	30	0	36	Is there enough empirical economic evidence on recommending a use of declining discount rate as a guidance for social discount rate? What about recommending regular sensitivity analysis and varying discount rates? (Anni Huhtala, Government Institute for Economic Research )	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
313	69284	17	9	30	9	30	Weitzman (2007) --> should be Weitzman (2009) (NETHERLANDS)	We corrected this error.
314	74013	17	9	30	9	32	Weitzman's point is not made clearly here. The text would benefit by paring most of this discussion and referring to the relevant sections of the WG3 report (e.g., Ch 3). (UNITED STATES OF AMERICA)	We significantly reduced the discussion of discount rates in the text. Other chapters in the WGIII report better address the commentors question.
315	69285	17	9	32	9	32	Heal (2012) not in reference list (NETHERLANDS)	We corrected this omission.
316	69286	17	9	35	9	36	Repetition of sentences/message in comparison with lines 26-28 but with other reference source (NETHERLANDS)	We corrected this error and significantly edited the text to remove repetition.
317	71529	17	9	39	0	0	Section 17.2.7: Also refer to Chapter 10 (Section 10.9.2.2). (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	This was done without the specific section number as that might change
318	69287	17	9	39	9	54	The title is "adaptation, poverty, equity and development" but the paragraph only talks about the relationship between adaptation and development" -> should change the title into "Adaptation and development" (NETHERLANDS)	This was done
319	80219	17	9	39	9	54	Section 17.2.7 is about adaptation, poverty, equity, and development. The pre-2007 (AR4) references could be either updated, or could be enhanced or replacd with more recent literature. The section ends quite abruptly, and without drawing much conclusion about the relationships (with illustrating evidence) between the factors in the sub-heading title. Some recent case studies on changes in rainfall variability, food and livelihood security, and migration have found that in countries where food security has been a national goal, communities can still feel significant problems. In Guatemala--a mid-income poor country which has achieved macro-level food security--in rural districts, people experience worsening food and livelihood security, and have few adaptation alternatives (including migration, the case study shows they are "trapped populations"). See Milan, A. & S. Ruano (2013) Rainfall variability, food insecurity, migration and trapped populations in Cabricán, Guatemala, Climate and Development, Vol. x, No. x, pp. xx-xx. This section is really important, but says so little about evidence on equity, poverty, adaptation and development. At a minimum please cross-reference to chapter 13 on poverty. But a lot more could be said about equity and the interrelationships! (Koko Warner, United Nations University - Institute for Environment and Human Security)	We retitled the section and cross referenced to other chapters. Given the coverage elsewhere in the AR5 we felt that we had an appropriate level of treatment and cross reference here.
320	79626	17	9	41	9	47	This discussion appears to resonate with text in 17.2.5 paragraph 2. Should this be cross-referenced? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We did this
321	69288	17	9	45	9	45	Butt et al., 2005 not in reference list (NETHERLANDS)	We fixed the year in the refernce
322	69289	17	9	45	9	45	Strzepek et al., 2010 not in reference list (NETHERLANDS)	wh changed to another reference

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
323	80218	17	9	45	10	14	Section 17.2.4 is about the interrelationships between adaptation costs and residual damage, but only offers some various definitions (lines 41-47). The examples in lines 1 - 13 on page 10 do provide additional insights on the relationships in the sub-section title. To bolster the evidence of the relationships, the authors might consider citing some of the nine case studies undertaken in 2012 (small-scale) on residual losses after adaptation efforts have been taken at the community level. What these cases find (summarized in a special issue of the International Journal of Global Warming on Loss and Damage (guest editors Kees van der Geest and Koko Warner) is that in spite of adaptation efforts, local communities experience both rising costs of adaptation (in their efforts to avoid climate-related damage to livelihoods, assets, and food security), but also eroding quality of life. So what you get in these case studies is both rising adaptation costs (in these cases at the household and community level) as well as rising residual damage. Here are some references from case studies you could look at: Warner, K. & K. van der Geest (2013). Loss and damage from climate change: Local-level evidence from nine vulnerable countries. Int. J Global Warming, Vol. X, No. x, pp. xx-xx. ; Kusters, K. & N. Wangdi (2013). The costs of adaptation: Changes in water availability and farmers' responses in Punakha district, Bhutan. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Monnereau, I. & S. Abraham (2013). Limits to autonomous adaptation in response to coastal erosion in Kosrae, Micronesia. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Rabbani, G., A. Rahman & K. Mainuddin (2013). Salinity induced losses and damages among farm households in coastal Bangladesh. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Opondo, D. (2013). Erosive coping after the 2011 floods in Kenya. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Yaffa, S. (2013). Coping measures not enough to avoid loss and damage from drought in the North Bank Region of The Gambia. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Traore, S., T. Owiyo & Y. Sokona (2013). Dirty drought causing loss and damage to livestock and crops in the Sahel region, Northern Burkina Faso. Int. J Global Warming, Vol. X, No. x, pp. xx-xx.; Brida, A.B., T. Owiyo & Y. Sokona (2013). Loss and damage from drought, flood and shifting rainfall patterns in Mozambique. Int. J Global Warming, Vol. X, No. x, pp. xx-xx. (Koko Warner, United Nations University - Institute for Environment and Human Security)	We believe this while valuable is better left to the rural and food security chapters
324	69290	17	9	46	9	46	Samet, 2009 not in reference list (NETHERLANDS)	The reference has been added.
325	69291	17	9	49	9	49	Economic development cannot be a form of adaptation, at most it can facilitate adaptation (and inversely) by raising adaptation capabilities. (NETHERLANDS)	We are discussing it as a possible co benefit and have reworded to make that clearer
326	84546	17	9	49	9	51	Please provide references to specific chapter sections to support these statements. (Michael Mastrandrea, IPCC WGII TSU)	We have reorganized and added references
327	70575	17	9	49	9	54	The discussion is linked to the the concept of residual damages as well as to adaptation deficits, but the linkage is not made clear in the paragraph. The last sentence would benefit from some sort of explanation and reference. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We put in the concept in this section
328	74014	17	9	49	9	54	There are contradictory statements about whether increased development increases or decreases adaptation potential and vulnerability result from confusing physical development in vulnerable areas such as along the coastal zone with general economic growth that increases national incomes. (UNITED STATES OF AMERICA)	we take the point and we believe the point is now made as we have material in the text on that point and references.
329	79627	17	9	49	9	54	bring out more clearly that development could lead to maladaptation (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	we take the point and we believe the point is now made as we have material in the text on that point and references.
330	65454	17	9	53	0	54	Please specify why 'better protection creates increased vulnerability to extreme events'. (Nicole Glanemann, University of Hamburg)	The sentence has been rewritten to provide more explanation.
331	69292	17	9	54	9	54	Burby, 2001 --> should be Burby et al., 2001 (NETHERLANDS)	This has been corrected.
332	69293	17	9	54	9	54	Hallegatte, 2012 not in reference list (NETHERLANDS)	This has been corrected.
333	77948	17	10	0	0	0	The concepts of the economics of governance and of transaction costs deserves much greater attention; see P. K. Rao, 2003, The Economics of Transaction Costs: Theory, Methods and Applications, London: Palgrave Macmillan. (Krishna Rao Pinninti, Rutgers University)	More has been introduced on this issue.
334	80064	17	10	3	0	0	The economic discipline offers a much larger toolkit for supporting adaptation decisions (under uncertainty) than suggested in Section 17.3. Of course, not all methods can be described in detail, but at least an overview of the most important measures should be given. For this purpose, it can be pointed to Section 3.3 of the literature survey stated above (Heuson et al 2012, Fundamental questions on the economics of climate adaptation...) (Reimund Schwarze, Helmholtz Leipzig)	The section has been revised to give a broader perspective.
335	74015	17	10	3	11	14	Much of this discussion is again misplaced and should instead be incorporated into an earlier section on reasons for public role in adaptation policies. (UNITED STATES OF AMERICA)	The discussion has been moved in 17.2



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
336	65973	17	10	3	13	7	This section should include a subsection on the emerging (theoretical and empirical) literature on the barriers to adaptation (including a reference to chapter 16), e.g. Moser, S. C. & Ekstrom, J. A. (2010) A framework to diagnose barriers to climate change adaptation, Proceedings of the National Academy of Sciences, 107, 22026-22031. Eisenack, K. und R. Stecker (2012) A framework for analyzing climate change adaptations as actions, Mitigation and Adaptation Strategies for Global Change 17 (3), 243-260. Biesbroek, R.; Klostermann, J.; Termeer, C. & Kabat, P. (2011) Barriers to climate change adaptation in the Netherlands, Climate Law, 2, 181-199. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Chapter 16 is dedicated to this literature but we added a reference to this chapter and some of the relevant literature.
337	68282	17	10	5	10	6	Currently, section 17.3. seems like a piecemeal collection of aspects that are somehow important for adaptation decision-making. The line of thought in section 17.3 (and the reasons why these aspects and not others have been selected) does not become clear yet. One or two more specific sentences on this in the beginning of 17.3. would help. (Christoph Oberlack, University of Freiburg)	The structure has been changed for clarity.
338	70576	17	10	9	10	24	This links up to the discussion in previous sections on the definition of adaptation and the definition of what constitutes costs of adaptation. Perhaps it would be useful to refer back to these sections or tie them together in some way? (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	The discussion has been moved in 17.2
339	63660	17	10	9	13	17	Chapter 17.3. offers general and basic conceptual considerations that could be part of ch. 17.2. as well. Please check if a combination could offer a more stringent and logic structure. (GERMANY)	Some of the discussion has been moved in 17.2
340	69294	17	10	11	10	12	"One may try to cancel all impacts...status quo" -> This statement needs a reference. (NETHERLANDS)	The discussion has been moved in 17.2, and the paragraph on the goals of adaptation has been cancelled. This question was treated in a better way earlier.
341	74016	17	10	11	10	13	The statement that adaptation can cancel all impacts, maintaining the status quo seems completely unrealistic. This is a misinterpretation of what economics is attempting to do when measuring willingness to pay. Any benefits of reducing damages still has to be weighed against the costs - it doesn't imply a return to a world of no impacts. In almost every case, unless damages are immediate and very high, these would almost certainly result in costs greater than benefits and would decrease societal welfare (it would crowd out too many other things we value). (UNITED STATES OF AMERICA)	The discussion has been moved in 17.2, and the paragraph on the goals of adaptation has been cancelled. This question was treated in a better way earlier.
342	63401	17	10	11	10	14	More generally one would expect here the mentioning of goals such as optimality, cost-effectiveness, and further goals such as justice, environmental protection, security of supply etc. (see Dannenberg, A.; Mennel, T.; Osberghaus, D. & Sturm, B. (2009), 'The Economics of Adaptation to Climate Change - The Case of Germany' (09-057) , Technical report, Zentrum für europäische Wirtschaftsforschung . ; Osberghaus, D.; Dannenberg, A.; Mennel, T. & Sturm, B. (2010), 'The role of the government in adaptation to climate change', Government and Policy 28 , 834--850 . ; Klein, R. J. T.; Schipper, L. & Dessai, S. (2005), 'Integrating Mitigation and Adaptation into climate and development policy - three research questions', Environmental Science and Policy 8 , 579--588 . ) (Anna Pechan, University of Oldenburg)	The discussion has been moved in 17.2, and the paragraph on the goals of adaptation has been cancelled. This question was treated in a better way earlier.
343	79628	17	10	11	10	14	It is not obvious to me why one would want to 'cancel' positive adaptation effort? Why maintain status quo when we can improve on it? Surely this option is strictly dominated by the other mention, rendering it irrelevant? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The discussion has been moved in 17.2, and the paragraph on the goals of adaptation has been cancelled. This question was treated in a better way earlier.
344	69295	17	10	18	10	18	IPCC SREX, Ch 8 --> USE Chapter 8 and a year should be added (NETHERLANDS)	This has been corrected.
345	69296	17	10	20	10	20	Hallegatte et al., 2011c --> reference list does not make a distinction between 2011c. (NETHERLANDS)	References have been corrected.
346	69297	17	10	23	10	23	Beltratti, Chichilnisky and Heal xxx --> should be Chichilnisky, Beltratti and Heal, 1998 (NETHERLANDS)	References have been corrected.
347	61438	17	10	27	10	35	17.3.2 section on information costs etc. is very important for decision making. This section should be amended and examples of barriers, missing information costs and their implications added. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	The section has been revised and now build on Chapter 16. Space issues make it impossible to provide more example and discussion in this chapter.
348	70577	17	10	27	10	35	Are there any new findings on transaction costs, etc. that could be included here? (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	This section makes the point that transaction and information costs matter, but there is little space for more examples.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
349	74017	17	10	27	10	36	This seems to be randomly placed in the chapter. How does this section link back to whether government intervention is justified within an economic framework? (UNITED STATES OF AMERICA)	The revised structure hopefully clarify. The existence of transaction and information costs represent a barrier to adaptation that may justify governmental action (e.g., provision of information and data).
350	71388	17	10	27	10	54	Suggest combining sections 17.3.2 and 17.3.3 as both speak to market barriers (e.g. market frictions, market failures and associated transaction costs). Specifically, Line 33 duplicates Line 40-41. (CANADA)	Thanks for your suggestion. The literature distinguishes between transaction and information costs and market failure and we decided to keep this distinction here.
351	63402	17	10	29	10	31	The conclusion made in this paragraph lacks substance from adaptation literature (Anna Pechan, University of Oldenburg)	Adaptation-related literature has been added.
352	63403	17	10	33	10	35	It is unclear whether the example is on transaction costs or externalities - in the latter case it is not straightforward to see why the private action (insulation) should have collective benefits. (Anna Pechan, University of Oldenburg)	The example has been revised.
353	69298	17	10	35	10	35	Jaffe et al., 2004 not in reference list (NETHERLANDS)	This example has been removed.
354	65975	17	10	38	10	38	A more appropriate heading would be „Market failures, regulatory barriers and adjustment costs“ (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	The title has been revised to reflect new content.
355	69299	17	10	38	10	38	"adjustment costs"-> the first letter of each word should be capitalized (NETHERLANDS)	Noted.
356	78043	17	10	38	17	54	An important reference for this section: Kelly, D., Kolstad, C., & Mitchell, G. (2005). Adjustment Costs from Environmental Change. Journal of Environmental Economics and Management, 50(3), 468–495. doi:10.1016/j.jeem.2005.02.003 (Frances Moore, Stanford University)	This reference has been included.
357	74018	17	10	39	10	54	The section on market failures should appear much earlier in the chapter. And adjustment costs should not appear in the same section. Section 17.3 seems to warehouse a set of random topics. (UNITED STATES OF AMERICA)	The structure has been changed for clarity.
358	63404	17	10	40	10	46	The conclusion made "As a consequence[...]" seems to indicate that the public good problem mentioned was a result of externalities and moral hazard. The example given subsequently then relates to moral hazard and not to a public good problem, which is misunderstandable. Other reasons for market failures should be mentioned here (e.g. information asymmetry, market power etc.) (see Osberghaus, D.; Dannenberg, A.; Menzel, T. & Sturm, B. (2010), 'The role of the government in adaptation to climate change', Government and Policy 28 , 834--850 . ). (Anna Pechan, University of Oldenburg)	This section has been rewritten to account for this comment.
359	65974	17	10	40	10	46	There are more potential market failures involved (see, e.g. Osberghaus, D.; Dannenberg, A.; Menzel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, Environment and Planning C, 28, 834-850. Aakre, S. & Rübberke, D. T. G. (2010) Adaptation to Climate Change in the European Union: Efficiency vs. Equity Considerations, Environmental Policy and Governance, 20, 159-179. Eisenack, K. (2013) The inefficiency of private adaptation to pollution in the presence of endogenous market structure, Environmental and Resource Economics, DOI 10.1007/s10640-013-9667-6). It should be discussed, however, that all this are not new market failures, but market failures that exist independently from climate change, but may be exacerbated by climate change. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	This literature has been added and the text revised accordingly.
360	80139	17	10	40	46	0	vague, especially terms like social insurance and social damage are unclear. What does "social" indicate? Same goes for public norms and standards. It would be helpful to provide more specific instances that shed light on these terms. You can expand on your example of flooding to illustrate these. (So-Min Cheong, University of Kansas)	Text has been revised for clarity.
361	74019	17	10	43	10	46	Post-disaster bailouts by the public sector are less economically efficient than flood insurance programs. The degree of subsidization of flood insurance programs is an important factor affecting the ability to shift costs to others and incur moral hazard. (UNITED STATES OF AMERICA)	The authors fully agree with this statement but there is little space to provide these details. The text only states that subsidized insurance creates moral hazard. To avoid bias, the text now also mention post-disaster support (which also creates moral hazard).
362	69300	17	10	45	10	45	Tierney, 1997 --> should be Tierney, 1995 (NETHERLANDS)	The reference was removed.
363	58623	17	10	48	10	54	This paragraph would need some reference for the main sentence (the very last sentence), since it is a quite strong statement. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	The paragraph has been removed.
364	69301	17	10	51	10	54	We cannot infer from trade liberalization experience in Brazil that the same adjustment cost will occur in case of climate change adaptation. (NETHERLANDS)	The paragraph has been removed.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
365	69302	17	10	54	10	54	Muendler, 2010 not in reference list (NETHERLANDS)	The paragraph has been removed.
366	70578	17	10	54	10	54	Last sentence is not substantiated. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	The paragraph has been removed.
367	84547	17	10	54	10	54	Is this a conclusion of the author team? If not, please provide references to support the statement. If so, please characterize using calibrated uncertainty language and consider for inclusion in the executive summary. (Michael Mastrandrea, IPCC WGII TSU)	The paragraph has been removed.
368	74020	17	11	3	11	14	Why is this section in the adaptation chapter, since behavioral obstacles are not unique to climate adaptation and most of the citations are not adaptation or even climate specific. This seems like a topic for a more general chapter (for instance chapter 2 of WG III). Also, whether and how behavioral failures occur is still a subject of debate in the literature, which is not reflected here. (UNITED STATES OF AMERICA)	The revised section now provides examples of behavioral obstacles to climate change adaptation.
369	70780	17	11	5	0	8	What about the role of information, social norms and nudges? (Anni Huhtala, Government Institute for Economic Research )	Social norms are now mentioned. Nudging is discussed where instruments are reviewed.
370	59495	17	11	5	11	8	The authors could consider citing also the work of Ford et al. (2010 & 2011) that examines how climate change is perceived and responded to by Canadian mine operations (Citation 1: Ford, J., Pearce, T., Prno, J., Duerden, F., Berrang Ford, L., Beaumier, M. and Smith, T. (2010). Perceptions of climate change risks in primary resource use industries: a survey of the Canadian mining sector, Regional Environmental Change, 10(1), pp. 65-81. Citation 2: Ford, J., Pearce, T., Prno, J., Duerden, F., Berrang Ford, L. Smith, T. and Beaumier, M. (2011). Canary in a coal mine: perceptions of climate change risks and response options among Canadian mine operations, Climatic Change, 109(3-4), pp. 339-415). (Dimitris Damigos, Mining and Metallurgical Engineering, NTUA, Greece) (GREECE)	This literature has been added (in the section on information) and the text revised accordingly.
371	58624	17	11	5	11	14	As far as I can see, none of the cited references in this section really analyses adaptation behavior - rather energy consumption and general betting behavior in the laboratory. Obviously, there is a lack in the literature on behavioral aspects of adaptation which should clearly be mentioned here. Like it is now, the section raises the expectation that the field is well researched. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	The revised section now provides examples of behavioral obstacles to climate change adaptation.
372	74021	17	11	5	11	14	Consider cross-referencing to Chapter 16. Adaptation Opportunities, Constraints, and Limits. Also consider citing Moser, S. C. and J. A. Ekstrom (2010). "A Framework to Diagnose Barriers to Climate Change Adaptation." Proceedings of the National Academy of Sciences (PNAS) 107(51): 22026-22031. (UNITED STATES OF AMERICA)	Chapter 16 and Moser and Ekstrom is now referred to at the beginning on the section on barriers.
373	70779	17	11	7	0	8	Is it still the case that discount rates are as high as measured in Train in 1985? No recent studies? (Anni Huhtala, Government Institute for Economic Research )	This example has been removed.
374	69303	17	11	7	11	8	"It has been observed for... discount rate of 20% to 100%" -> We do not see the relationship between this statement and the previous statement or the topic of paragraph. What are the implications of such high discount rates? (NETHERLANDS)	This example has been removed.
375	70579	17	11	7	11	8	The link to adaptation could be spelled out. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	The revised section now provides examples of behavioral obstacles to climate change adaptation.
376	84548	17	11	7	11	8	Have there been studies since 1985 on this topic that should also be cited? (Michael Mastrandrea, IPCC WGII TSU)	This example has been removed.
377	63415	17	11	10	11	14	Studies that focus explicitly on adaptation behaviour should be mentioned here, e.g.: Grothmann, T. & Patt, A. (2005), 'Adaptive capacity and human cognition: The process of individual adaptation to climate change', Global Environmental Change Part A 15 (3) , 199--213 . ; Osberghaus, D., Finkerl, E. and Pohl, M. (2010b): Individual adaptation to climate change: the role of information and perceived risk, ZEW Discussion Paper No. 10-061, Zentrum für Europäische Wirtschaftsforschung, Mannheim. (Anna Pechan, University of Oldenburg)	These papers are now mentioned in the text.
378	63416	17	11	10	11	14	The issue of hyperbolic discounting could be mentioned here (Cimato, F. and Mullan, M. (2010): Adapting to climate change: analysing the role of government, Department for Environment, Food and Rural Affairs (DEFRA), London, UK.) (Anna Pechan, University of Oldenburg)	Hyperbolic discounting is now discussed. Cimato and Mullan provides a typology of adaptation barrier and is therefore cited at the beginning of the section.
379	79629	17	11	13	11	14	Gillingham et al study appears to be missing from the reference list. Do these two paper in this final sentence of the paragraph refer to adaptation explicitly? If not is the argument really transferable? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	These examples have been replaced by examples focusing on adaptation.
380	69304	17	11	14	11	14	Gillingham et al., 2009 not in reference list (NETHERLANDS)	This reference has been removed from the text.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
381	79630	17	11	19	11	38	Defra has just published a research paper that takes stock of current modelling techniques to estimate the macroeconomic impact of climate change, including adaptation. You may find some material of use here ( <a href="http://randd.defra.gov.uk/Default.aspx?Menu=Menu&amp;Module=More&amp;Location=None&amp;ProjectID=18639&amp;FromSearch=Y&amp;Publisher=1&amp;SearchText=macroeconomics%20of%20climate%20change&amp;SortString=ProjectCode&amp;SortOrder=Asc&amp;Paging=10#Description">http://randd.defra.gov.uk/Default.aspx?Menu=Menu&amp;Module=More&amp;Location=None&amp;ProjectID=18639&amp;FromSearch=Y&amp;Publisher=1&amp;SearchText=macroeconomics%20of%20climate%20change&amp;SortString=ProjectCode&amp;SortOrder=Asc&amp;Paging=10#Description</a> ) (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Thanks for the reference. This paragraph is about the limitation on indicators to measure adaptation success, so this reference does not appear essential here.
382	69305	17	11	21	11	21	CMEPSP, 2009; OECD, 2009; Heal, 2012 not in reference list (NETHERLANDS)	This was corrected.
383	74022	17	11	24	11	24	Distributional issues do not automatically justify public intervention; they MAY justify intervention depending on societal values and how distributional concerns are weighed against other societal goals. (UNITED STATES OF AMERICA)	This was corrected.
384	74023	17	11	24	11	30	Distributional issues may play a little differently within a country's borders vs internationally. Are you thinking about adaptation mostly at a local or subnational level? Or is the point to think about distributional issues in the context of international cooperation? (UNITED STATES OF AMERICA)	The new text clarifies this point: the section refers to international, national, and local scales.
385	79631	17	11	24	11	30	Do we have any idea what groups of society are likely to be most vulnerable to the impacts of CC? This could be a pretty significant evidence gap (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Other chapters are focusing on this issue, which is not treated in this chapter.
386	69306	17	11	25	11	25	Fussel, 2012 --> should be Fussel et al., 2012 (NETHERLANDS)	This was corrected.
387	69307	17	11	25	11	25	World Bank, 2012 not in reference list (NETHERLANDS)	This was corrected.
388	69308	17	11	28	11	30	It should be clarified which complementary policies the authors are talking about (NETHERLANDS)	The new text only says that losers may need to be compensated. The discussion on how to do so is beyond the scope of this chapter.
389	69309	17	11	34	11	34	Brown and Heal, 1979 not in reference list (NETHERLANDS)	This was corrected.
390	69310	17	11	34	11	34	Atkinson and Stiglitz, xxxx --> should be Atkinson and Stiglitz, 1980 (NETHERLANDS)	This was corrected.
391	70442	17	11	34	11	34	Insert text after "Stiglitz (xxx)" as follows: Michaelowa et al. (2012) thus propose to base adaptation policies on two generic adaptation effectiveness metrics: 1) wealth saved from destruction through climate change impacts, and 2) disability-adjusted life years saved (DALYs), which are widely used in public health policy analysis. On this basis, an adaptation market mechanism could be developed." The full reference is: Michaelowa, A.; Köhler, M.; Butzengeiger-Geyer, S. (2012): Market mechanisms for adaptation - an aberration or a key source of finance?, in: Michaelowa, A. (ed.): Carbon markets or climate finance?, Routledge, Abingdon, p. 188-208 (Axel Michaelowa, University of Zurich)	This statement is beyond the scope of this chapter.
392	69311	17	11	36	11	36	Kanbus, 2010 not in reference list (NETHERLANDS)	This was corrected.
393	69312	17	11	37	11	37	Example is not relevant. Even though the development aid is controversial as stated in Bulir and Hamman (2008), the context in which they place their discussion is different from climate change adaptation issues. (NETHERLANDS)	Example has been removed.
394	63405	17	11	38	11	38	why do you write "we"? (Anna Pechan, University of Oldenburg)	This was corrected.
395	74024	17	11	38	11	38	Rankings that reflect both equity and efficiency can be done, though what weights to use are inherently ad hoc and also an important policy decision. This can also be done - and is routinely done - by keeping efficiency and equity separate but then considering both pieces of information in tandem. (UNITED STATES OF AMERICA)	The new text says exactly what the comment suggests.
396	74025	17	11	41	11	41	Section 17.3.6. is another example of a section that is not really adaptation specific. The reader could be referred to WGIII chapter 2 on uncertainty for a thorough discussion of these issues. (UNITED STATES OF AMERICA)	The new version clarifies the link with other chapters.
397	80412	17	11	43	12	3	Section 17.3.6.1: Although now including very general WGI references, the uncertainty discussion appears to be weak and oversimplifying; Please provide more specific cross-references. (Gian-Kasper Plattner, IPCC WGI TSU)	The uncertainties are discussed in all chapters of WGI (and to a lesser extent WGIII), making it difficult to provide more specific links.
398	79632	17	11	45	11	50	Is this list exhaustive? Uncertainty in socioeconomic context? More detail on capacity of households and organisations to adapt in third bullet? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	These elements have been introduced in the last bullet.
399	74026	17	11	48	11	48	Uncertainty about future growth will interact with climate change, with the potential to mitigate or exacerbate impacts. (UNITED STATES OF AMERICA)	These elements have been introduced in the last bullet.
400	82762	17	11	48	11	48	As worded, this source of uncertainty is very much relevant to the working group 2 contribution to the 5th assessment report as well. (Katharine Mach, IPCC WGII TSU)	This was corrected.
401	84549	17	11	48	11	48	I believe you mean how global climate change will manifest regionally/locally, but stated as "local impacts" this reads as the domain of WGII as well as WGI. Please clarify. (Michael Mastrandrea, IPCC WGII TSU)	This was corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
402	82763	17	11	49	11	50	The coral reef example here is oddly specific given the scope of the 1st part of line 49. Additionally, it would be clearest to provide reference to relevant chapters of this report. Also, in place of "reaction" the chapter team could consider saying "vulnerability, sensitivity, and adaptive capacity." (Katharine Mach, IPCC WGII TSU)	This was corrected.
403	84550	17	11	49	11	50	For this bullet, it may be clearer to state as uncertainty about the sensitivity and adaptive capacity of ecosystems and societies. (Michael Mastrandrea, IPCC WGII TSU)	This was corrected.
404	82764	17	11	52	11	54	These statements should be coordinated with chapter 14, with cross-references provided. (Katharine Mach, IPCC WGII TSU)	The cross-reference does not appear necessary.
405	63417	17	11	52	12	1	Callaway (2004) could be cited here: over- and underadaptation and distincting between cost of caution and cost of precaution (Callaway, J. M. (2004), 'Adaptation benefits and costs: are they important in the global policy picture and how can we estimate them?', Global Environmental Change 14 , 273--282 . ) (Anna Pechan, University of Oldenburg)	While important, this reference does not seem necessary to make the point on maladaptation.
406	65976	17	11	52	12	3	A crucial reference here is Callaway, J. M. (2004) Adaptation benefits and costs: are they important in the global policy picture and how can we estimate them?, Global Environmental Change, 14, 273-282. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	While important, this reference does not seem necessary to make the point on maladaptation.
407	69313	17	12	1	12	1	"at the time" should be "at the time of decision making" (NETHERLANDS)	This was corrected.
408	74027	17	12	1	12	3	Investments now vs. later in irrigation can be linked back to a real options framework and the benefits of maintaining flexibility/waiting for new better information vs. the risk of damages occurring. (UNITED STATES OF AMERICA)	Real option framework is discussed later. Here the chapter simply makes the point that some "adaptation options" currently implemented are unsustainable over the long term.
409	79633	17	12	8	12	15	is Robust Decision Making also better able to deal with uncertainty and appraise more options than standard scenario based CBA? (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	It is not a consensus, but many would say so. The revised text tries to be clearer on this point.
410	63406	17	12	8	12	41	In this chapter only cost-benefit analysis or CB-based analysis is mentioned. Other criteria of decision making e.g. implementability, cost-effectiveness, flexibility are left out. Furthermore the problematic issue of relatively certain costs but uncertain benefits of adaptation measures is not discussed. (Anna Pechan, University of Oldenburg)	The revised version tries to do a better job at reviewing the different methodologies.
411	69314	17	12	8	12	41	The text covers methods to compare different adaptation measures. When the authors wrote " the first method is cost-benefit analysis under uncertainty", it can be immediately understood that cost-benefit analysis is one method to compare different adaptation measures but it is not sure what the other methods are. In order to make readers easily understand the section, we suggest the authors use the words "the second", "the third" etc., for other methods. (NETHERLANDS)	The revised version tries to do a better job at reviewing the different methodologies.
412	79634	17	12	8	13	17	I would like to have seen some evaluation of these approaches and their advantages/ disadvantages - or at least clear reference to where this may be found. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	One paragraph on this question has been added. It is difficult to provide clear-cut answers in the absence of consensus in the scientific community.
413	57859	17	12	9	0	0	The uncertainty of future projections for surface air temperature changes over Japan by three Bayesian probabilistic frameworks is quantified in the following article: Ishizaki, Y., T. Nakaegawa and I. Takayabu 2012: Comparison of three Bayesian approaches to project surface air temperature changes over Japan due to global warming. SOLA, Vol6, 021-024 (Toshiyuki Nakaegawa, Meteorological Research Institute)	This reference is interesting but too precise and technical to fit into this section.
414	69315	17	12	10	12	10	New and Hulme, 2006 not in reference list (NETHERLANDS)	This was corrected.
415	69316	17	12	11	12	13	To clarify which risk-aversion measure (NETHERLANDS)	This sentence has been rewritten for clarity.
416	74028	17	12	11	12	13	What do the authors mean by "risk aversion can be taken into account by seeking to maximize average income minus a risk-aversion measure times variation in costs and benefits? Seems overly technical. Why average income? Variation in costs and benefits over what? Risk aversion is a parameter - at least conceptually - in the discount rate under a Ramsey framework. How does that interact here? (UNITED STATES OF AMERICA)	This sentence has been rewritten for clarity.
417	63244	17	12	17	12	21	It should be acknowledged that not all social costs can be valued in monetary terms and that a cost benefit analysis can only be used to analyse specific economic aspects of social costs and benefits. Hence decisions need to take into account that there are also other social values that are not covered in a CBA and therefore, decisions cannot only be based on a CBA. Given the limitations of monetary valuation that I mentioned here and others that are already mentioned in the current text, CBA can be a useful tool but it should not be the only one that is used in a decision making process. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This point has been clarified and is also discussed in Section 17.3.2.2
418	69317	17	12	19	12	19	Squire and van der Tak, 1975 not in reference list (NETHERLANDS)	This was corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
419	59496	17	12	23	12	26	Though in the field of climate change the application of Real Options for assessing climate change adaptation strategies is limited, some organizations provide guidance proposing Real Options as an appropriate tool (e.g. H.M. Treasury 2009; World Bank 2009 & 2011). In addition, Real Options analysis has been applied to adaptation to climate change in the protection of coastal areas (e.g. Scandizzo, 2012; Linquiti and Vonortas, 2012), in flood risk management (Woodward et al., 2010; Dobes, 2010), and in the agriculture sector (Hertzler, 2007). Real Option Valuation provides flexibility in the decision making process and has the potential to maximize the benefits from adaptation strategies. Thus, it is argued to be a promising approach to tackling with uncertainty involved. Perhaps, the authors could consider expanding this paragraph to include this information (Citations: H.M. Treasury (2009). Accounting for the Effects of Climate Change: Supplementary Green Book Guidance; World Bank (2011). Climate Change and Fiscal Policy: A Report for APEC, Office of the Chief Economist, East Asia and Pacific Region. Available at: <a href="http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/02/01/000333038_20110201000150/Rendered/PDF/565630REV0ESW010Policy01Jan13112011.pdf">http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/02/01/000333038_20110201000150/Rendered/PDF/565630REV0ESW010Policy01Jan13112011.pdf</a> ; World Bank (2009). Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects, Guidance Note 7, Annex 12. Environment Department. Available at: <a href="http://climatechange.worldbank.org/climatechange/content/note-7-evaluate-adaptation-economic-analysis">http://climatechange.worldbank.org/climatechange/content/note-7-evaluate-adaptation-economic-analysis</a> ; Woodward, M., Gouldby, B., Kapelan, Z., Khu, S., & Townend, I. (2010). Incorporating Real Options into Flood Risk Management Decision Making, Real Options 15th International Conference, Turku: Finland; Scandizzo, P. (2012). Climate Change Adaptation and Real Option Evaluation: A Case Study in Campeche, Mexico. CEIS Tor Vergata, Research Paper Series, 10(6), No. 232; Linquiti, P. and Vonortas, N. (2012). The value of flexibility in adapting to climate change: a real options analysis of investments in coastal defense. Climate Change Economics 3(2), 1250008-1-1250008-33; Hertzler, G. (2007). Adapting to Climate Change and Managing Climate Risks by Using Real Options. Australian Journal of Agricultural Research 58, 985-992; Dobes, L. (2010). Notes on applying 'real options' to climate change adaptation measures, with examples from Vietnam, CCEP working paper 7.10, Centre for Climate Economics & Policy, Crawford School of Economics and Government, The Australian National University, Canberra). (Dimitris Damigos, Mining and Metallurgical Engineering, NTUA, Greece) (GREECE)	More on real option has been included. Also, the suggested references (those published in peer-reviewed journals) have been included.
420	69318	17	12	23	12	26	The first sentence announce both decision delay and option value issues, but the rest of the paragraph refers uniquely to decision delay. (NETHERLANDS)	The text has been revised for clarity.
421	84551	17	12	23	12	26	It would be useful to mention here that the decision delay or option value should be weighed against the additional impacts incurred by delay, including the potential for irreversible impacts. (Michael Mastrandrea, IPCC WGII TSU)	This is done through Heal and Kristrom
422	69319	17	12	24	12	24	Henry, 1974; Arrow and Fisher, 1974 not in reference list (NETHERLANDS)	This was corrected.
423	69320	17	12	26	12	26	Heal and Kristrom, 2003 --> should be Heal and Kristrom, 2001 (NETHERLANDS)	This was corrected.
424	69322	17	12	29	12	29	Kunreuther et al., 2012 not in reference list (NETHERLANDS)	This was corrected.
425	69321	17	12	29	12	31	The sentence is not clear, it is obvious that if we talk about likelihoods only, we can get a probability distribution. (NETHERLANDS)	This was corrected.
426	69323	17	12	31	12	31	Gilboa, 2010 not in reference list (NETHERLANDS)	This was corrected.
427	78044	17	12	31	12	31	An important "not" seems to be missing from this sentence: "Climate problems are in the realm of ambiguity rather than risk, meaning that while there is some information about relative likelihoods, this does NOT constitute a probability distribubtions". (Frances Moore, Stanford University)	This was corrected.
428	82765	17	12	31	12	31	Instead of "does constitute" it seems the author team may mean "does not constitute." (Katharine Mach, IPCC WGII TSU)	This was corrected.
429	69324	17	12	32	12	32	Henry and Henry, 2002; Millner et al., 2010; Kunreuther et al., 2012 not in reference list (NETHERLANDS)	This was corrected.
430	69325	17	12	37	12	37	Lempert and Schlesinger, 2000 not in reference list (NETHERLANDS)	This was corrected.
431	69326	17	12	37	12	37	Ranger et al, 2010 --> Should be Ranger et al., 2011; Hallegatte et al., 2012 --> should be another year (NETHERLANDS)	This was corrected.
432	63407	17	12	40	12	40	why do you write "we"? (Anna Pechan, University of Oldenburg)	This was corrected.
433	84552	17	12	41	12	41	What does this disadvantage imply? Further elaboration here would be useful. (Michael Mastrandrea, IPCC WGII TSU)	This discussion has been rewritten.
434	78045	17	12	44	13	2	Critical categories of non-market costs and benefits are missing here that must be discussed. These include human morbidity and mortality and the loss of culture, heritage and soveriegnty particularly in the context of arctic warming and SLR. (Frances Moore, Stanford University)	These elements are mentioned in Section 17.3.2.2.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
435	80220	17	12	44	13	2	This small section on valuing non-economic costs and benefits overlaps a bit with section 17.3.6.2. Some of my comments apply to 17.3.6.2--the authors might need to reorganize these two sections slightly so the material fits more neatly under the headers. Section 17.3.6.3 needs more substantial treatment and references. Here is a longer comment, containing some thoughts the authors might consider to make this a more even, useful section: An important component of non-economic loss includes losses to the socio-cultural systems in which value is produced through the establishment of knowledge and or practice. Non-economic losses can take both material and symbolic forms. Yet economic and legal systems founded in relations of production, consumption and distribution which are oriented towards private property are inclined to see such relations as central to any claim of loss: if one does not own something, how can one lose it? Non-economic loss and damage is an issue principally because the formal tools of economic valuation ignore a host of forms of value, and this includes other ways of valuing non-market or non-economic costs and benefits of adaptation. The failure to adequately address non-economic climate impacts can seriously impair resilience: Cultural elements sustain communities materially and nourish cultural identity and social relations that constitute the community. These cultural elements such as common identity and values make it possible for people to come together to organize and jointly manage stressors to the human-natural system—this is the core principle behind resilience. The collective cost of losses of culturally derived, non-economic resources, such as language, indigenous knowledge systems, livelihood practices, belief systems, social networks and even citizenship, reduces the capacity of a society to cope with and adapt to further climate impacts. All societies have distinct moral boundaries that distinguish between what is a right, a gift, and a commodity. And they all place moral limits as to what may properly be bought and sold in a market. And yet it is those market-oriented properties that are typically measured – tools for assessing economic value rely on assumptions that property is alienable (the value of a good or service can be separated from the person who owns it) and substitutable (all goods can be replaced by some other goods). So this short section could do more to consider the challenges to meaningfully representing non-economic losses in policy, and perhaps offer alternative suggestions. There are challenges in meaningfully representing hard-to-measure values in policy discussions—we are accustomed to measuring and quantifying values that then get priority for policy (e.g. because we show “this is a big problem”, or “this is a significant issue” with money terms or other quantities that have meaning to macropolitical objectives). A key challenge with addressing non-economic loss and damage is the assumption that all losses can be replaced, repaired, or compensated with money. There are certain objects, places, conditions or state of affairs that are constituted by certain shared understandings that are incompatible with market relations on moral or ethical grounds—if sea level rise destroyed an ancestral burial ground, and affected communities were asked what is the value (as opposed to the price, of that loss)—the reaction may be that assigning a price to be compensated for the loss in inappropriate. Ways of establishing value for non-economic losses and damage include contingency valuation (willingness to pay). However, by establishing value based on people’s willingness to pay, we often end up undervaluing it (because they may be unable to pay, and thus less willing to pay. Conventional development strategies have produced social structures that order specific exposure and vulnerability to climate change. In adopting a compensatory strategy, loss and damage may miss the opportunity for a more fundamental transformation. Any framework for assessing “costs” and “benefits” to adaptation must aim not merely at considering previous living conditions before climate change impacts, but at improving them. In the case of climate change, cost benefit analysis does not really address systemic vulnerabilities and contains no imperative for structural change. An alternative the authors could explore is to focus analysis on the role adaptation efforts (including goods and services) play in making society function in a resilient way, not their role in making profit. Modes and relations of production generate different understandings of value. In order to account for value in societies with different ways of thinking, modes and relations of production require different ways of understanding value. For example, appreciating the value of land in many indigenous societies requires an approach to valuation which codifies relevant assumptions about the relationship between material and symbolic value. (Koko Warner, United Nations University - Institute for Environment and Human Security)	Fixed.
435.2	80220	17	12	44	13	2	show “this is a big problem”, or “this is a significant issue” with money terms or other quantities that have meaning to macropolitical objectives). A key challenge with addressing non-economic loss and damage is the assumption that all losses can be replaced, repaired, or compensated with money. There are certain objects, places, conditions or state of affairs that are constituted by certain shared understandings that are incompatible with market relations on moral or ethical grounds—if sea level rise destroyed an ancestral burial ground, and affected communities were asked what is the value (as opposed to the price, of that loss)—the reaction may be that assigning a price to be compensated for the loss in inappropriate. Ways of establishing value for non-economic losses and damage include contingency valuation (willingness to pay). However, by establishing value based on people’s willingness to pay, we often end up undervaluing it (because they may be unable to pay, and thus less willing to pay. Conventional development strategies have produced social structures that order specific exposure and vulnerability to climate change. In adopting a compensatory strategy, loss and damage may miss the opportunity for a more fundamental transformation. Any framework for assessing “costs” and “benefits” to adaptation must aim not merely at considering previous living conditions before climate change impacts, but at improving them. In the case of climate change, cost benefit analysis does not really address systemic vulnerabilities and contains no imperative for structural change. An alternative the authors could explore is to focus analysis on the role adaptation efforts (including goods and services) play in making society function in a resilient way, not their role in making profit. Modes and relations of production generate different understandings of value. In order to account for value in societies with different ways of thinking, modes and relations of production require different ways of understanding value. For example, appreciating the value of land in many indigenous societies requires an approach to valuation which codifies relevant assumptions about the relationship between material and symbolic value. (Koko Warner, United Nations University - Institute for Environment and Human Security)	
436	79968	17	12	44	13	17	Please consider developing those two important sections. (NORWAY)	Those sections have been developed, in the limits of the chapter size constraints.
437	69327	17	12	46	12	46	Acronym CBA should be introduced already in paragraph 17.3.6.2 (NETHERLANDS)	Corrected.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
438	63245	17	12	46	13	2	What I mentioned in the comment above also applies to this section. It would be useful to mention that TEEB (TEEB 2010) is providing an approach (the so-called TEEB approach) for how to integrate monetary valuation into decision making. The TEEB approach is aiming at informing decision making in a tiered process: First recognizing all values including those that cannot be expressed in monetary terms (e.g. cultural and spiritual values), second demonstrating the monetary dimension of selected ecosystem services where this is deemed to be useful for the decision making process, and third, capturing monetary values for specific ecosystem services where this can inform specific economic instruments and policies, e.g. strategies for climate change adaptation, PES schemes, or other. Reference: TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB. URL: <a href="http://www.teebweb.org/publications/teeb-study-reports/synthesis/">http://www.teebweb.org/publications/teeb-study-reports/synthesis/</a> (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	These elements are mentioned (briefly) in the section.
439	74029	17	12	46	13	2	Note that most economists have greater confidence in revealed preference methods over stated preference methods. These terms need to be defined here and be listed with examples. Revealed preference is based on people's actual behavior. Stated preference is based on what people say. It is not constrained by actual willingness and ability to pay and is subject to considerable strategic, hypothetical, and instrumental biases. (UNITED STATES OF AMERICA)	These points have been added.
440	69328	17	12	50	12	50	Provision of cultural ecosystem services (NETHERLANDS)	This was corrected.
441	70580	17	12	51	12	52	The references for MEA, 2005, and TEEB, 2010 are missing in the list of references. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	This was corrected.
442	63246	17	12	52	12	52	There is a reference to "TEEB 2010" but it is not cited in the list of references. Different TEEB Reports were published in 2010. I would recommend in this context to use the reference to the scientific foundations of TEEB summarizing important scientific information on the methods of non-monetary and monetary valuation of biodiversity and ecosystem services: TEEB (2010) The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations. Edited by Pushpam Kumar. Earthscan, London and Washington. URL: <a href="http://www.teebweb.org/publications/teeb-study-reports/foundations/">http://www.teebweb.org/publications/teeb-study-reports/foundations/</a> (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This was corrected.
443	69329	17	12	52	12	52	TEEB, 2010; Bateman et al., 2011 not in reference list (NETHERLANDS)	This was corrected.
444	69330	17	12	52	12	54	The first sentence enumerates two main approaches (revealed and stated preference methods), but in the next sentence it relates already to the new one (no apparent link between the three). (NETHERLANDS)	The paragraph has been rewritten for clarity.
445	63247	17	12	53	12	53	There is a typo: it should read "scarce" and not "scare" (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This was corrected.
446	63408	17	12	53	12	53	why do you write "we"? (Anna Pechan, University of Oldenburg)	This was corrected.
447	69331	17	12	53	12	53	"resources are scares" --> should be changed to "scarce"; "CBAs" --> should be "CBA" (NETHERLANDS)	This was corrected.
448	63409	17	12	53	13	2	The problems and ethical considerations in valuation of non-market costs and benefits should be mentioned, e.g. also the valuation of human lives. (Anna Pechan, University of Oldenburg)	This element has been added.
449	70581	17	12	53	13	2	It could be relevant to note the limitation or inaccuracies of applying value transfer approaches that have been documented in the literature as being highly significant. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	It is mentioned that these methods need to be used with caution
450	69332	17	12	54	12	54	Navrud and Ready, 2007; Brander et al., 2010 not in reference list (NETHERLANDS)	This was corrected.
451	69333	17	12	54	13	1	Not clear what will be the benefits of adaptation measures. (NETHERLANDS)	This was corrected.
452	69334	17	13	2	13	2	Add brackets around "2004" (NETHERLANDS)	This was corrected.
453	61439	17	13	5	13	17	This a section on Multi-Criteria Analysis. Please give some study results as examples. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	An example with a figure is added.
454	77510	17	13	5	13	17	This section (17.3.6.4) seems best placed to add a reference and a few lines to the SSP' developed alongside the RCPs. (Adriaan Perrels, Finnish Meteorological Institute FMI)	Lack of space makes it impossible to introduce such a reference.
455	60066	17	13	7	13	17	Suggest a more balanced discussion of Multi-criteria analysis (MCA), which includes disadvantages. See: Dobes and Bennett (2009) Multi-Criteria Analysis: "Good Enough" for Government Work? <a href="http://epress.anu.edu.au/agenda/016/03/pdf/whole.pdf">http://epress.anu.edu.au/agenda/016/03/pdf/whole.pdf</a> (AUSTRALIA)	The text now mentions this reference and stresses the difficulty of aggregating in a rigorous manner various indicators.
456	63248	17	13	7	13	17	Martinez-Alier, J., G. Munda, J. O'Neill (1998) Weak comparability of values as a foundation for ecological economics. Ecological Economics 26, 277–286. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	The reference has been introduced.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
457	63249	17	13	7	13	17	The following might be a useful reference for the potential use of the MCA method: Martinez-Alier, J., G. Munda, J. O'Neill (1998) Weak comparability of values as a foundation for ecological economics. Ecological Economics 26, 277–286. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	The reference has been introduced.
458	74030	17	13	7	13	17	A better description of multiple criteria analysis is needed for this to become clear to readers not already familiar with it. A text box showing an example would be useful. (UNITED STATES OF AMERICA)	An example has been introduced, and the discussion has been expanded. Space constraints prevent a longer treatment of this methodology.
459	69335	17	13	8	13	9	Clarify importance of what? (NETHERLANDS)	The section has been modified and clarified.
460	74031	17	13	9	13	10	An example of a tradeoff that has been brought up several times in equity vs. efficiency. (UNITED STATES OF AMERICA)	This trade-off is indeed important and the equity issue is in the selected example.
461	63410	17	13	10	13	11	MCA is also difficult to undertake where data is limited. (Anna Pechan, University of Oldenburg)	The revised text do not say that MCA is easier in data-poor environments.
462	63411	17	13	13	13	17	The Difficulties of weighting and comparability when doing MCAs should be mentioned here, (Anna Pechan, University of Oldenburg)	We are using the broader definition of MCA that does not imply weighting and aggregating. In our definition, MCA allows to identify and quantify trade-offs.
463	84553	17	13	23	13	23	Do these ancillary effects have to be unintended? (Michael Mastrandrea, IPCC WGII TSU)	The term "unintended" is not in the revised text.
464	71530	17	13	27	0	0	Section 17.4.1: The title of this section does not fit the content very well. The section gives a list of „no regret“ adaptation measures. (Leonhard Kaehler, Carl von Ossietzky Universitaet Oldenburg)	17.4.1 and 17.4 in the old version were merged to 17.2.3.1 in the new version and the title of 17.4 prevailed. Anyway we understand that the examples are ancillary and no-regrets.
465	78046	17	13	29	13	47	This section should be integrated with 17.2.1.2 (Frances Moore, Stanford University)	The suggestion was accepted. Most of the section 17.4 is now in section 17.2 in the new version.
466	84554	17	13	29	13	47	Many of these examples include co-benefits with mitigation, which may be worth discussing explicitly here. Such benefits are still climate-related, in contrast to other types of ancillary benefits. (Michael Mastrandrea, IPCC WGII TSU)	It is true. However, the text was not changed due to space limits.
467	69336	17	13	33	13	34	There are studies showing also that some drought-resistant crops have much lower productivity under normal conditions (NETHERLANDS)	The text was changed taking the comment into account,
468	74032	17	13	33	13	34	It is likely that crop varieties adapted to heat and drought have tradeoffs in performance under other conditions or other non-climate factors. (UNITED STATES OF AMERICA)	The text was changed taking the comment into account,
469	59713	17	13	39	13	40	There is an important aspect that should be included within this two lines: adaptation through water saving technologies have a key role (see Asian regional chapter, amongst other similar informations) as an adaptation mean. In dry areas, water saving technology often provide also a mitigation effect, since in dry areas most often irrigation water comes from the underground, so when pumped water (1L=1kg !) is saved, also energy and emissions are saved, providing a relevant mitigation effect. (Roger Cremades, University of Hamburg)	It is true. However, the text was not changed due to space limits.
470	69337	17	13	41	13	42	Add reference to this bullet statement (NETHERLANDS)	The example does not require an expert judgement to be valid.
471	69338	17	13	45	13	45	"al,2005" --> needs a space before 2005 (NETHERLANDS)	The correction has been made
472	69339	17	13	47	13	47	"mitigation , improve" --> delete the space before the comma (NETHERLANDS)	the correction has been made
473	69340	17	13	53	13	54	The statement should refer to the law of equimarginal returns (NETHERLANDS)	This part of the text is shorter and with no such details in the new version.
474	74033	17	13	54	13	54	Replace "diminishing return" with correct economic term "diminishing marginal returns" since total returns may still increase with each additional unit. (UNITED STATES OF AMERICA)	This expression is no longer in the text
475	69341	17	13	54	14	2	The beginning of the sentence states that ancilliary effects are not captured by the actor, but then it states that the actor will favor the activity with larger ancilliry effects (this implies that she must know them) (NETHERLANDS)	This part of the text was deleted in the new version
476	74034	17	14	1	14	6	An example may be useful here to illustrate the point. For example, say a town is building a new bridge. The main reason for the new bridge is not climate change, it is due to normal wear and tear. However, consideration of adaptation by the decision maker may lead him or her to ask whether the bridge should be built stronger or higher to withstand the risk of extreme events (wind and flooding). In this case one would weigh the cost of building additional safeguards into the bridge (not the cost of the entire project) against the benefits of avoided climate damages to the bridge due to its enhancement. (UNITED STATES OF AMERICA)	We understand that the example suggested here is of a simple adaptation expenditure and not of an ancillary benefit.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
477	69342	17	14	2	14	4	The given example and reference are highly context-specific. (NETHERLANDS)	The comment was accepted and text was changed in the new version
478	63661	17	14	2	14	6	Change sentence: "Viguie an Hallegatte (2011) [...] among others argue that ancillary effects should be highly regarded. Contrary Elbakidze and McMarc (2007) ...". Rationale: The sentence is likely to be misinterpreted. Most studies argue that ancillary effects should be regarded. So the common argument should be stated first. (GERMANY)	The comment was accepted and text was changed in the new version
479	69343	17	14	4	14	4	Viguie and Hallegatte (2011) --> should be Viguie and Hallegatte (2012) (NETHERLANDS)	The correction has been made
480	59714	17	14	4	14	6	At least one main reason should be given to explain the argument of the 6(!) sources provided, otherwise the text and reasoning are not balanced with the previous sentence. The whole sentence can be shortened including only 2-3 sources. (Roger Cremades, University of Hamburg)	The comment was accepted and text was changed (shortened) in the new version
481	84555	17	14	4	14	6	Why do these authors argue the contrary? Do they assert that ancillary effects do differ in magnitude, or do they make other arguments? Please explain the range of views on this topic more clearly. (Michael Mastrandrea, IPCC WGII TSU)	The comment was accepted and text was changed (shortened) in the new version
482	69344	17	14	9	14	9	mitigation and/ or other aspects of development (NETHERLANDS)	This section is now 17.2.7 and has a different writing in the new version .
483	69345	17	14	12	14	13	The phrase is an oxymoron: if marginal returns are equal, it implies the equality of marginal rates. (NETHERLANDS)	This part of the text was deleted in the new version
484	69346	17	14	13	14	13	Starret, 1998 --> should be Starret, 1988 (NETHERLANDS)	This part of the text was deleted in the new version
485	70582	17	14	16	14	27	There seems to be a link to and possibly slight repetition with section 17.2.2. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	This part of the text was deleted in the new version
486	80221	17	14	16	14	27	Section 17.4.3 could cross reference chapter 20, which deals more extensively with adaptation and development pathways. As it stands, this small section is not much more than a scratch-the-surface mentioning of already-dated literature. Could the authors get more updated references that better reflect current discussions on adaptation and development pathways? O'Brien 2012 was really the one stand-out article that was both relevant and current. (Koko Warner, United Nations University - Institute for Environment and Human Security)	This part of the text was deleted in the new version
487	74035	17	14	17	14	27	This section seems like it could be combined with some earlier sections on related topics so it isn't just sitting on its own, tucked between two disparate topics. (UNITED STATES OF AMERICA)	This part of the text was deleted in the new version
488	69347	17	14	25	14	25	Kellenberg and Mobarak, 2008 not in reference list (NETHERLANDS)	This part of the text was deleted in the new version
489	69348	17	14	26	14	26	climate mitigation policies are now approached... (NETHERLANDS)	This part of the text was deleted in the new version
490	69349	17	14	26	14	26	World Bank, reference needs year; UN, reference needs further clarification (UN-what?) (NETHERLANDS)	This part of the text was deleted in the new version
491	70782	17	14	30	0	0	Should there be some discussion somewhere about economics and (international) politics and failure of economic instruments (such as emissions trading) because of failure of understanding politics? This is rather critical for adaptation too. (e.g. Acemoglu et al (2013) Economics versus Politics: Pitfalls of Policy Advice.) (Anni Huhtala, Government Institute for Economic Research )	Since this is a chapter on adaptation we have not covered mitigation instruments. Discussion of links between mitigation and adaptation can be found in 17.2.3
492	79635	17	14	30	14	39	One market based approaches not considered is that of international trade. This can help both share the impacts of an extreme weather event which eg cuts food production by allowing the country to meet all or part of the food gap (though shock-induced rising global prices can also be a source of indirect climate impact to net importing countries) and could allow slower-time adaptation to changes in the country's comparative advantage. This point is covered in AR5 Chapter 10 and could simply be cross referred to rather than duplicated in detail. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We will cross reference it and we note the comment-
493	63662	17	14	30	18	9	As regulation plays an important role for adaptation activities there should be an additional chapter on regulation- in addition to the more market based instruments being described in ch. 17.5. Possible literature: Kennedy, C. and J. Corfee-Morlot (2012), "Mobilizing Investment in Low Carbon, Climate Resilient Infrastructure", OECD Environment Working Papers, No. 46, OECD Publishing. <a href="http://dx.doi.org/10.1787/5k82m3gxxmnq-en">http://dx.doi.org/10.1787/5k82m3gxxmnq-en</a> (GERMANY)	Space constraints prevent such a chapter being included.
494	65988	17	14	30	18	9	Please harmonize and re-organize this whole section. Redundancies should be avoided. The section should better fit with its introductory paragraph and p4 144 – p5 120. Reconsider the subheadings. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Comment is too general. A link yo 17.5 on page 4 has been added.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
495	70583	17	14	30	18	9	This section is really interesting and draws more extensively on the latest literature than the preceding sections. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	Thank You for the positive comment.
496	77512	17	14	30	18	9	section 17.5 misses a discussion of unintended effects of non-climate taxes and subsidies (e.g. with wrong incentives for where and how to build a house); also local taxes (such as real-estate tax) can be relevant (Adriaan Perrels, Finnish Meteorological Institute FMI)	The section focussed more on instruments that provide incentives for adaptation. The point raised is however true.
497	65977	17	14	32	14	39	Here is some repetition in relation to p 5   6 – p 5   20. Please merge / harmonize these sections. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	I have looked carefully at the text on page 5 and find no repetition.
498	65978	17	14	32	14	39	As further instruments I would add the provision of local public goods and the internalisation of externalities. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	These are not instruments but objectives of instruments. We argue that the instruments we have included are motivated by these objectives, among others.
499	69350	17	14	35	14	35	Agrawala and Fankhauser, 2010 --> should be Agrawala and Fankhauser, 2008 (NETHERLANDS)	Thank you.
500	63663	17	14	35	14	39	Delete the sentence. Rationale: There is no publication by Agrawala and Falkhauser in 2010. (Maybe the publication from 2008 is meant?) (GERMANY)	We have corrected this.
501	74036	17	14	36	14	39	Is the list of incentive providing instruments consistent with what is mentioned in the ES? Also it is important to distinguish between instruments that need government attention and those that will develop in the marketplace on their own accord (for instance, certain types of insurance). (UNITED STATES OF AMERICA)	The ES has been amended to make the lists the same.
502	70438	17	14	39	14	39	Add text as follows "...Agrawala (2008). Market mechanisms could be used for fund raising for adaptation projects, including project-based offsets linked to a system of trading adaptation commitments (see Michaelowa et al. 2012)". Full reference: Michaelowa, A.; Köhler, M.; Butzengeiger-Geyer, S. (2012): Market mechanisms for adaptation - an aberration or a key source of finance?, in: Michaelowa, A. (ed.): Carbon markets or climate finance?, Routledge, Abingdon, p. 188-208 (Axel Michaelowa, University of Zurich)	We have noted this in the revised text.
503	58626	17	14	42	15	29	The section on insurance as an economic adaptation instrument lacks of mentioning index insurance as a possibility of providing a safety net without moral hazard, but with the drawback of a high base risk. See for example Hochrainer, S., Mechler, R., & Pflug, G. (2009). Climate change and financial adaptation in Africa. Investigating the impact of climate change on the robustness of index-based microinsurance in Malawi. Mitigation and Adaptation Strategies for Global Change, 14, 231–250. doi:10.1007/s11027-008-9162-5 and Collier, B., Skees, J., & Barnett, B. (2009). Weather Index Insurance and Climate Change: Opportunities and Challenges in Lower Income Countries. The Geneva Papers on Risk and Insurance Issues and Practice, 34(3), 401–424. doi:10.1057/gpp.2009.11 (Daniel Osberghaus, Centre for European Economic Research (ZEW))	Reference to this scheme has been included.
504	74037	17	14	42	15	29	In general, chapter 10 contains a much more robust, nuanced discussion of the role of insurance than chapter 17. That's fine but care should be taken to make sure the two sections are consistent and cross-reference each other. (UNITED STATES OF AMERICA)	Cross reference has been made.
505	63664	17	14	44	15	29	Please add: which climate damages can be insured privately. Where are limits for private/ commercial insurance protection because of market failures? Where public action is needed? (Moreover results of ch. 10.7. should be considered here). (GERMANY)	We had mentioned flood protection and agricultural crop failure in the section.
506	69351	17	14	45	14	47	The reference is not relevant: the article deals uniquely with intrinsic, not covariant risk (see p. 6), and with strategies at individual level only (NETHERLANDS)	Not sure which reference the comment is referring to.
507	69352	17	14	46	14	47	Published version of this article exists: Cohen M. and J. Sebstad (2005), "Reducing vulnerability: the demand for microinsurance", Journal of International Development, Vol. 17 issue 3, pp. 397 - 474 (NETHERLANDS)	Reference has been updated.
508	69353	17	14	48	14	48	National Round Table on the Environment and the Economy, 2012 not in reference list (NETHERLANDS)	Reference has been corrected.
509	69354	17	14	52	14	52	Aakre et al., 2010 --> should be Aakre et al., 2009 (NETHERLANDS)	Reference has been corrected.
510	69355	17	15	1	15	2	"In 2010 globally about 30% of ...were insured" --> needs Linnerooth-Bayer et al., 2011 as reference (NETHERLANDS)	Reference has been moved to after the text.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
511	69356	17	15	1	15	2	The sentence 'In 2010 globally about 30% of disaster losses and 20% of climate related losses were insured' has the source Linnerooth-Bayer et al., 2011. The numbers and the level of detail of the statement in the source are quite different however: 'In the richest countries about 30% of losses in this period (1980-2004) were insured; in low-income countries, only about 1% of losses were insured'. The 20% climate related losses stated in the IPCC paragraph cannot be traced back in the reference source at all. (NETHERLANDS)	The text has been amended accordingly.
512	74038	17	15	1	15	30	The authors may want to consider adding a few examples with regard to the role of re-insurance. For example, the state of Alabama decided to purchase reinsurance for its state-owned properties in order to spread risk. (UNITED STATES OF AMERICA)	This is a good example but we would need the reference to include it.
513	69358	17	15	4	15	4	The sentence introduces direct and indirect effects of insurance-related instruments, whereas the previous paragraph (lines 44 p.14 to line 2 p. 15) has already spoken of different aspects of direct effects. (NETHERLANDS)	We think it offers the reader a guide to what is being described in the following sentence.
514	69357	17	15	4	15	29	Too little attention is paid to the moral hazard which is only mentioned in one sentence while it poses a real problem in insurance area (NETHERLANDS)	We have increased the importance of this.
515	69360	17	15	7	15	7	Hoeppe and Gurenko, 2006 --> should be Hoppe and Gurenko, 2006 (NETHERLANDS)	Reference has been corrected.
516	69359	17	15	7	15	9	There is also evidence that insured farmers are more risk-prone and care less about the proper crop-mix (moral hazard issues) (NETHERLANDS)	A good example but space limits us from including more text.
517	69361	17	15	12	15	15	Examples seem to match the reality of developed countries, but not necessarily that of developing world. Counterexample: in Mozambique, population remains reluctant to leave flood-prone areas despite governmental or NGO programs (see Stal M. (2009), EACH-FOR Environmental Change and Forced Migration Scenarios, Mozambique case study). Another counterexample: there is evidence in the US that insurance program for flood-prone areas encourages people to settle down on these areas because of expectations of high insurance compensation on case of disaster. (NETHERLANDS)	These are examples of moral hazard and we would argue that they are not only relevant in developing countries.
518	69362	17	15	13	15	13	Kunreuther and Michel-Kerjan, 2009 not in reference list (NETHERLANDS)	Reference has been corrected.
519	69363	17	15	13	15	13	Kunreuther --> add year to reference (NETHERLANDS)	Reference has been corrected.
520	74039	17	15	15	14	15	Participants in US National Flood Insurance Program are not paying the full actuarial costs of the risks due to the subsidization. (UNITED STATES OF AMERICA)	Good example but we cannot include all examples for space constraint reasons.
521	69364	17	15	19	15	19	World Bank, 2007 not in reference list (NETHERLANDS)	Reference has been corrected.
522	69365	17	15	20	15	20	Linnerooth-Bayer and Mechler, 2011 --> should be Linnerooth-Bayer, Hochrainer and Mechler, 2011 (NETHERLANDS)	Reference has been corrected.
523	69366	17	15	23	15	23	Kunreuther et al., 2009 not in reference list (NETHERLANDS)	Reference has been corrected.
524	65979	17	15	27	15	27	Kunreuther 1996 is not the appropriate reference for moral hazard. Bring an old and original reference, or no reference. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We had intended Kunreuther 1998, which is an appropriate reference.
525	69367	17	15	27	15	27	Kunreuther, 1996 --> Should be Kunreuther, 1998 (NETHERLANDS)	Reference has been corrected.
526	58625	17	15	28	15	29	This phenomenon is presented quite briefly, given its high relevance (at least in some developed countries). More information in the underinsurance due to expectation of state relief ("charity hazard") can be found in Raschky, P. A., Schwarze, R., Schwindt, M., & Zahn, F. (2013). Uncertainty of Governmental Relief and the Crowding out of Flood Insurance. Environmental and Resource Economics, 54, 179–200. doi:10.1007/s10640-012-9586-y and Raschky, P. A., & Weck-Hannemann, H. (2007). Charity hazard—A real hazard to natural disaster insurance? Environmental Hazards, 7(4), 321–329. doi:10.1016/j.envhaz.2007.09.002 (Daniel Osberghaus, Centre for European Economic Research (ZEW))	Space considerations limit us from adding more examples. There is more discussion of this issue in Chapter 10
527	74040	17	15	28	15	30	Local or state regulations may undermine incentives to decrease risk (for instance, by not allowing insurance rates to be fully risk adjusted). One possible policy instrument is the removal of existing regulations that distort market signals in order to re-align incentives. (UNITED STATES OF AMERICA)	We have added this example to the section.
528	65980	17	15	29	15	29	Please use an original reference to the Samaritan's Dilemma, Gibson, Andersson, Ostrom, Shivakumar (2005) The Samaritan's Dilemma: The Political Economy of Development Aid, Oxford University Press. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We have changed the reference.
529	65981	17	15	32	15	52	This subsection covers less than the similar aspects considered in p 15   32-49 and p 5   6-20. Please harmonize and please extend here. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	P 5 provides only a list of measures. The text here add some discussion of the motivations for using the incentives.
530	65982	17	15	32	15	52	Please supply more references to this subsection. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	Reference to each of the different instruments is given later when they are discussed further.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
531	71389	17	15	32	15	52	Section 17.5.2. Incentive Design: as the title implicates, this subsection mainly focuses on principles of designing policies or instruments to provide incentives, which is more over-arching for 17.5. It is awkward to place this subsection in the middle of various instruments for adaptation. Suggest that this subsection be put before 17.5.1 as an introductory part for section 17.5. (CANADA)	We have redesigned the section moving the text as suggested.
532	82766	17	15	34	15	43	Citations should be provided in support of these statements. (Katharine Mach, IPCC WGII TSU)	The citations are in the sub-sections below.
533	68113	17	15	34	15	52	"Equity" is essential to climate change adaptation actions, because the poor and the undeveloped regions, which are generally more vulnerable, all the more need funding, technology and other support in the area of climate change, which warrants the enhanced institutional sustainability and motivated voluntary mitigation actions (B. Smit, et.al, 2001; Bruin, 2011; M. Stadelmann, et.al, 2012). The currently designed incentives for adaptation lack consideration of the factor of equity. It is suggested to add equity in this section as one of the important principles governing the design of incentives. Reference: B. Smit, 2011, Adaptation to climate change in the context of sustainable development and equity; K. Bruin, 2011, An economic analysis of adaptation to climate change under uncertainty; M. Stadelmann, et.al, 2012, Equity and cost-effectiveness of multilateral adaptation finance – are they friends or foes? (CHINA)	Equity is included in the chapter as a very important aspect of adaptation in section 17.2.7. It is also covered in other chapters.
534	77572	17	15	34	15	52	The section on Incentives design needs to be expanded (Malini Nair, Indian Institute of Science)	We have restructured the section so hopefully it provides more information while keeping to our word limit.
535	59715	17	15	47	15	47	In order to provide completely meaningful information, a descriptor for the word "cases" should be added. It can be "punctual cases", or "some cases", or "special cases", depending upon the mean message of the cited source. (Roger Cremades, University of Hamburg)	we have added the word "some".
536	69368	17	15	49	15	49	Roy, 2000 not in reference list (NETHERLANDS)	Reference has been corrected.
537	69369	17	15	50	15	52	Source of the statement should be specified (NETHERLANDS)	We have made it a bit clearer.
538	58289	17	16	1	16	10	This section emphasize on the effects of PPP on solve investment. In economics, PPPs is not a useful tool under some conditions, and used into climate change that have strong public and long-term interest attribute investment behaviour simply which will overstate the tool's actual effects. Furthermore, the conclusion in this section have one reference support only, which is lack of convincing. So I suggest to add to context explain on PPPs' limits. eg. 17.6.3, FAQ3, To give various policy tool's context limits etc. (Juqi Duan, National Climate Center, Chinese Meteorological Administration)	If we delete this section then we don't have to follow this recommendation.
539	63665	17	16	1	16	10	Suggestion: Delete chapter 17.5.3 completely. Rationale: There is no evidence that PPP are really successful in providing incentives on adaptation. The argumentation given in 17.3.3 is highly theoretical. In opposite to the argumentation on chapters 17.5.4-8 no sound studies are given. Bräuninger is a contract work for the EU Commission, not a reviewed paper and also stays theoretical. The single example of Thames estuary are not suitable for worldwide generalization of that argument. Even Agrawala and Falkhauser (2008) stated this way. This missing proof is especially critical as PPP are prominent mentioned in SMP (Page 7 Line 51) where they are stated under "high confidence". (GERMANY)	We have to decide whether to take this advice. My inclination is to remove the section.
540	65983	17	16	1	16	10	As far as I know, there is generally some controversy about the effectiveness, efficiency and the distribution of risks with PPPs. This should be mentionend. Reference empirical literature that identifies success of failure (there should be more than just one paper from the grey literature). (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	If we delete this section then we don't have to follow this recommendation.
541	74041	17	16	1	16	10	It is important to discuss moral hazard and additionality issues in the context of public-private partnerships. (UNITED STATES OF AMERICA)	If we delete this section then we don't have to follow this recommendation.
542	69370	17	16	3	16	3	PPP's have gained popularity since the 90s, thus not so long ago (NETHERLANDS)	If we delete this section then we don't have to follow this recommendation.
543	69371	17	16	3	16	10	The described situation refers more to the developed countries, what about the PPPs in developing countries? What about the controversies related to PPPs, for example in the water sector? (NETHERLANDS)	If we delete this section then we don't have to follow this recommendation.
544	70738	17	16	6	16	10	I do not find this a very good example. It seems that the project is executed by the private sector, and financed by the public sector. How is that a good example of a PPP? (Willem Pieter Pauw, German Development Institute (DIE))	If we delete this section then we don't have to follow this recommendation.
545	74042	17	16	13	16	53	Ecosystems and water markets both tend to be local markets because the benefits are location specific and non-transferable to another water or eco-system. In these cases, one should acknowledge some of the challenges of setting up a formal market. For instance, transaction costs in thin markets can be quite high. (UNITED STATES OF AMERICA)	Lines 22 to 26 point to the problems. We will add a comment to indicate the further difficulties.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
546	69372	17	16	15	16	15	Please clarify how ES can contribute to adaptation (NETHERLANDS)	A few words have been added to explain why.
547	69373	17	16	15	16	15	Daily (1997) --> reference not in reference list (NETHERLANDS)	We will add it to the references.
548	65984	17	16	15	16	16	Please say explicitly how/why PES can contribute to adaptation. One further general reference is van de Sand (2012) Payments for Ecosystem Services in the Context of Adaptation to Climate Change, Ecology and Society 17(1): 11. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We have added a few word to explain why and included the proposed reference.
549	74043	17	16	15	16	32	ES and PES needs to be introduced and explained better. Currently there is more detailed information provided in the FAQ at the end of the chapter on this (p 22, lines 23-31) than in the main text. At a minimum, what is in the FAQ should also be said in the body of the chapter. (UNITED STATES OF AMERICA)	We have ensured that what is in the FAQs is also in the main chapter on PES.
550	69374	17	16	16	16	16	Heal (2000) --> should be Heal et al. (2001) or Heal (2009) (NETHERLANDS)	Reference has been corrected.
551	69375	17	16	22	16	26	To specify why the reference suggests mixed succes (heavy dependence on government or international donors, little evidence that PES adversely affect access to water etc.). Also, the authors of the referenced article underline the pilot nature of the described projects and their location-specific character: is this reference relevant to make statements in the text? (NETHERLANDS)	We believe the problems identified are real and relevant to any application to adaptation. We have also added more qualifications based on a comment from the USA.
552	74044	17	16	22	16	26	How many of the PES programs were successful and how many were partly successful or unsuccessful? (UNITED STATES OF AMERICA)	It is not possible to answer simply because each was qualified and found to have some positive aspects but several negative ones.
553	59066	17	16	28	16	32	The justification of how PES can contribute to adaptation or be used as a policy instrument for adaptation is weak ("Potentially well designed PES schemes they (sic) offer a framework for adaptation"). First PES can produce adaptation co-benefits if the services that are paid for contribute to reducing the vulnerability of the society to climate change (e.g. hydrological services) or when the protection of a given service contribute to sustaining other services that are relevant to adaptation. Second PES can also have adaptation-relevant institutional spillovers, for example with institutional strengthening or increased coordination between economic sectors (Wertz-Kanounnikoff et al., 2012). Third PES can also influence (positively or negatively) the adaptive capacity of people receiving the payments (Locatelli et al., 2008). [Wertz-Kanounnikoff S., Locatelli B., Wunder S., Brockhaus M., 2011. Ecosystem-based adaptation to climate change: What scope for payments for environmental services? Climate and Development 3(2): 143-158. doi:10.1080/17565529.2011.582277] [Locatelli B., Rojas V., Salinas Z., 2008. Impacts of payments for environmental services on local development in northern Costa Rica: A fuzzy multi-criteria analysis. Forest Policy and Economics 10(5): 275-285. doi:10.1016/j.forpol.2007.11.007] (Bruno Locatelli, CIRAD-CIFOR)	Thank you for these references which we have included in the section.
554	56950	17	16	30	16	30	Note reference to Schultz, 2012 is not included in the references section. Add: Schultz, K., (2012), "Financing climate adaptation with a credit mechanism: initial considerations", Climate Policy Vol. 12, Issue 2, 2012, pages 187-197 (Karl Schultz, The Higher Ground Foundation)	Reference has been corrected.
555	69377	17	16	30	16	30	" PES schemes they offer" --> delete "they" (NETHERLANDS)	We have corrected the text.
556	69378	17	16	30	16	30	Butzengeiger-Geyer et al., 2011; Schultz, 2012 --> references not in reference list (NETHERLANDS)	References have been corrected after revisions.
557	69376	17	16	30	16	32	It does not result from the article that PES is the same as community based natural resources management (one of foundational elements of CBNRM id collective proprietorship, which is not necessarily the case of PES) (NETHERLANDS)	No the two are not the same and we are referring here to PES but we note that some researchers have drawn links between the two.
558	63666	17	16	31	16	31	Please explain more extensively what "Payments for Environmental Services" means for adaptation. (GERMANY)	We have add quite a lot more text to explain PES.
559	69379	17	16	31	16	31	Chishakwe et al. (2011) --> should be Chishakwe et al. (2012) (NETHERLANDS)	Reference has been added.
560	63667	17	16	32	0	0	Additional sentence: "With more and more experience and guidelines for implementation in place (FAO, Worldbank and others) PES might well contribute to adaptation as one of a multitude of feasible measures (e.g.. taxes, charges, subsidies, loans)." (GERMANY)	We have added this view, attributing it to development agencies.
561	77511	17	16	35	16	53	This section (17.5.5) in conjunction with the preceding section (17.5.4) should be elaborated to capture ecosystem services in general as a helpful concept in economics of adaptation. Next to fresh water markets, one can think of urban storm water management (and differentiation of urban fees or real estate taxes). This addition helps to clarify that ES can also be used in policy making wihtout explicit use of payments for environmental services (PES, which is briefly discussed at page 16 line 15-32). (Adriaan Perrels, Finnish Meteorological Institute FMI)	There is no space to elaborate things further but we will note the case of urban storm water management.
562	65985	17	16	37	16	44	You should mention that the consequences of water markets are also seen as controversial by some. They can lead to problematic distributional effects or can even conflict with basic human needs. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We feel we have noted these issues by talking about distributional issues and affordability.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
563	77573	17	16	37	16	53	The section on resource pricing needs to be expanded (Malini Nair, Indian Institute of Science)	Space limits prevent expanding the text without specific points that need to be covered.
564	69380	17	16	40	16	40	Adler (2009) --> should be Adler (2008) (NETHERLANDS)	References have been corrected.
565	69381	17	16	42	16	44	Source of this statement should be specified (NETHERLANDS)	This has been corrected.
566	69382	17	16	44	16	44	household sector instead of domestic sector (domestic suggests national or country-level) (NETHERLANDS)	This has been corrected.
567	60067	17	16	46	16	53	Add an example of where water markets are effective (for example, in the Murray Darling Basin in Australia). This will demonstrate how water markets can be effectively implemented to adapt to a changing climate and deliver positive environmental and economic outcomes. (AUSTRALIA)	Thank you for the suggestion. We did not add this due to space constraints.
568	69383	17	16	53	16	53	"...pricing, (Griffin, 2012)" --> delete the comma after pricing (NETHERLANDS)	This has been corrected.
569	69384	17	17	2	17	2	Title mentions Land Taxes, but the text covers other types of taxes only (NETHERLANDS)	The word "Land" has been removed.
570	64328	17	17	2	17	12	This second draft no longer contains the sentence (from the first draft, p. 19 l. 40) "Pueyo et al. (2010) found evidence of a critical transition to a megafire regime under extreme drought in rainforests; this phenomenon is likely to determine the time scale of a possible loss of Amazonian rainforest caused by climate change." As an author of the cited paper I respect the removal of this fragment whatever the reason. However, I am surprised that the possibility of a sudden transition to a megafire regime when reaching a critical threshold is not considered important enough to be mentioned. Quite the opposite, I see it as one of the main criteria to decide at which point there is "dangerous" interference with the climate system. Indeed the evidence is not definitive, but I do not think it is weaker than the evidence in favor of the other type of tipping point that is mentioned in the text (the weight of this evidence justified the publication of the paper by Pueyo et al. in a high profile journal such as ELE, and I am aware of no study refuting it). Note that there is no redundancy with the other references, because they describe a different type of transition (in physical terms, most of the literature refers to a "first order phase transition", while Pueyo et al. 2010 refer to a "second order phase transition"; the two types of transitions may or may not occur together). This issue has major implications for time scales (I reproduce a fragment from Pueyo et al. 2010, p. 800: "While the above-mentioned models predict a delay of decades to centuries between committed and actual forest loss (Jones et al. 2009), critical transitions of the kind that we suggest in this paper are likely to reduce this delay and cause a stepwise rather than a continuous loss"). (Salvador Pueyo, Institut Català de Ciències del Clima (IC3))	The example is a good one but this is not the right section to add it.
571	65986	17	17	2	17	18	Title and substance of this subsection do not fit together. It also contains redundancies in relation to the previous subsections. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	We have modified the title, which we think is consistent with the substance.
572	70781	17	17	7	0	0	"taxes (not axes) over subsidies" (Anni Huhtala, Government Institute for Economic Research )	The text has been corrected.
573	69385	17	17	7	17	7	"...for axes over subsidies..." --> axes should be changed to taxes (NETHERLANDS)	The text has been corrected.
574	84556	17	17	7	17	7	"Axes" should be "taxes." (Michael Mastrandrea, IPCC WGII TSU)	The text has been corrected.
575	69386	17	17	9	17	9	"...resources at below..." --> delete preposition at (NETHERLANDS)	The text has been corrected.
576	84557	17	17	10	17	10	The most obvious example here would be fossil fuel-based energy sources rather than hydro... (Michael Mastrandrea, IPCC WGII TSU)	We will included both examples.
577	74045	17	17	11	17	11	"better priced" should be "optimally priced." (UNITED STATES OF AMERICA)	The text has been changed.
578	69387	17	17	11	17	12	Source of this statement should be specified (NETHERLANDS)	Reference has been added.
579	74046	17	17	14	17	18	Another instrument that merits mention is the removal of market distorting subsidies in the energy market, for example, that induce investments in technologies that contribute to climate change or make adaptation more difficult. (UNITED STATES OF AMERICA)	This example has been added.
580	69388	17	17	17	17	18	Impact of pricing on the access for the poor should be developed more, while it is barely mentioned in one phrase. (NETHERLANDS)	Some more text has been added.
581	74047	17	17	21	17	33	The statements made in this section are too strong. For instance the section states as fact that individuals fail to account properly for low probability risks or weigh long term consequences consistently. However, while this has been demonstrated in some contexts it is a matter of debate in others. (UNITED STATES OF AMERICA)	We have changed the text to reflect this uncertainty.
582	74048	17	17	23	17	33	Some of the terminology used in this paragraph seems overly subjective. It is recommended that the authors review it in detail, adjusting wording to be more precise. For example, what do you mean by "taking into account behavioral biases" in line 24? Did you intend to say something about improved information provision? Also, what do you mean by "biased and under-optimal responses" in line 33? (UNITED STATES OF AMERICA)	We have addressed these point by modifying the text.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
583	74049	17	17	23	17	33	The poor tend to have very short time horizons since they are concerned about surviving now and in the near term. They cannot deal with uncertain, longer-term issues. (UNITED STATES OF AMERICA)	We agree - high discount rates are an essential part of planning for least advantaged, but as pointed out in section 17.4, in developing country contexts there are effective ways to identify robust adaptation options under uncertainty. Further, some economic analyses identify win-win opportunities to increase economic productivity now while also increasing resilience to climate change.
584	69389	17	17	28	17	28	Fischhoff et al., 1978; Slovic, 1997 --> not in reference list (NETHERLANDS)	The references have been added.
585	74050	17	17	30	17	33	In cases where risk management and risk awareness are expected to have an impact on individual decisionmaking, the obvious policy instrument to consider is information provision that will increase the salience of particular types of impacts and risks. (UNITED STATES OF AMERICA)	The essence of this has been noted.
586	69390	17	17	33	17	33	Weber et al., 2004 --> not in reference list (NETHERLANDS)	The sentence has been deleted.
587	74051	17	17	33	17	33	"under-optimal" should be "sub-optimal." (UNITED STATES OF AMERICA)	The sentence has been deleted.
588	82767	17	17	36	0	0	Section 17.5.8. This section should be coordinated with the assessment of chapter 14 to ensure harmonized, non-overlapping assessment. (Katharine Mach, IPCC WGII TSU)	This has been noted, and acted upon.
589	71390	17	17	36	17	51	This section needs to be balanced. It should be mentioned that intellectual property (IP) rights are seen by many authors as an enabler to technology development and transfer rather than as a constraint. This idea is well explained in section 13.9.2 of the draft WGIII contribution to the AR5. Suggest using some of the sources used by WGIII in section 13.9.2 and adding some of their findings within section 17.5.8, including: "Empirical literature finds a role of strong IP protection in receiving countries in facilitating technology transfer from advanced countries"; and "In summary, the evidence indicates a systematic impact of IP protection on technology transfer through exports, FDI and technology licensing, particularly for middle-income countries for which the risk of imitation in the absence of such protection is relatively high". (CANADA)	These aspects of IP protection have been noted.
590	69392	17	17	38	17	38	Christensen et al. (2011) --> not in reference list (NETHERLANDS)	The reference has been added.
591	70584	17	17	38	17	38	Reference to Christensen, 2011, is missing in the list of references. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	The reference has been added.
592	69391	17	17	38	17	39	Should be clarified that the numbers concern in fact technological needs in the area of mitigation of greenhouse gas emissions and adaptation to climate change (NETHERLANDS)	This has been noted.
593	74052	17	17	38	17	39	Can you provide some description or examples of these "technological needs" to make this more informative. (UNITED STATES OF AMERICA)	Space limitations prevent it but 1-2 examples have been added.
594	79636	17	17	38	17	51	I think this section would benefit by beginning about the benefits of increasing global stock of knowledge on adaptation - before discussing the issues of patents. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	A sentence to this effect has been added.
595	69393	17	17	41	17	42	Dutz and Sharma, 2012 --> in reference list (p.26 l.4-5) as Dutz and Sharma, 2102 (NETHERLANDS)	The reference has been corrected.
596	69394	17	17	45	17	46	It better to explain why limits to technology transfer are limiting climate change adaptation. Otherwise repetition of the idea stipulated in line 40. (NETHERLANDS)	The limits have been outlined in lines and text has been changed so it is not a repetition.
597	69395	17	17	49	17	49	IPR should be explained in full form before it is abbreviated (NETHERLANDS)	This has been done.
598	69396	17	17	50	17	50	Should be specified that we talk about improved/ drought-resistant/ genetically modified seeds (NETHERLANDS)	This has been done.
599	80459	17	18	0	0	0	Section on the costing of adaptation should be better integrated with the discussion in the rest of the chapter. How do different estimates of the costs of adaptation differ in their incorporation of the "broad definition" of adaptation the authors promote? Do these estimates use the cost-benefit approaches discussed earlier or are they more reliant upon bottom-up engineering estimates? How do the policy mechanisms discussed change the costs of adaptation by making adaptation more efficient? How is autonomous adaptation accounted for? (Robert Heilmayr, Stanford University)	The authors have modified the chapter and reorganized some text to better integrate this section into the broader chapter. In particular the authors have moved the discussion of the methodology of benefit and cost comparisons to the front of this section, and added detail to the referenced section to respond to the reviewers suggestions.
600	69397	17	18	1	18	1	Title "Innovation, R&D Subsidies" suggests Innovation and R&D Subsidies. However, the paragraph only talks about subsidies not innovation. TO get clearer title, it should be written "Innovation and R&D Subsidies", so that we can understand as subsidies for innovation and R&D (NETHERLANDS)	This has been modified accordingly
601	65987	17	18	1	18	9	This section seems to contain only general statements derived from the theoretical literature, but no paper that explicitly study adaptation. Please improve the references with respect to innovation for adaptation. (Klaus Eisenack, Carl von Ossietzky University Oldenburg)	The section merely notes that there is no literature on adaptation and R&D subsidies.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
602	69398	17	18	5	18	6	More relevant references can be found directly in the area of economics of regulation (Popp (2004), Klaassen et al.. (2005)) (NETHERLANDS)	The Popp reference has been added.
603	74053	17	18	7	18	9	Subsidies are often poorly targeted and end up getting captured by middle and upper income people. They may also encourage over-consumption. (UNITED STATES OF AMERICA)	This has been noted.
604	74054	17	18	7	18	10	Any discussion of subsidies would be remiss without mentioning several drawbacks of this approach: (1) it requires revenues to fund the subsidies that must come from either increased taxes or cutting programs elsewhere unless a government is planning to take on more debt; (2) subsidies create distorting long term incentives for entry and exit. (UNITED STATES OF AMERICA)	The sense of this has been noted.
605	65436	17	18	12	18	12	The costs of adaptation should always be considered along side the value of the impacts that would be avoided (John Hay, University of the South Pacific)	To make this more clear, the authors have reorganized the chapter to include discussion of costs and benefits more generally directly in front of this presentation of estimates from the literature.
606	74055	17	18	12	18	12	It may be useful to mention Hsiang and Narita (2012) somewhere in this section too. The estimate the extent of adaptation to tropical cyclones (TCs) using a global cross-section of countries . Hsiang, S.M., Narita, D., 2012. Adaptation to Cyclone Risk: Evidence from the Global Cross-Section. Climate Change Economics: Special Issue on Adaptation, Vol. 3 No. 2. (UNITED STATES OF AMERICA)	We added some studies to Table 17-4 as space allowed.
607	70585	17	18	12	21	6	Again, a very interesting section with good discussion of findings in the available literature. I was wondering why the "real" local studies, e.g. at district, city, project level are not included? It would be interesting - but perhaps also too daunting? - to include more information on the findings on adaptation costs at local/project level for various types of adaptation measures. A table equivalent to table 17-4 (a great table) for these types of studies would be very useful. (Anne Olhoff, UNEP Risø Centre on Energy, Climate and Sustainable Development)	We added some studies to Table 17-4 as space allowed.
608	74056	17	18	12	21	13	This section is much better organized and flows better than the previous sections of the chapter. It also seems reasonably complete. (UNITED STATES OF AMERICA)	Thank you for the comment.
609	80060	17	18	15	0	0	what is the second level of costing? (Reimund Schwarze, Helmholtz Leipzig)	Added text to clarify that the second level is regional and local-scale studies
610	74057	17	18	21	19	8	Another fundamental problem that applies both to econometric studies and simulation models is the difficulty of accepting stationarity over long time periods. Economies and societies evolve, as does technology. Trying to model economic costs and benefits of a policy in 2100 from the vantage point of 1910 would present some severe problems, Yet somehow when we try to visualize 2100 we tend to model a world very much like the one we live in today. A second problem is the limitations of economics with respect to large scale changes. If the world is a bit warmer or colder than it is at present, the generally marginal changes in the economy and society can be costed out. But If we manage to melt the Greenland ice cap, we will change the planet in some rather fundamental ways, and the world we live in will be very different, not always in predictable ways (beyond more ocean and less land). In a sense, the economic costs and benefits of such a fundamental change are imponderable and irrelevant. Different people will live different places, in different societies, doing different things. It is beyond the capacity of human ingenuity to track all the repercussions of large scale change, and beyond the power of economics to put meaningful prices on such large changes. (UNITED STATES OF AMERICA)	This factor is now mentioned in section 17.4, clarifying that costs and benefits are conditional on socioeconomic context.
611	78048	17	18	21	19	8	Somewhere in this section it would be helpful to point out different definitions of adaptation costs used in different studies. For instance, most of the sectors in the UNFCCC and World Bank study define it as the cost of fully restoring welfare. The exception is the Coastal Sector, where the definition is the economically optimal cost. (Frances Moore, Stanford University)	The commentor is correct and there is text elsewhere in this section which directly speaks to this point.
612	68114	17	18	22	18	27	Please insert adaptation funding needs by developing countries as estimated by the organizations mentioned in this paragraph. (CHINA)	The text of the chapter does indicate that the World Bank and UNFCCC estimates were used to estimate funding needs for developing countries.
613	69399	17	18	24	18	24	World Bank, 2006 --> should be another year (NETHERLANDS)	This was corrected.
614	69400	17	18	24	18	24	UNDP, 2007 --> should be UNDP, 2008 (NETHERLANDS)	This was corrected
615	69401	17	18	24	18	24	UNFCCC, 2008 --> not in reference list (NETHERLANDS)	This was corrected
616	69402	17	18	24	18	25	The estimates have been done for developed countries too. (NETHERLANDS)	The commentor has not provided citations - while some estimates have been done for developed countries, the global cost studies of UN and World Bank focus on developing countries.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
617	78047	17	18	25	18	25	See comment for page 3, line 47. These estimates are not global costs, they are just for developing countries (and mostly just public rather than private costs). (Frances Moore, Stanford University)	The commentor is correct that the estimates are for developing countries, but they are considered global estimates for these countries, as the text indicates. Not all of the costs estimated in the studies are public costs, however.
618	61440	17	18	25	18	26	Cost estimate of adaptation in 2050. Note that low confidence is assigned to that estimate, indicating high uncertainty related to societal and climate change impact over time. It is shown that the upper end can be much higher than \$100 billion in 2050 (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	The chapter authors agree and make these points in the existing text.
619	69403	17	18	25	18	26	Most recent estimate of global yearly adaptation costs for 2050, as shown in table 17.2, is that from World Bank 2010. This source states that in 2050 annual adaptation costs range from 70 to 100 USD billion. Not from 75 to 100 USD billion. It should be thus "from US \$70 to more than US \$100 billion" (NETHERLANDS)	This was corrected in the revised chapter.
620	84558	17	18	25	18	26	As mentioned in the context of the ES, it is not clear where the \$75 billion comes from. Table 17-2 provides a range of 70-100 billion for the 2010 World Bank study, is that the intended range? Or is this a range that seeks to synthesize across studies in Table 17-2? Please clarify the scope. In addition, the executive summary states "\$100 billion" rather than "more than \$100 billion" as the upper end of the range. Please reconcile. (Michael Mastrandrea, IPCC WGII TSU)	This was corrected in the revised chapter.
621	74058	17	18	26	0	0	Is this \$75 or \$75 billion? (UNITED STATES OF AMERICA)	This was clarified in the revised chapter.
622	65455	17	18	26	0	26	Please check the numbers. The lower number is \$70 in the table. (Nicole Glanemann, University of Hamburg)	This was corrected in the revised chapter.
623	63250	17	18	26	18	26	Please be more precise: does the cost range from US\$ 75 billion (?) to US\$100 billion per year? Monetary values are presumably in US\$ per year? The table 17-2 shows that estimates range from US\$ 4 billion to US\$ 109 billion per year. Check why there is this contradiction. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This was corrected in the revised chapter.
624	82768	17	18	26	18	26	Instead of 75-100 billion, the table seems to support a range of 70-100? (Katharine Mach, IPCC WGII TSU)	This was corrected in the revised chapter.
625	58290	17	18	29	0	0	Please revise table 17.2, adding one column to list the adaptation financial needs by developing countries. (Juqi Duan, National Climate Center, Chinese Meteorological Administration)	As noted in the chapter text, the global cost studies of UN and World Bank focus on developing countries.
626	63668	17	18	31	18	31	Please add reasons why IPCC considers only a low confidence. (GERMANY)	The revised chapter text includes this discussion.
627	69404	17	18	31	18	31	IPCC (2012) --> should be IPCC (2011) (NETHERLANDS)	This was corrected in the revised chapter.
628	69405	17	18	31	18	31	World Bank (2006) --> not in reference list (NETHERLANDS)	This was added to the revised reference list.
629	69406	17	18	33	18	33	UNDP (2007) --> should be UNDP (2008) (NETHERLANDS)	The reference is correctly listed as published in 2007.
630	69407	17	18	34	18	34	World Bank (2010a) --> in reference list not determined which reference is 2010a (NETHERLANDS)	This was corrected in the revised reference list.
631	84559	17	18	34	18	34	Please introduce the acronym for investment and financial flows (used on the next page without introduction). (Michael Mastrandrea, IPCC WGII TSU)	This change has been made.
632	82769	17	18	39	18	39	The described "seeming convergence" is not all that apparent in the table. (Katharine Mach, IPCC WGII TSU)	The revised chapter text includes this discussion.
633	84560	17	18	39	18	40	The referenced convergence is somewhat unclear, given the range of estimates presented in Table 17-2. Further clarity is needed here. (Michael Mastrandrea, IPCC WGII TSU)	The revised chapter text includes this discussion.
634	74059	17	18	39	18	48	Given the amount of space allotted to the World Bank and UNFCCC studies, more explanation of their methodologies would be very useful here. Also, offering examples throughout this paragraph would make the discussion more concrete and informative e.g. types of extreme events (line 41), limited set of adaptation options - such as? (line 43), note regions with an existing adaptation deficit (line 46). (UNITED STATES OF AMERICA)	The commentor makes a good suggestion but space considerations make an expanded discussion of these studies difficult. The references are publicly available and readily accessed, however.
635	74060	17	18	44	18	45	Add detail on the specific types of costs omitted from adaptation cost estimates. (UNITED STATES OF AMERICA)	We have added some additional detail on the omissions - including adaptation to nonmarket and socially contingent effects
636	69408	17	18	45	18	46	The sentence is not clear. The authors of the referenced article mention the fact that the additional costs of adaptation have sometimes been calculated as 'climate mark-ups' against low levels of assumed investment as only one of three main reasons for underestimation (NETHERLANDS)	This sentence has been modified to clarify.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
637	63251	17	18	50	18	52	Figure could be in higher quality, the crosses are very small. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	The figure was modified to improve clarity.
638	69409	17	18	51	18	52	Reference Parry et al. (2009) should be mentioned in the table (NETHERLANDS)	The table was modified.
639	69410	17	19	1	19	1	"The practical challenges.... Are apparent in the literature" --> Which literature? References are missing (NETHERLANDS)	We added citations to relevant literature.
640	61444	17	19	11	0	0	Sect. 17.6.2: Make a true claim that there is a convergence of numbers. But it should be considered this might be an artifact, because certain studies almost in every case look on one dominant adaptation measure namely dike construction under very similar modelling frameworks (FUND, DIVA). Moreover, costs for dike building refers usually to a rather old reference, namely Hoozemans 1992. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	Agree. The text has been edited to clarify these points.
641	69411	17	19	13	19	13	inform --> should be underpin/justify (NETHERLANDS)	The authors have made an edit and use the word "guide" rather than "inform".
642	61441	17	19	13	19	34	Costing adaptation (17.6). This section is a bit disappointing, but unfortunately this section is one of the most important ones. The numbers being presented are quite old (e.g. Worldbank more than 6yrs.) More recent estimates are provided by De Bruin et al. (2011) GEC 21; De Bruin et al. 2009 OECD Environment Working Paper 6. In respect to regional-level estimates the work from S. Hallegatte (2009) could be considered. Using climate analogues for assessing climate change economic impacts could have been considered. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	The table referenced is designed to show a progression of global studies through time, which is why some older studies are included. In addition, the strengths and weaknesses of climate analogue studies are considered in broader discussion of Ricardian methods.
643	79637	17	19	13	19	34	In the previous section you discuss global effects and then in this section that local/national are difficult to compare. This is fine. But local (e.g. Appraising specific adaptation options) is difficult to scale up to the national level as well. One cannot simply add up a set of independent local studies (i.e. bottom up studies) to form a national picture as it may ignore important indirect/cross-sectoral impacts. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We agree and believe the text adequately recognizes this conclusion.
644	69412	17	19	18	19	19	Assessments have predominantly been conducted in a developed country context' while table 17.4 shows at least as many local studies focused on a developing country as local studies with a focus on developed countries (NETHERLANDS)	Agree - we deliberately focused the table on developing country estimates to provide indications that the best methods can nonetheless be applied in developing country contexts.
645	82770	17	19	18	19	19	It could be helpful to specify further the contrast between these estimates for developed countries and the global adaptation cost estimates primarily focusing on developing countries. (Katharine Mach, IPCC WGII TSU)	Jim found Katie and clarified that what's needed here is sharper point about coverage - but we can't compare estimates for developed versus developing, except to note data limitations
646	69413	17	19	21	19	21	[Table 17-3] If comparing the table with the original table of Agrawala and Fankhauser (2008) especially the analytical coverage needs some revisions. E.g. for energy IPCC states N. America and Europe, while Agrawala and Fankhauser (2008) state Primarily North America. (NETHERLANDS)	This was clarified in the revised chapter.
647	63252	17	19	21	19	22	Figure 17-3: The tickmarks should be qualified. What is the meaning of one, two or three tickmarks? What is the scale? 1-3, with 1 being low and 3 tickmarks being high? (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This was clarified in the revised chapter.
648	61442	17	19	26	19	26	What is a I&FF methodology? (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	I&FF was explained in a prior paragraph, but that explanation has been augmented to clarify the approach.
649	63253	17	19	26	19	26	Please explain what is meant by "I&FF". The "true" cost to society cannot be expressed in monetary terms as there are always values/costs associated to values that cannot be expressed in monetary terms, e.g. Loss of cultural heritage, spiritual values, etc. Hence economic valuation can only assess parts of the social costs involved in adaptation. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	I&FF was explained in a prior paragraph, but that explanation has been augmented to clarify the approach.
650	69414	17	19	26	19	26	Acronym I&FF not specified (Investment and Financial Flows?) (NETHERLANDS)	I&FF was explained in a prior paragraph, but that explanation has been augmented to clarify the approach.
651	69415	17	19	32	19	32	World Bank (2010b, 2010c, 2010d) --> in reference list not specified which of 2010 are b, c, and d (NETHERLANDS)	This was corrected in the revised draft
652	69416	17	19	33	19	33	In the source article Elbehri (2011) a range is mentioned from 9 to 86 billion USD per year. This is quite different from the statement in line 33: "In the range of 10-40 billion annually". (NETHERLANDS)	This text was revised and clarified in the revised draft

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
653	74061	17	19	33	19	33	This study is over what time frame? (UNITED STATES OF AMERICA)	This text was revised and clarified in the revised draft
654	74062	17	19	34	19	0	What was included in this estimate of adaptation expenditures and was this only for agriculture? Was this global? (UNITED STATES OF AMERICA)	This text was revised and clarified in the revised draft
655	69417	17	19	34	19	34	Elbehri et al. (2011) --> Not in reference list (NETHERLANDS)	This was corrected in the revised draft
656	61443	17	19	37	0	0	17.6.3 Selected studies on sectors and regions. This is a very good methodology overview that is very welcome as it helps to understand the differences in assessment approaches. However these descriptions belong rather to the methodology selection and what is needed here are the economic results that could be well related to the approaches and their constraints. (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	The authors have re-arranged the chapter to link the methodology sections (from prior section 17.2) to this section on applications of the methodologies.
657	61445	17	19	37	21	13	this section fails to concretely present the results of such selected studies. It presents methodological approaches but not so much the results of such studies. The EEA report on "adaptation in Europe" may reveal useful in that context. <a href="http://www.eea.europa.eu/publications/adaptation-in-europe">http://www.eea.europa.eu/publications/adaptation-in-europe</a> (European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	We investigated this citation and found no cited estimates of the economic implications of adaptation. Further, space considerations preclude inclusion of an exhaustive summary.
658	74063	17	19	37	21	16	Somewhere in the report, consider including another local study that uses an integrated assessment approach to evaluate the costs and benefits of adaptation in eight economic sectors in New York State. Citation: "Rosenzweig, C., W. Solecki, A. DeGaetano, M. O'Grady, S. Hassol, P. Grabhorn (Eds.). 2011. Responding to Climate Change in New York State: The ClimAID Integrated Assessment for Effective Climate Change Adaptation. Technical Report. New York State Energy Research and Development Authority (NYSERDA), Albany, New York. <a href="http://www.nyserda.ny.gov">www.nyserda.ny.gov</a> (UNITED STATES OF AMERICA)	We investigated this study and included in a prior draft, but space considerations precluded us from adding it here. Further we have tried to skew the listings in Table 17.4 toward developing country applications where possible.
659	74064	17	19	44	19	50	Need a good explanation of the definitions and differences between the Ricardian and "more generic correlational approaches". (UNITED STATES OF AMERICA)	This was corrected in the revised draft
660	78049	17	19	44	19	50	It would be helpful to point out here that different econometric techniques will include different levels and types of adaptation in their estimates of long-run climate change impacts. For instance, Mendelsohn et al (1994) use cross-sectional variation in land-values so fully accounting for all long-run adaptations in their estimates. Deschenes and Greenstone (2007) on the other hand use a panel estimator that removes cross-sectional variation in fixed-effects. Therefore their estimate only includes short-run interannual adaptations and not the long-run adaptations such as capital investments or crop choice (and also should not be called a Ricardian estimate). (Frances Moore, Stanford University)	Excellent point - we attempted to reflect this in the revised text.
661	63254	17	19	44	20	29	The text can be improved by clearer separating the two approaches. Perhaps including subheadings on "Econometric approach" and "Simulation approach". (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	Space considerations preclude adding a sub-section, but have tried in text editing to more clearly delineate the approaches
662	69418	17	19	46	19	49	Definition of Ricardian studies not clear, instead of the sentence in the parentheses it could be stated: based on the assumption of direct causal relationship between climate events and land value (NETHERLANDS)	Author team has edited to clarify
663	69419	17	19	48	19	48	Schlenker et al. (2005) --> differs from year in reference list (NETHERLANDS)	This was corrected in the revised draft
664	58628	17	19	48	20	3	The source "Schlenker et al. 2005" is cited as a reference to both types of cost study methodologies - this is confusing. Furthermore, the source is missing in the reference list. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	The Schlenker study discusses the differences in approaches. The reference is to the 2006 study, not 2005 - that was corrected in the revision.
665	69420	17	19	49	19	49	Not clear: Effect of climate on which impacts? (NETHERLANDS)	Text was edited in the revised chapter.
666	69421	17	19	49	19	49	Seo and Mendelsohn (2008) --> 2008a, 2008b or 2008c (NETHERLANDS)	The references were updated and clarified in the revised draft
667	69423	17	20	3	20	3	Schlenker et al., 2005 --> year is not correct with reference in reference list (NETHERLANDS)	This was corrected in the revised draft
668	69422	17	20	3	20	49	Dinar and Mendelsohn, 2011 --> not in reference list (NETHERLANDS)	The reference was added in the revised draft
669	82771	17	20	7	20	42	Further citations should be provided for these statements. (Katharine Mach, IPCC WGII TSU)	Additional references were added
670	84561	17	20	7	20	42	This discussion is fairly academic. What are the implications of work using these approaches, with the context provided here as a basis for evaluating their results? (Michael Mastrandrea, IPCC WGII TSU)	We have attempted to add some discussion of these implications.
671	69424	17	20	18	20	18	Schlenker et al., 2005 --> year is not correct with reference in reference list (NETHERLANDS)	This was corrected in the revised draft

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
672	69425	17	20	27	20	29	The fact that simulation requires many steps from the analyst, like adjusting parameters and calibrating, taken here exclusively as an advantage of the approach, constitutes also a big disadvantage making the results highly dependent on the analyst decisions within these steps (NETHERLANDS)	We agree - the text mentions that it is both an advantage if done well and a burden of the approach
673	69426	17	20	29	20	29	Dinar and Mendelsohn, 2011 --> not in reference list (NETHERLANDS)	The reference was added in the revised draft
674	74065	17	20	31	20	42	The point about what is the goal of adaptation is stated much better here than earlier. Because this point does not really need to be made twice, it is suggested that the authors delete the earlier discussion in favor of this one. (UNITED STATES OF AMERICA)	The chapter has been modified to better reflect this concern.
675	78050	17	20	33	20	37	This discussion is important and should be included earlier and more prominently in the evaluation of the methodologies behind large-scale cost of adaptation studies. See comment on page 18 line 21. (Frances Moore, Stanford University)	The methodology discussions have been more closely linked in this revised draft.
676	74066	17	20	35	20	35	Here again please review wording for unnecessarily subjective language. E.g., by "more mature" do you simply mean that more of the recent literature adopts this perspective? (UNITED STATES OF AMERICA)	This was revised in the draft
677	78051	17	20	44	21	3	This is a useful framework for evaluation of studies. It would be helpful if it was applied to the large-scale cost of adaptation studies discussed in section 17.6.1 (Frances Moore, Stanford University)	We have added text to indicate that these principles also apply to the global studies - further we use these principles in our evaluation of global studies.
678	69427	17	20	49	20	49	Lempert and Kalra, 2009 --> not in reference list (NETHERLANDS)	The reference was added in the revised draft
679	69428	17	20	54	20	54	World Bank, 2010 --> which 2010? (NETHERLANDS)	This was clarified in the revised chapter.
680	59497	17	21	1	21	3	The authors could consider citing the work of Kontogianni et al. (2011). (Citation: Kontogianni, A., Tourkolias, C., Skourtos, M., Papanikolaou, M. (2011). Linking Sea Level Rise Damage and Vulnerability Assessment: The Case of Greece, International Perspectives on Global Environmental Change, Young, S. (Ed.), pp. 375 – 398, InTech, Available at: <a href="http://www.intechopen.com/books/international-perspectives-on-global-environmental-change/linking-sea-level-rise-damage-and-vulnerability-assessment-the-case-of-greece">http://www.intechopen.com/books/international-perspectives-on-global-environmental-change/linking-sea-level-rise-damage-and-vulnerability-assessment-the-case-of-greece</a> ). (Dimitris Damigos, Mining and Metallurgical Engineering, NTUA, Greece) (GREECE)	Space considerations preclude citing all relevant work. Note that we do not attempt to be exhaustive in this section but only trying to illustrate the four points about study considerations.
681	69429	17	21	3	21	3	Watkiss, 2011b --> 2011b is not in reference list, 2011 is (NETHERLANDS)	The reference was added in the revised draft
682	69430	17	21	6	21	6	Lemper et al., 2006 --> not in reference list (NETHERLANDS)	The reference was added in the revised draft
683	84562	17	21	8	21	16	The section (and chapter) ends quite abruptly. What are conclusions that can be drawn based on the selected studies and the comparison in Table 17-4? Do these studies provide numerical results that can be presented and evaluated? It would be very useful to provide such details and an evaluation of the confidence in those estimates. (Michael Mastrandrea, IPCC WGII TSU)	The chapter has been reorganized to address this point.
684	69431	17	21	15	21	15	[Table 17-4] Butt and McCarl (2006) --> should be Butt, McCarl and Kergna (2006) (NETHERLANDS)	The reference was corrected in the revised draft
685	69432	17	21	15	21	15	[Table 17-4] Sutton et al. (2013) --> not in reference list (NETHERLANDS)	The reference was added in the revised draft
686	69433	17	21	15	21	15	[Table 17-4] Neumann et al. (2010a) --> which 2010? (NETHERLANDS)	The reference was clarified in the revised chapter
687	69434	17	21	15	21	15	[Table 17-4] Margulis (2011) --> should be Margulis et al. (2011) (NETHERLANDS)	The reference was modified in the revised chapter
688	63255	17	21	15	21	16	Table 17-4: First row, second column "... In the face of climate ..." Is there the word "change" missing? (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	This was corrected in the revised draft
689	74067	17	21	18	21	18	A concluding or research needs section would be extremely helpful to included here. (UNITED STATES OF AMERICA)	The chapter has been reorganized to address this point.
690	65438	17	21	19	21	19	The answers to the FAQs should be more concise (John Hay, University of the South Pacific)	Text was edited in the revised chapter.
691	74068	17	21	19	22	31	There are several important points made in the FAQs that do not appear earlier in the text. In general, the FAQs should not make new points but instead distill the answer to these questions from the chapter itself. Specifically, lines 31-41 on p. 21 in FAQ 17.1 need to be discussed in the chapter. The response to FAQ 17.2 is much more well written than the same point made in the main text and therefore could be used to replace the muddled main text. Lines 13-21 on p. 22 - the response to FAQ 17.3 - also should appear in the main text. (UNITED STATES OF AMERICA)	We have tried to align the FAQs and the main text of the chapter as much as possible.
692	81259	17	21	21	0	0	FAQ 17-1 The answer is too theoretical. It will be helpful if the language is simplified and examples are provided to illustrate measures (may or may not be climate change related) that maximise an objective function, least cost solution that keeps probable losses to an acceptable level, and solutions which meet some criteria of minimum acceptable benefits across a range of scenarios. (Monalisa Chatterjee, IPCC WGII TSU)	In this FAQ, we intended to dwell on the economic tools that the chapter has identified as being useful in aiding decision-making under uncertainty.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
693	65437	17	21	21	21	21	The "effectiveness" of adaptation, rather than the "effects" of adaptation (John Hay, University of the South Pacific)	We decided to keep the original formulation to allow for different types of effects, which can be positive or negative.
694	71391	17	21	21	21	41	FAQ 17.1 speaks to the objective of this chapter or the fundamental question about the rationale of having this chapter under the "Adaptation" section. This suggests incorporating this part into the "Background" section in the beginning to help situate the chapter in the whole document. (CANADA)	Thank you for the suggestion. The revised formulation of the background provides a much clearer basis of the chapter and its contribution. The revision also situates the chapter in the broader framework of AR5 WG2 (see 17.1).
695	82772	17	21	21	21	41	Given the last paragraph of the answer to this question, it might be helpful to provide a more nuanced view on any potential limitations of these methods. (Katharine Mach, IPCC WGII TSU)	This and the preceding paragraphs are attempt to highlight the limitations in brief.
696	63256	17	21	21	22	31	FAQ section is very nice for bring economics back into the broader decision making context. (Johannes Förster, Helmholtz Centre for Environmental Research - UFZ)	Thank you for the positive comment.
697	74069	17	21	28	21	28	Expected value may not be an appropriate decision criterion for low-probability, catastrophic events. (UNITED STATES OF AMERICA)	We highlight later in the FAQ the limitations of assigning specific values to all outcomes, which is a weakness of portfolio approaches. In this case, we agree alternatives are needed.
698	74070	17	21	33	21	33	Please clarify that by "acceptable" you mean a pre-defined or agreed upon level. (UNITED STATES OF AMERICA)	This refers to agreed upon levels.
699	65456	17	21	38	0	38	Please provide references. (Nicole Glanemann, University of Hamburg)	Text was edited in the revised chapter.
700	81260	17	21	43	0	0	FAQ 17-2 A relevant FAQ that is answered in the first paragraph. It is not clear how paragraphs 2 (highlighting a framework to include issues like equity?) and 3 (highlighting economic approaches that provide the scope for including different value systems?) contribute towards answering the FAQ. Authors may consider explaining it explicitly. Paragraph 2 discussion may be too technical for a wider community. The issue of attaching monetary values to non-market impacts (benefits and shortcomings) is a relevant topic and could be potentially addressed in a separate FAQ. (Monalisa Chatterjee, IPCC WGII TSU)	The FAQ has been revised and is now more explicit.
701	65439	17	21	43	21	44	Add subsistence economies (John Hay, University of the South Pacific)	We decided to keep the original questions as the suggested category can fall within those already in the existing formulation.
702	74071	17	22	1	22	2	If you use "noneconomic" then please define what exactly you mean by this. Otherwise may be better to replace with "with both economic efficiency and distributional factors being taken into consideration". (UNITED STATES OF AMERICA)	The chapter decided to keep the "non-economic" aspect open to avoid characterising objectives as either efficiency or distributional. That would also introduce terminology that would need definitions and simplifications.
703	81261	17	22	11	0	0	FAQ 17-3 The answer has too many technical details. The scope of the FAQ and the answer needs to be simplified for a wider audience. Authors should avoid providing a list of options. The comparison of what can be implemented in the context of developed and developing countries is a good approach however it is not explicit in the answer. (Monalisa Chatterjee, IPCC WGII TSU)	The chapter has revised this FAQ to make it simpler, and has added some illustrations.
704	65440	17	22	11	22	11	The instruments used rather than the way they are deployed (John Hay, University of the South Pacific)	We have changed the formulation of the question.
705	69435	17	22	34	38	7	Reference list is 1) incomplete with respect to the references that are used in the main text , 2) inconsistent regarding the reference formats 3) not in the right alphabetic sequence, 4) Including a lot of typing errors, 5) containing a lot of references that are not being used in the text at all. Example 1: Page 22 line 36, year 2009 is in blankets and followed by a full stop, but line 40 year 10 is followed by a comma, line 47 year 2003 is seperated to author name by a comma and followed by a colon, line 50 year 2008 is put at the end of the sentence instead of standing after author name. Example 2: page 23 line 52 "structural safty xxx (2011) in press" is not a proper way of citing. Example 3 refers to the format of pages number written in the references: some just write the number "549-571"( page 24 line 5), some write pp.27-44 (page 24 line 14), p.232-244 (page 35 line 41), pages 5-76 (page 36 line 49). Example 4: page 36 line 50, it is better to delete "grey literature". Example 5: page 37 line 51-54, duplicated references -> delete one of this reference. (NETHERLANDS)	We have thoroughly revised references, citations and typographical erros.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
706	58629	17	24	11	24	27	In general, I have the impression that the (new?) definition of the term maladaptation complicates the matter more than it clarifies it. Defining maladaptation as an adaptive activity which brings any harm to anybody or at any point in time, it virtually encompasses all adaptation activities. Every dollar spent for one adaptation project is necessarily missing in another adaptation project, so according to the definition, would be maladaptation. The subsequent sections would stay overall correct and would be even clearer if maladaptation would be defined more narrowly, by restricting it to activities which result in an overall net increase of vulnerability. (Daniel Osberghaus, Centre for European Economic Research (ZEW))	The revised chapter now refers to maladaptation as an activity that increases vulnerability (see p11 line 44).
707	69436	17	36	53	36	53	The exact title of the article in a published version is: Inter-temporal... (NETHERLANDS)	We have revised references to the chapter.
708	58627	17	39	0	0	0	Table 17-2: It would be good to include a column "Spatial coverage" (Global or only developing countries?) (Daniel Osberghaus, Centre for European Economic Research (ZEW))	That is a useful suggestion. It was difficult to get much more instructive information than is already in column 4.
709	62715	17	39	0	0	0	Table 17-2; The adaptation costs depend strongly on the World Bank reports. The world bank reports are not peer-reviewed papers. This is out of the principle of the IPCC reports. The descriptions should be deleted. Otherwise, a note that the estimates are not based on peer-reviewed papers should be clearly described at least. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	The World Bank reports were not published in a peer-reviewed journal, but they were peer-reviewed, including by external peer reviewers. They are also recognized as representing the current state-of-the-art in this field, which as we point out in the text is quite a nascent field which requires improvement before the estimates can be considered reliable.
710	74072	17	39	0	0	0	Table 17-1: This table is inappropriate in its use of the term "eligible" adaptation. This seems quite policy prescriptive and should be struck. The table also suggests that adaptation can reduce the risk of climate change and climate variability. But this is false. Adaptation cannot affect the probability that a large destructive hurricane will hit a particular location or that sea level rise will occur. Adaptation can only change the damages associated with climate change and climate variability. (UNITED STATES OF AMERICA)	We discuss in the text that there is no conclusive definition, and only quote this table from the literature to illustrate what the literature says. The text also presents other considerations from a burden sharing perspective.
711	74073	17	39	0	0	0	Table 17-2: Please note what year dollars are being shown in column 2. Also please explain what "time frame" means in this table -- the amount that will have to be spent in the specified year only, or by that year? (UNITED STATES OF AMERICA)	From the given sources, we have not been able to go into such detail for all sources.
712	74074	17	39	0	0	0	Table 17-3: Please explain how the check marks are being used in the table. (UNITED STATES OF AMERICA)	The check marks are now explained in the revised chapter.
713	80461	17	39	0	0	0	Table 17-3 needs a caption or discussion in the text - otherwise it is unclear what it is trying to convey. (Robert Heilmayr, Stanford University)	Table is now referenced in the text.
714	82773	17	39	0	0	0	Table 17-1. Further opportunities for expanding this table could be helpful. For example, where do calculated adaptation costs fall in terms of the categories here? Beyond eligible adaptation, is it possible to characterize adaptation more broadly across developed and developing country contexts? (Katharine Mach, IPCC WGII TSU)	We bring additional considerations from the literature from the point of view of what could be financed, without taking the risk of being prescriptive.
715	82774	17	39	0	0	0	Table 17-2. For these estimates, it would be beneficial to specify which focus on developing countries and which on all countries. This information could be provided in an additional column within the table. Is it possible to provide further information across the estimates as well, such as indicating which costs are optimized costs versus the costs to remove all impacts of climate change? (Katharine Mach, IPCC WGII TSU)	The revised text of the chapter now notes that the bulk of the numbers have been estimated for developing countries.
716	82775	17	39	0	0	0	Table 17-3. This table does not seem to greatly elucidate much. Further development, or at least further introduction in the caption, should be incorporated. For example, how should the check marks be interpreted? How should the descriptors under analytical coverage be interpreted? (Katharine Mach, IPCC WGII TSU)	we provide more information on the table contents, especially the check marks.
717	84563	17	39	0	0	0	Table 17-1: It appears that the examples for definitions 3 and 4 could apply to either category. Are more distinct examples available? (Michael Mastrandrea, IPCC WGII TSU)	Agreed, but we restricted ourselves to what is in the original source.
718	84567	17	39	0	0	0	Table 17-2: Please add a column to the figure indicating geographic scope for each analysis, as not all of these are global. (Michael Mastrandrea, IPCC WGII TSU)	The focus here was on the global scale.
719	80462	17	40	0	0	0	Table 17-4 should include additional columns to provide more quantitative evaluation of the geographic scale, the estimated costs, and the certainty of those estimates. (Robert Heilmayr, Stanford University)	Space considerations precluded us from adding this information.
720	82776	17	40	0	0	0	Table 17-4. For the 3rd to last and last entries within the methodology column, the start of the entries should be clarified. (Katharine Mach, IPCC WGII TSU)	Text was edited in the revised chapter.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
721	82777	17	40	0	0	0	Table 17-4. It seems this table provides rich opportunities for further development. 1st of all, what are the actual estimates made from these various studies? Across the sectors, is it possible to specify the relevant questions addressed in each sector (as they may be different)? How do the levels of confidence vary across sectors and studies? As overall context, how well do economic evaluations work at these various scales, as compared to the more problematic global cost of adaptation estimates? (Katharine Mach, IPCC WGII TSU)	We declined to add estimates because they apply only to the particular decision-making or research context of the studies, and therefore are not generalizable. The methods, however, are generalizable.
722	84564	17	40	0	0	0	Table 17-4: As commented in the corresponding text, do these studies provide numerical results that can be presented and evaluated as well? (Michael Mastrandrea, IPCC WGII TSU)	We declined to add estimates because they apply only to the particular decision-making or research context of the studies, and therefore are not generalizable. The methods, however, are generalizable.
723	78052	17	40	0	40	0	This table would be more useful if: 1. How these studies were selected was made clear 2. The actual results from the studies were discussed rather than just the methodologies. (Frances Moore, Stanford University)	We have clarified the selection of studies, but declined to add estimates/results because they are apply only to the particular decision-making or research context of the studies.
724	68283	17	41	0	0	0	Figure 17-1: The wording of "what we want to do" ("what should be done") and "what we will do" ("what will be done") suggests a very harmonious picture of adaptation decision-making. This might not be the most appropriate language. In particular, this language tends to hide crucial aspects of adaptation decision-making in contexts where adaptation involves strong, potentially violent inter-personal conflicts and distinctive inequalities of decision-making power. (Christoph Oberlack, University of Freiburg)	The concern is very much understood. We kept the terminology, assuming that the bottom part of the figure uses terminology that is technical while the top part tries to get into the shoes of the basic user.
725	70775	17	41	0	0	0	Figure 17-2. Is this figure informative and necessary to be included? If yes, write out SLR and explain more carefully what point the figure makes. As it stands out now, it is too abstract and out of context. (Anni Huhtala, Government Institute for Economic Research )	The figure has been taken out from the chapter.
726	74075	17	41	0	0	0	Figure 17.2: Suggest changing the label, "adaptation needs to cancel SLR costs" to "cost if complete adaptation occurs (cancelling all SLR costs)." (UNITED STATES OF AMERICA)	The figure has been taken out from the chapter.
727	74076	17	41	0	0	0	Figure 17-1: This figure is vague and does not provide any additional information or insight into the accompanying text. There is no logical flow or direction to the figure, other than to show that adaptation options are somehow narrowed down. However, the concepts are valuable. Therefore a better representation would be a simple x-axis, a scale, showing the full "adaptation space" and within that space the options that we will actually engage in. We will be operating in a multi-dimensional adaptation space, but unless we have axes to describe it, it doesn't make sense to show it as some sort of bull's eye. Rather, represent it on a line. Otherwise, delete. (UNITED STATES OF AMERICA)	We decided to keep the figure, but provide more description in the text, and under a revised heading, to keep it simple as it is, but informative.
728	74077	17	41	0	0	0	Figure 17-2: Unclear: Is this to be cited from Hallegatte et al (2011)? It needs a citation. (UNITED STATES OF AMERICA)	The figure has been taken out from the chapter.
729	80463	17	41	0	0	0	Figure 17-2 is difficult to interpret. There should be a more straightforward way of illustrating the use of marginal costs and benefits of adaptation action in decision-making. (Robert Heilmayr, Stanford University)	The figure has been taken out from the chapter.
730	81430	17	41	0	0	0	Figure 17-2: Figure caption requires much more cogent explanation in order for it to be comprehensible as a standalone figure. (Yuka Estrada, IPCC WGII TSU)	The figure has been taken out from the chapter.
731	81431	17	41	0	0	0	Figure 17-3: What is the take away message of this figure? The author team must include a sentence in the figure caption explaining the main message of this figure. (Yuka Estrada, IPCC WGII TSU)	This figure has been re-wroked for clarity.
732	82778	17	41	0	0	0	Figure 17-1. The caption for this figure should be expanded to clarify the chapter team's intended rationale for the conceptualization. Is there a way to incorporate outcomes of adaptation actions, their measurement and evaluation, and how this feeds back on to subsequent choices made? (Katharine Mach, IPCC WGII TSU)	We added more detail in the text to clarify the message of the figure.
733	82779	17	41	0	0	0	Figure 17-2. In addition to or in place of this figure, the chapter team should consider depicting a visualization of adaptation, mitigation, and residual costs. (Katharine Mach, IPCC WGII TSU)	A figure of this sort was added in the revised chapter.
734	84565	17	41	0	0	0	Figure 17-1: This figure would benefit greatly from a caption that explains the key points it is intended to communicate, and from then evaluating the extent to which it communicates those points clearly with the help of the graphics experts in the TSU. (Michael Mastrandrea, IPCC WGII TSU)	We added more detail in the text to clarify the message of the figure.
735	74078	17	42	0	0	0	Figure 17.3: Does it make sense to compare these two studies in this way given that they are looking at different time frames - 2030 vs. 2050? And do they have the same geographic coverage? (UNITED STATES OF AMERICA)	We believe it makes sense to compare them as both are widely cited attempts at "global" costs of adaptation.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
736	74079	17	42	0	0	0	Figure 17.3: Is this consistent with what is reported in Agrawala et al (2011) in IRERE? It looks like the costs reported here for the World Bank and UNFCCC studies are different from what is reported in their paper. Their way of presenting the information seems more informative because it shows the time path of investment as well as a developed and developing country break down. (UNITED STATES OF AMERICA)	The estimates are from the original studies.
737	82780	17	42	0	0	0	Figure 17-3. For the estimates provided, which are for 2030 versus 2050? Where sectoral estimates vary substantially, is it possible to provide further explanation within the caption or the chapter text? (Katharine Mach, IPCC WGII TSU)	We edited the figure and accompanying table to address these questions.
738	84566	17	42	0	0	0	Figure 17-3: Are these estimates for the same or different future years (e.g., 2030 vs. 2050)? Please specify in the caption. Are there additional sectoral estimates such as those described in Table 17-4 that could be used to broaden the scope of this comparison? (Michael Mastrandrea, IPCC WGII TSU)	We edited the figure and accompanying table to address these questions.