#	Ch	From Page	From Line	To Page	To Line	Comment
1	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 & polices. 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. (Labib, Mounir Wahba , Third National Communication (TNC) Project)
2	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). (Cremades, Roger, University of Hamburg)
3	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)
4	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
5	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 comparision 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 meastreaming 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 conrete 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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
6	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. \nThe 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.\nThe 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. (Afifi, Tamer, United Nations University Institute for Environment and Human Security)
7	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).\n (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
8	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, Global Environmental Change, 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, Environmental Science and Policy, 12, 832-843. Eisenack, K. (2012) Adaptation financing in a global agreement: is the adaptation levy appropriate?, Climate Policy, 12, 491-504. Fankhauser, S. & Martin, N. (2010) The economics of the CDM levy: Revenue potential,tax incidence and distortionary effects, Energy Policy, 38, 357-363. Bowen, A. (2011) Raising climate finance to support developing country action: some economic considerations , Climate Policy, 11, 1020-1036. Müller, B., 2008, International Adaptation Finance: The Need for an Innovative and Strategic Approach, Oxford Institute for Energy Studies EV 42, Oxford, UK. Horstmann, B. (2011) Operationalizing the Adaptation Fund: challenges in allocating funds to the vulnerable, Climate Policy, 11, 1066-1096.\n (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
9	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, Oldenburg Discussion Papers in Economics V – 344 – 12. Zehaie, F. (2009) The Timing and Strategic Role of Self-Protection, Environmental and Resource Economics, 44, 337-350. Ebert, U. & Welsch, H. (2012) Adaptation and Mitigation in Global Pollution Problems: Economic Impacts of Productivity, Sensitivity, and Adaptive Capacity, Environmental and Resource Economics, 52, 49-64. Barrett, S. (2008). Dikes v. windmills: Climate treaties and adaptation. John Hopkins University Discussion\nPaper. Benchekroun, H., Marrouch, W. and A. R. Chaudhuri (2011). Adaptation Effectiveness and Free-Riding Incentives in International Environmental Agreements. CentER Discussion Paper Series No. 2011-120. Ingham, A., J. Ma, and A. Ulph (2007). Climate change, mitigation and adaptation with uncertainty and learning. Energy Policy 35, 5354–5369. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
10	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, Environmental and Resource Economics, 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?, Global Environmental Change, 14, 273-282. Eisenack, K. und L. Kähler (2012) Unilateral emission reductions can lead to Pareto improvements when adaptation to damages is possible, Oldenburg Discussion Papers in Economics V – 344 – 12. 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. Ingham, A., J. Ma, and A. Ulph (2007). Climate change, mitigation and adaptation with uncertainty and learning. Energy Policy 35, 5354–5369. Fankhauser & Soare (2013) An economic approach to adaptation: illustrations from Europe, Climatic Change, 118, 367-379. Osberghaus, D.; Dannenberg, A.; Mennel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, Environment and Planning C, 28, 834-850. Aakre, S. & Rübbelke, D. T. G. (2010) Adaptation to Climate Change in the European Union: Efficiency vs. Equity Considerations, Environmental Policy and Governance, 20, 159-179. 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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
11	17	0	0	0	0	Much literature on adaptation in integrated assessment models has appeared. This deserves an own section. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
12	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 sufficently explored / tested. This comment refers to both practical decision making and to scientific research. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
13	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. (Parry, Martin, Imperial College)
14	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)
15	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. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
16	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) (Huhtala, Anni, Government Institute for Economic Research)
17	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)
18	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)

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19	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)
20	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)
21	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)

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22	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.\nAddressing 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)
23	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
24	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)
25	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)
26	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)
27	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 CCIAV, 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., Goria, A., Karakaya, E., Tol, R. (2011), Methodological aspects of recent\nclimate 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\nwithin 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.ress.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 (Perrels, Adriaan, Finnish Meteorological Institute FMI)
28	17	0	0	0	0	Both very balanced, comprehensive and clear (partly table overloaded, but text clear) (Schwarze, Reimund, Helmholtz Leipzig)
29	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)
30	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)

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31	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)
32	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. (Heilmayr, Robert, Stanford University)
33	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. (Chatterjee, Monalisa, IPCC WGII TSU)
34	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. (Mach, Katharine, IPCC WGII TSU)
35	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. (Mach, Katharine, IPCC WGII TSU)
36	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. (Mach, Katharine, IPCC WGII TSU)
37	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. (Mach, Katharine, IPCC WGII TSU)
38	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. (Mach, Katharine, IPCC WGII TSU)
39	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. (Mach, Katharine, IPCC WGII TSU)

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40	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? (Mach, Katharine, IPCC WGII TSU)
41	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. (Mach, Katharine, IPCC WGII TSU)
42	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. (Mach, Katharine, IPCC WGII TSU)
43	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. (Mastrandrea, Michael, IPCC WGII TSU)
44	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? (Mastrandrea, Michael, IPCC WGII TSU)
45	17	0	0	0	0	It goes on forever. Who cares? (Gray, Vincent, Climate Consultant)

#	Ch	From Page	From Line	To Page	To Line	Comment
46	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 referneces 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 consitent with the original. However, where possible, I provided appropriate references that can benefit to the overall scientific credibility of the chapter. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
47	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 accuractely 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? (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
48	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. (Mach, Katharine, IPCC WGII TSU)
49	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
50	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
51	17	2	37	2	37	Are the policy goals "alernative", or simply "other policy goals"? (Hay, John, University of the South Pacific)
52	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. (Akimoto, Keigo, Research Institute of Innovative Technology for the Earth (RITE))
53	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
54	17	2	37	2	40	The full text of Ch.17 suggests that adaptation implies “synergies” between alternative policy goals, rather than “trade-offs.”\n\nFor instance, 17.4.1 and 17.4.3 explicitly describe synergies and/or possibility for synergies.\n17.3.2, 17.3.3 and 17.3.4 discuss the issue of implementation difficulties, which is far from “trade-offs.”\nThe 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.\n\nIn 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. (Oda, Junichiro, Research Institute of Innovative Technology for the Earth (RITE))
55	17	2	37	2	46	Add paragraph 17.4 as a reference\n\n (NETHERLANDS)
56	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)
57	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. (Mastrandrea, Michael, IPCC WGII TSU)
58	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.\n\n (NETHERLANDS)
59	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. (Mastrandrea, Michael, IPCC WGII TSU)
60	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. (Kheshgi, Haroon, ExxonMobil Corporate Strategic Research)
61	17	2	48	0	0	additional insight: potential barriers to eficient public adaptation through the lense 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. (Schwarze, Reimund, Helmholtz Leipzig)
62	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. (Schwarze, Reimund, Helmholtz Leipzig)

#	Ch	From Page	From Line	To Page	To Line	Comment
63	17	2	48	2	48	Economics is great, say economists (high confidence) (Tol, Richard S.J., Vrije Universiteit Amsterdam)
64	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. \n\n (NETHERLANDS)
65	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? (Mastrandrea, Michael, IPCC WGII TSU)
66	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 l 49, p 3 l 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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
67	17	2	50	2	50	Reference paragraph 17.3.7.3 does not exist, should be 17.3.6.3\n\n (NETHERLANDS)
68	17	2	51	2	51	Add paragraph 17.3.5 as a relevant reference\n\n (NETHERLANDS)
69	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 adapation. It is better if authors cite another relevant references or explain types of autonomous adaptation in more detail in 17.2.1\n\n (NETHERLANDS)
70	17	3	2	3	2	Add also reference paragraphs 17.2.1, 17.2.3 and 17.3.6.1 to this statement\n\n (NETHERLANDS)
71	17	3	3	3	4	Add paragraph 17.2.6.4 as a relevant reference\n\n (NETHERLANDS)
72	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
73	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 occassions, 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).\n\nOptimality concepts have been frequently critized 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). \n\nAs 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. \n\nThe 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 occassionally 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).\n\nReferences:\n- Adger, W.N., Arnell, N.W., Tompkins, E.L., 2005. Successful adaptation to climate change. Global Environmental Change 15, 77-86.\n- Buchanan, J.M., 1959. Positive economics, welfare economics and political economy. Journal of Law and Economics 2, 124-138.\n- Mendelsohn, R., 2006. The role of markets and governments in helping society adapt to a changing climate. Climatic Change 78, 203-215.\n- Paavola, J., Adger, W.N., 2005. Institutional ecological economics. Ecological Economics 53, 353-368.\n- Van den Bergh, J.C.J.M., 2004. Optimal climate policy is a utopia: From quantitative to qualitative cost-benefit analysis. Ecological Economics 48, 385-393. (Oberlack, Christoph, University of Freiburg)
74	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.\n\n (NETHERLANDS)
75	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\n\n (NETHERLANDS)
76	17	3	10	3	10	It would be preferable to specify what the "important inputs" are rather than just indicating that they exist. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
77	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 emphazises 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 .....".\n\n (NETHERLANDS)
78	17	3	10	3	16	Reference paragraph 17.3.7 does not exist\n\n (NETHERLANDS)
79	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? (Mastrandrea, Michael, IPCC WGII TSU)
80	17	3	14	3	15	Are there limitations to these methodologies for capturing non-monetary effects and distributional impacts that should be mentioned? (Mach, Katharine, IPCC WGII TSU)
81	17	3	18	3	25	Reference paragraph 17.4.4 does not exist\n\n (NETHERLANDS)
82	17	3	20	3	20	I believe that "…co benefits" should be written as "co-benefits", i.e., with a hyphen. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
83	17	3	21	3	21	Delete „ancilliary 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.; Mennel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, Environment and Planning C, 28, 834-850.). (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
84	17	3	25	3	25	17.4.4 should be 17.4.1 here. (Mastrandrea, Michael, IPCC WGII TSU)
85	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 (Pauw, Willem Pieter, German Development Institute (DIE))
86	17	3	27	3	30	Maybe add that adaptation is a long-term process, whereas the private sector usually operates on the shorter term. (Pauw, Willem Pieter, German Development Institute (DIE))
87	17	3	27	3	31	Even though the statement is correct, the reasons for public action are not explicitly presented in the main text.\n\n (NETHERLANDS)
88	17	3	27	3	34	You're too timid. Public action also includes removing subsidies and barriers to trade, migration, investment. (Tol, Richard S.J., Vrije Universiteit Amsterdam)
89	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. (Duan, Juqi, National Climate Center, Chinese Meteorological Administration)
90	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
91	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 chagne. These should be separated into their own paragraphs for clarity, or at the very least, ideas 1 and 2 should be separated from 3. (Moore, Frances, Stanford University)
92	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. (Mastrandrea, Michael, IPCC WGII TSU)
93	17	3	28	3	28	Please rephrase "the public goods nature of knowledge".\n\n (NETHERLANDS)
94	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. (Mach, Katharine, IPCC WGII TSU)
95	17	3	31	0	0	You could write instead, "Such instruments include … " unless this list is truly exhuastive. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
96	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)
97	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) adjustement of environmental and market regulation, (iii) review of liability rules. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
98	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? (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
99	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:\nhttp://www.imf.org/external/np/pp/eng/2013/012813.pdf (UNITED STATES OF AMERICA)
100	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)
101	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". \n\n (NETHERLANDS)
102	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 (Hay, John, University of the South Pacific)
103	17	3	36	3	43	Paragraph 17.4 is not relevant\n\n (NETHERLANDS)
104	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)
105	17	3	38	0	0	The term "kinship networks" is definitely outside of my vernacular. Is this something you could describe parenthetically? (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
106	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. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)

#	Ch	From Page	From Line	To Page	To Line	Comment
107	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)
108	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 exeption.\n\n (NETHERLANDS)
109	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)
110	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.\n\n (NETHERLANDS)
111	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.' \n\n (NETHERLANDS)
112	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)
113	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. (Mastrandrea, Michael, IPCC WGII TSU)
114	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)
115	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. (Mastrandrea, Michael, IPCC WGII TSU)
116	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). (Moore, Frances, Stanford University)
117	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." (Mach, Katharine, IPCC WGII TSU)
118	17	3	50	3	50	It's unclear why estimates would depend on value judgements. This statement should be substantiated. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
119	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 (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
120	17	3	50	3	52	Reference paragraphs 17.3.10 and 17.3.11 do not exist\n\n (NETHERLANDS)
121	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
122	17	3	51	3	52	What consequences for adaptation funding are meant? Please specify. (Mastrandrea, Michael, IPCC WGII TSU)
123	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. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
124	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. (Pauw, Willem Pieter, German Development Institute (DIE))
125	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. (Mastrandrea, Michael, IPCC WGII TSU)
126	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)
127	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? (Mastrandrea, Michael, IPCC WGII TSU)
128	17	4	17	0	0	Section 17.1\nHere (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. (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)
129	17	4	22	4	22	Adger et al., 2007 not in reference list --> should be Adger et al., 2003 or Adger et al., 2006\n\n (NETHERLANDS)
130	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. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
131	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 poignent 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. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
132	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 adapation 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. (Glanemann, Nicole, University of Hamburg)
133	17	4	23	3	24	„Benefits of early action are greater than the costs of inaction“: Please provide references! (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
134	17	4	23	4	24	This "key message" is not clearly formulated. Benefits of early action are not easily comparable to costs of inaction. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
135	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
136	17	4	23	4	24	Please provide a source(s) for this statement. (UNITED STATES OF AMERICA)

#	Ch	From Page	From Line	To Page	To Line	Comment
137	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. (Mach, Katharine, IPCC WGII TSU)
138	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? (Mastrandrea, Michael, IPCC WGII TSU)
139	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)
140	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
141	17	4	30	4	32	Assumptions involved in economic valuation are well presented and critically reflected (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
142	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)
143	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. (Moore, Frances, Stanford University)
144	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
145	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)
146	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 wonderfull with some more in-depth discussionto boost the value added of the chapter/section (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)

#	Ch	From Page	From Line	To Page	To Line	Comment
147	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)
148	17	4	38	0	0	If maladaptation is meant as the increase of vulnerability as a result of adaptation, the arguement 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. Environment and Planning C: Government and Policy, 28, 834–850. doi:10.1068/c09179j (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
149	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) (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
150	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
151	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)
152	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). Efficient Adaptation to Climate Change. Climatic Change, 45, 583–600. (Moore, Frances, Stanford University)
153	17	4	44	0	0	Section 17.2.1. More citation should be provided for all statements in this section and its subsections. (Mach, Katharine, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
154	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). The role of the government in adaptation to climate change. Environment and Planning C: Government and Policy, 28, 834–850. doi:10.1068/c09179j and Gawel, E., Heuson, C., & Lehmann, P. (2012). Drivers of and barriers to public adaptation to climate change – An investigation of drivers and barriers from a Public Choice perspective. Leipzig, Germany. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
155	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)
156	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
157	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
158	17	4	46	5	3	Public goods: Consider defining what they are or make sure a definition is in cluded in the glossary (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
159	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 (Michaelowa, Axel, University of Zurich)
160	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? (Pauw, Willem Pieter, German Development Institute (DIE))
161	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" http://www.degruyter.com/view/j/jbca.2013.4.issue-1/jbca-2012-0008/jbca-2012-0008.xml> Moore, Mark A. / Boardman, Anthony E. / Vining, Aidan R. (UNITED STATES OF AMERICA)
162	17	4	51	5	3	Please supply the bullet points with examples and references. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
163	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). (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
164	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
165	17	4	51	5	3	under provision of information on future climate risks should be included (UNITED STATES OF AMERICA)
166	17	4	54	4	54	I guess you mean „externalities“ here. Please use this term for precision. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
167	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 (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
168	17	5	6	0	20	Should "international agreements" be mentioned here? (Huhtala, Anni, Government Institute for Economic Research)
169	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
170	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)
171	17	5	6	5	16	These bullet points were very helpful for understanding as a non-economist. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
172	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". (Moore, Frances, Stanford University)
173	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. (Warner, Koko, United Nations University - Institute for Environment and Human Security)
174	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
175	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
176	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)
177	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 incomparison 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. (Warner, Koko, United Nations University - Institute for Environment and Human Security)
178	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 (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
179	17	5	27	5	27	Jacoby et al., 2011 not in reference list\n\n (NETHERLANDS)
180	17	5	28	5	28	Fankhauser and Tol, 1995 not in reference list\n\n (NETHERLANDS)
181	17	5	30	5	30	Hallegatte and Dumas, 2008 not in reference list\n\n (NETHERLANDS)
182	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
183	17	5	38	5	53	This section and the related figure are extremely confued. The first paragraph seems to be making a distinctions 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, impractibility 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. Tehcnical and Physical limits describe the suite of possible adaptations options 2. Values and priorities combined with economic constraints define the suite of desireable adaptation options 3. Implementation constraints define the suite of possible adaptation options. (Moore, Frances, Stanford University)
184	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)
185	17	5	41	5	41	complete adaptation is a subjective goal. Suggest to revise the language. (UNITED STATES OF AMERICA)
186	17	5	47	5	53	Figure 17-1 is described via a sommation of 5 stages. However, the figure shows only 4 stages. \n\n (NETHERLANDS)
187	17	5	47	5	53	Figure 17-1 should be re-drawn. The text should be bended to fit within the circle\n\n (NETHERLANDS)
188	17	5	53	5	53	adoption should be "adaptation." (UNITED STATES OF AMERICA)
189	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)
190	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)
191	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. (Heilmayr, Robert, Stanford University)
192	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 (Moore, Frances, Stanford University)
193	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)
194	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)
195	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] (Backus, George, Sandia National Laboratories)

#	Ch	From Page	From Line	To Page	To Line	Comment
196	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)
197	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 exisiting 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 activites are needed that are cost-effective and can cope with this challlenge 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 investmenting 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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
198	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. (Mastrandrea, Michael, IPCC WGII TSU)
199	17	6	17	6	17	(needs a reference) --> remember to put a reference here\n\n (NETHERLANDS)
200	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. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)

#	Ch	From Page	From Line	To Page	To Line	Comment
201	17	6	17	6	17	The missing reference must be supplied. (Mach, Katharine, IPCC WGII TSU)
202	17	6	18	0	0	In this context, I am unclear what multilateral and bilateral adaptation funds are. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
203	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. (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
204	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)
205	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)
206	17	6	35	6	46	It would be interesting if references to literature analysing experience from current practice could be included. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
207	17	6	46	6	46	Agrawala, 2008 --> should be Agrawala and Fankhauser, 2008\n\n (NETHERLANDS)
208	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)
209	17	6	51	6	51	Stern, 2006\n\n (NETHERLANDS)
210	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)
211	17	6	54	6	54	Does "and capability" belong here? The previous sentence did not discuss capability. (UNITED STATES OF AMERICA)
212	17	6	54	7	1	Statement needs reference\n\n (NETHERLANDS)
213	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)
214	17	7	1	7	3	Please provide a reference for these sentences. (UNITED STATES OF AMERICA)
215	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)
216	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
217	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)
218	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)
219	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)
220	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)
221	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. (Schwarze, Reimund, Helmholtz Leipzig)
222	17	7	17	7	23	Another question: What degree of oversight is conducted, from deployment to decommisioning, of internationally-funded adaptation programs and who is resposible for monitoring and evaluating their short- and long-term efficacy? (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
223	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)
224	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)
225	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
226	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)
227	17	7	34	0	0	Section 17.2.3\nThe relationship of mitigation and adaptation is very relevant to the formation of international environmental agreements.\n\nRefer to:\n\nBarrett, S. (2008): Dikes v. Windmills. Climate Treaties and Adaptation. John Hopkins University Discussion Paper.\nBuob, S. And S. Siegenthaler (2011): Does adaptation hinder self-enforcing international environmental agreements? In Proceedings of EAERE 2011 conference.\nEbert, U. and H.~Welsch (2012): Adaptation and mitigation in global pollution problems: Economic\nimpacts of productivity, sensitivity, and adaptive capacity. Environmental and Resource Economics.\nZehaie, F. (2009): The timing and strategic role of self-protection. Environmental and Resource Economics. (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)
228	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 hetereogenous interests. All these actors/groups obviously have incentives to influence the (political) decison 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 inves-tigation 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. (Schwarze, Reimund, Helmholtz Leipzig)
229	17	7	38	7	39	Should be specified which adaptation strategies compete with mitigation and food production (example)\n\n (NETHERLANDS)
230	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
231	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)
232	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)
233	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)
234	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.\nThe figure given (figure 17-2) does not link physical adaptation to adaptation costs, therefore it shows little without further information.\n\nAlso refer to:\nTulkens, 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. (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
235	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) "Migitation, 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.\n (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
236	17	7	45	8	13	Adaptaion cost should be considered in view of damage cost according to B/C. Japanese government counts B/C for investment fo 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 hydaulic 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. \nAlmost developed counties shift from hard infrastructures for disaster risk to soft countermeasures such as early warning system, hazard map distribution and so on. (Kazama, So, Tohoku University)
237	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. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
238	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)
239	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). (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
240	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)
241	17	8	1	8	13	More detail on the specifics of these studies would be helpful here. (UNITED STATES OF AMERICA)
242	17	8	10	8	10	This should be De Bruin et al. (2009b) -- the modeling paper (UNITED STATES OF AMERICA)
243	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)
244	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)
245	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 …." (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)

#	Ch	From Page	From Line	To Page	To Line	Comment
246	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)
247	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. apropriate adaptation discussion). After defining the adaptation amount, one could go the step further and discuss costs and benefits. This sequence is not clear. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
248	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
249	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
250	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) (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
251	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)
252	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.\nMention the difficulty of separating adaptation costs from damages. Also refer to adaptation that does not only reduce damages but exploits benefits from climate change. (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)
253	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. (Moore, Frances, Stanford University)

#	Ch	From Page	From Line	To Page	To Line	Comment
254	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
255	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)
256	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. (Mastrandrea, Michael, IPCC WGII TSU)
257	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)
258	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 inccured 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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
259	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
260	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)

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261	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 (Michaelowa, Axel, University of Zurich)
262	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)
263	17	8	34	8	34	Dessai and Hulme, 2007 not in reference list\n\n (NETHERLANDS)
264	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 insequirity and could ultimately lead to human insecurity, which could be exacerbated by the effects of climate change (Younus, 2010). (Younus, Md, Lecturer, School of the Environment, Flinders University, Research Fellow, Adelaide University, South Australia)
265	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
266	17	8	37	9	36	There are three methodological considerations that are not mentioned in this section, but should be: 1)\t 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.\n2)\tClimate 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)\tThe 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)

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267	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 benfits in the methodology and model discussion). (Perrels, Adriaan, Finnish Meteorological Institute FMI)
268	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
269	17	8	39	8	47	I would take a more current conceptual approach here to describing "Data Quality and Quantity". (Hernandez, Rebecca R., Stanford University / Carnegie Institution for Science)
270	17	8	41	8	41	Data gaps apply to benefits as well as costs of adaptation. (UNITED STATES OF AMERICA)
271	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)
272	17	8	46	8	47	Please provide a reference for this statement. (Mastrandrea, Michael, IPCC WGII TSU)
273	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.\n\n (NETHERLANDS)
274	17	8	50	9	11	Are more studies/references available? (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
275	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? (Huhtala, Anni, Government Institute for Economic Research)
276	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. \n\n (NETHERLANDS)
277	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)
278	17	9	2	9	3	Please provide a reference for this statement. (Mastrandrea, Michael, IPCC WGII TSU)
279	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 (Michaelowa, Axel, University of Zurich)
280	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)
281	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"\n\n (NETHERLANDS)
282	17	9	8	9	9	Mechler and Bouwer, 2013 is not mentioned in the list of references (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)

#	Ch	From Page	From Line	To Page	To Line	Comment
283	17	9	8	9	9	Mechler and Bouwer, 2013 not in reference list\n\n (NETHERLANDS)
284	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)
285	17	9	8	9	11	Are there results that illustrate the points being made here? Please unpack this discussion. (Mastrandrea, Michael, IPCC WGII TSU)
286	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)
287	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
288	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)
289	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 (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
290	17	9	16	9	36	The specific link of discount rate and adaptation (costs, policy decisions) should be explained more extensively. (GERMANY)
291	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)
292	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\n\n (NETHERLANDS)
293	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 IRERE for a discussion of this point. (UNITED STATES OF AMERICA)
294	17	9	17	9	17	Baum, 2009 not in reference list\n\n (NETHERLANDS)
295	17	9	17	9	17	Beltratti, Chichilnisky and Heal xxx --> should be Chichilnisky, Beltratti and Heal, 1998\n\n (NETHERLANDS)

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296	17	9	19	9	19	Please provide reference to the Stern Review (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
297	17	9	19	9	19	The estimates in the Stern review are high not only in relative, but also in absolute terms.\n\n (NETHERLANDS)
298	17	9	19	9	23	A proper citation should be provided for the Stern review referenced on lines 19 and 23. (Mach, Katharine, IPCC WGII TSU)
299	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)
300	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)
301	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)
302	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)
303	17	9	23	9	23	Stern --> should be Stern (2006)\n\n (NETHERLANDS)
304	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. (Huhtala, Anni, Government Institute for Economic Research)
305	17	9	26	9	26	Reference not correctly stated\n\n (NETHERLANDS)
306	17	9	26	9	26	Guesnerie (2004) not in reference list\n\n (NETHERLANDS)
307	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)
308	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)
309	17	9	28	9	28	Arrow et al., 2012 not in reference list\n\n (NETHERLANDS)
310	17	9	28	9	28	The Arrow et al. 2012 reference is missing in the references. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
311	17	9	28	9	28	This should be Arrow et al 1996. (Mastrandrea, Michael, IPCC WGII TSU)
312	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? (Huhtala, Anni, Government Institute for Economic Research)
313	17	9	30	9	30	Weitzman (2007) --> should be Weitzman (2009)\n\n (NETHERLANDS)
314	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)
315	17	9	32	9	32	Heal (2012) not in reference list\n\n (NETHERLANDS)
316	17	9	35	9	36	Repetition of sentences/message in comparison with lines 26-28 but with other reference source\n\n (NETHERLANDS)
317	17	9	39	0	0	Section 17.2.7: Also refer to Chapter 10 (Section 10.9.2.2). (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)
318	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"\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
319	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! (Warner, Koko, United Nations University - Institute for Environment and Human Security)
320	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)
321	17	9	45	9	45	Butt et al., 2005 not in reference list\n\n (NETHERLANDS)
322	17	9	45	9	45	Strzepek et al., 2010 not in reference list\n\n (NETHERLANDS)
323	17	9	45	10	14	Section 17.2.4 is about the interrelationships between adaptation costs and residual damage, but only offers some vaious definitions (lines 41-47). The examples in lines 1 - 13 on page 10 do provide additional insights on the relationshiops 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 livehoods, 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. (Warner, Koko, United Nations University - Institute for Environment and Human Security)
324	17	9	46	9	46	Samet, 2009 not in reference list\n\n (NETHERLANDS)
325	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.\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
326	17	9	49	9	51	Please provide references to specific chapter sections to support these statements. (Mastrandrea, Michael, IPCC WGII TSU)
327	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 paragrapfh. The last sentence would benefit from some sort of explanation and reference. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
328	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)
329	17	9	49	9	54	bring out more clearly that development could lead to maladaptation (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
330	17	9	53	0	54	Please specify why 'better protection creates increased vulnerability to extreme events'. (Glanemann, Nicole, University of Hamburg)
331	17	9	54	9	54	Burby, 2001 --> should be Burby et al., 2001\n\n (NETHERLANDS)
332	17	9	54	9	54	Hallegatte, 2012 not in reference list\n\n (NETHERLANDS)
333	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. (Pinninti, Krishna Rao, Rutgers University)
334	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...) (Schwarze, Reimund, Helmholtz Leipzig)
335	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)
336	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.\n (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
337	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. (Oberlack, Christoph, University of Freiburg)
338	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? (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
339	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)
340	17	10	11	10	12	One may try to cancel all impacts…status quo -> This statement needs a reference.\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
341	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)
342	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 .) (Pechan, Anna, University of Oldenburg)
343	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)
344	17	10	18	10	18	IPCC SREX, Ch 8 --> USE Chapter 8 and a year should be added\n\n (NETHERLANDS)
345	17	10	20	10	20	Hallegatte et al., 2011c --> reference list does not make a distinction between 2011c.\n\n (NETHERLANDS)
346	17	10	23	10	23	Beltratti, Chichilnisky and Heal xxx --> should be Chichilnisky, Beltratti and Heal, 1998\n\n (NETHERLANDS)
347	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
348	17	10	27	10	35	Are there any new findings on transaction costs, etc. that could be included here? (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
349	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)
350	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)
351	17	10	29	10	31	The conslusion made in this paragraph lacks substance from adaptation literature (Pechan, Anna, University of Oldenburg)
352	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. (Pechan, Anna, University of Oldenburg)
353	17	10	35	10	35	Jaffe et al., 2004 not in reference list\n\n (NETHERLANDS)
354	17	10	38	10	38	A more appropriate heading would be „Market failures, regulatory barriers and adjustment costs“ (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
355	17	10	38	10	38	adjustment costs-> the first letter of each word should be capitalized \n\n (NETHERLANDS)
356	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 (Moore, Frances, Stanford University)
357	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
358	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 asymmetrym, market power etc.) (see 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 .). (Pechan, Anna, University of Oldenburg)
359	17	10	40	10	46	There are more potential market failures involved (see, e.g. Osberghaus, D.; Dannenberg, A.; Mennel, T. & Sturm, B. (2010) The role of the government in adaptation to climate change, Environment and Planning C, 28, 834-850. Aakre, S. & Rübbelke, 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 markt failures that exist independently from climate change, but may be exacerbated by climate change. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
360	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. (Cheong, So-Min, University of Kansas)
361	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)
362	17	10	45	10	45	Tierney, 1997 --> should be Tierney, 1995\n\n (NETHERLANDS)
363	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
364	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.\n\n (NETHERLANDS)
365	17	10	54	10	54	Muendler, 2010 not in reference list\n\n (NETHERLANDS)
366	17	10	54	10	54	Last sentence is not substantiated. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
367	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. (Mastrandrea, Michael, IPCC WGII TSU)
368	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)
369	17	11	5	0	8	What about the role of information, social norms and nudges? (Huhtala, Anni, Government Institute for Economic Research)

#	Ch	From Page	From Line	To Page	To Line	Comment
370	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)
371	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
372	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)
373	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? (Huhtala, Anni, Government Institute for Economic Research)
374	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?\n\n (NETHERLANDS)
375	17	11	7	11	8	The link to adaptation could be spelled out. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
376	17	11	7	11	8	Have there been studies since 1985 on this topic that should also be cited? (Mastrandrea, Michael, IPCC WGII TSU)
377	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. (Pechan, Anna, University of Oldenburg)
378	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.) (Pechan, Anna, University of Oldenburg)
379	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)
380	17	11	14	11	14	Gillingham et al., 2009 not in reference list\n\n (NETHERLANDS)
381	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 (http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18639&FromSearch=Y&Publisher=1&SearchText=macroeconomics%20of%20climate%20change&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description) (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)
382	17	11	21	11	21	CMEPSP, 2009; OECD, 2009; Heal, 2012 not in reference list\n\n (NETHERLANDS)
383	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
384	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)
385	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)
386	17	11	25	11	25	Fussel, 2012 --> should be Fussel et al., 2012\n\n (NETHERLANDS)
387	17	11	25	11	25	World Bank, 2012 not in reference list\n\n (NETHERLANDS)
388	17	11	28	11	30	It should be clarified which complementary policies the authors are talking about\n\n (NETHERLANDS)
389	17	11	34	11	34	Brown and Heal, 1979 not in reference list\n\n (NETHERLANDS)
390	17	11	34	11	34	Atkinson and Stiglitz, xxxx --> should be Atkinson and Stiglitz, 1980\n\n (NETHERLANDS)
391	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 (Michaelowa, Axel, University of Zurich)
392	17	11	36	11	36	Kanbus, 2010 not in reference list\n\n (NETHERLANDS)
393	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.\n\n (NETHERLANDS)
394	17	11	38	11	38	why do you write "we"? (Pechan, Anna, University of Oldenburg)
395	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)
396	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)
397	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. (Plattner, Gian-Kasper, IPCC WGI TSU)
398	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)
399	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)
400	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. (Mach, Katharine, IPCC WGII TSU)
401	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. (Mastrandrea, Michael, IPCC WGII TSU)
402	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." (Mach, Katharine, IPCC WGII TSU)
403	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. (Mastrandrea, Michael, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
404	17	11	52	11	54	These statements should be coordinated with chapter 14, with cross-references provided. (Mach, Katharine, IPCC WGII TSU)
405	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 .) (Pechan, Anna, University of Oldenburg)
406	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.\n (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
407	17	12	1	12	1	at the time should be "at the time of decision making" \n\n (NETHERLANDS)
408	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)
409	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)
410	17	12	8	12	41	In this chapter only cost-benfit analysis or CB-based analysis is mentioned. Other criteria of decision making e.g. implementability, cost-effectiveness, felxibility are left out. Furthermore the problematic issue of relatively certain costs but uncertain benefits of adaptation measures is not discussed. (Pechan, Anna, University of Oldenburg)
411	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 comprare 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.\n\n (NETHERLANDS)
412	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)
413	17	12	9	0	0	The uncertainty of future projections for surface air temperature changes\nover Japan by three Bayesian probabilistic frameworks is quantifed in the following article: \nIshizaki, 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 (Nakaegawa, Toshiyuki, Meteorological Research Institute)
414	17	12	10	12	10	New and Hulme, 2006 not in reference list\n\n (NETHERLANDS)
415	17	12	11	12	13	To clarify which risk-aversion measure\n\n (NETHERLANDS)
416	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)
417	17	12	17	12	21	It should be acknolwedged 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, decsions 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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
418	17	12	19	12	19	Squire and van der Tak, 1975 not in reference list\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
419	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: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/02/01/000333038_20110201000150/Rendered/PDF/565630REV0ESW010Policy01Jan13112011.pdf; World Bank (2009). Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects, Guidance Note 7, Annex 12. Environment Department. Available at: http://climatechange.worldbank.org/climatechange/content/note-7-evaluate-adaptation-economic-analysis; 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)
420	17	12	23	12	26	The first sentence annouce both decision delay and option value issues, but the rest of the paragraph refers uniquely to decision delay.\n\n (NETHERLANDS)
421	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. (Mastrandrea, Michael, IPCC WGII TSU)
422	17	12	24	12	24	Henry, 1974; Arrow and Fisher, 1974 not in reference list\n\n (NETHERLANDS)
423	17	12	26	12	26	Heal and Kristrom, 2003 --> should be Heal and Kristrom, 2001\n\n (NETHERLANDS)
424	17	12	29	12	29	Kunreuther et al., 2012 not in reference list\n\n (NETHERLANDS)
425	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.\n\n (NETHERLANDS)
426	17	12	31	12	31	Gilboa, 2010 not in reference list\n\n (NETHERLANDS)
427	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". (Moore, Frances, Stanford University)
428	17	12	31	12	31	Instead of "does constitute" it seems the author team may mean "does not constitute." (Mach, Katharine, IPCC WGII TSU)
429	17	12	32	12	32	Henry and Henry, 2002; Millner et al., 2010; Kunreuther et al., 2012 not in reference list\n\n (NETHERLANDS)
430	17	12	37	12	37	Lempert and Schlesinger, 2000 not in reference list\n\n (NETHERLANDS)
431	17	12	37	12	37	Ranger et al, 2010 --> Should be Ranger et al., 2011; Hallegatte et al., 2012 --> should be another year\n\n (NETHERLANDS)

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432	17	12	40	12	40	why do you write "we"? (Pechan, Anna, University of Oldenburg)
433	17	12	41	12	41	What does this disadvantage imply? Further elaboration here would be useful. (Mastrandrea, Michael, IPCC WGII TSU)
434	17	12	44	13	2	Critcal categories of non-market costs and benefits are missing here that must be disccussed. These include human morbidity and mortality and the loss of culture, heritage and soveriegnty particularly in the context of arctic warming and SLR. (Moore, Frances, Stanford University)
435	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 mor 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 system s 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

#	Ch	From Page	From Line	To Page	To Line	Comment
435.2	17	12	44	13	2	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 climte 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. (Warner, Koko, United Nations University - Institute for Environment and Human Security)
436	17	12	44	13	17	Please consider developing those two important sections. (NORWAY)
437	17	12	46	12	46	Acronym CBA should be introduced already in paragraph 17.3.6.2\n\n (NETHERLANDS)
438	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 decsion 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 usuful 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 synthesisof the approach, conclusions and recommendations of TEEB. URL: http://www.teebweb.org/publications/teeb-study-reports/synthesis/ (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
439	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)
440	17	12	50	12	50	Provision of cultural ecosystem services\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
441	17	12	51	12	52	The references for MEA, 2005, and TEEB, 2010 are missing in the list of references. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
442	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 scietific 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: http://www.teebweb.org/publications/teeb-study-reports/foundations/ (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
443	17	12	52	12	52	TEEB, 2010; Bateman et al., 2011 not in reference list\n\n (NETHERLANDS)
444	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).\n\n (NETHERLANDS)
445	17	12	53	12	53	There is a typo: it should read "scarce" and not "scare" (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
446	17	12	53	12	53	why do you write "we"? (Pechan, Anna, University of Oldenburg)
447	17	12	53	12	53	resources are scares --> should be changed to "scarce"; "CBAs" --> should be "CBA"\n\n (NETHERLANDS)
448	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 lifes. (Pechan, Anna, University of Oldenburg)
449	17	12	53	13	2	It could be relevant to note the limitation or inaccuracyies of applying value transfer approaches that have been documented in the literature as being highly significant. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
450	17	12	54	12	54	Navrud and Ready, 2007; Brander et al., 2010 not in reference list\n\n (NETHERLANDS)
451	17	12	54	13	1	Not clear what will be the benefits of adaptation measures.\n\n (NETHERLANDS)
452	17	13	2	13	2	Add brackets around "2004"\n\n (NETHERLANDS)
453	17	13	5	13	17	This a section on Multi-Criteria Analysis. Please give some study results as examples. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
454	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. (Perrels, Adriaan, Finnish Meteorological Institute FMI)
455	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? http://epress.anu.edu.au/agenda/016/03/pdf/whole.pdf (AUSTRALIA)
456	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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
457	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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
458	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)
459	17	13	8	13	9	Clarify importance of what?\n\n (NETHERLANDS)
460	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)
461	17	13	10	13	11	MCA is also difficult to undertake where data is limited. (Pechan, Anna, University of Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
462	17	13	13	13	17	The Difficulties of weighting and comparability when doing MCAs should be mentioned here, (Pechan, Anna, University of Oldenburg)
463	17	13	23	13	23	Do these ancillary effects have to be unintended? (Mastrandrea, Michael, IPCC WGII TSU)
464	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. (Kaehler, Leonhard, Carl von Ossietzky Universitaet Oldenburg)
465	17	13	29	13	47	This section should be integrated with 17.2.1.2 (Moore, Frances, Stanford University)
466	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. (Mastrandrea, Michael, IPCC WGII TSU)
467	17	13	33	13	34	There are studies showing also that some drought-resistant crops have much lower productivity under normal conditions\n\n (NETHERLANDS)
468	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)
469	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. (Cremades, Roger, University of Hamburg)
470	17	13	41	13	42	Add reference to this bullet statement\n\n (NETHERLANDS)
471	17	13	45	13	45	al,2005 --> needs a space before 2005\n\n (NETHERLANDS)
472	17	13	47	13	47	mitigation , improve --> delete the space before the comma\n\n (NETHERLANDS)
473	17	13	53	13	54	The statement should refer to the law of equimarginal returns\n\n (NETHERLANDS)
474	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)
475	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)\n\n (NETHERLANDS)
476	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)
477	17	14	2	14	4	The given example and reference are highly context-specific.\n\n (NETHERLANDS)
478	17	14	2	14	6	Change sentence: "Viguie an Hallegate (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)
479	17	14	4	14	4	Viguie and Hallegatte (2011) --> should be Viguie and Hallegatte (2012)\n\n (NETHERLANDS)
480	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. (Cremades, Roger, University of Hamburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
481	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. (Mastrandrea, Michael, IPCC WGII TSU)
482	17	14	9	14	9	mitigation and/ or other aspects of development\n\n (NETHERLANDS)
483	17	14	12	14	13	The phrase is an oxymoron: if marginal returns are equal, it implies the equality of marginal rates.\n\n (NETHERLANDS)
484	17	14	13	14	13	Starret, 1998 --> should be Starret, 1988\n\n (NETHERLANDS)
485	17	14	16	14	27	There seems to be a link to and possibly slight repitition with section 17.2.2. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
486	17	14	16	14	27	Section 17.4.3 could cross reference chapter 20, which deals more extensively with adaptation and devleopment 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 develpoment pathways? O´Brien 2012 was really the one stand-out article that was both relevant and current. (Warner, Koko, United Nations University - Institute for Environment and Human Security)
487	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)
488	17	14	25	14	25	Kellenberg and Mobarak, 2008 not in reference list\n\n (NETHERLANDS)
489	17	14	26	14	26	climate mitigation policies are now approached…\n\n (NETHERLANDS)
490	17	14	26	14	26	World Bank, reference needs year; UN, reference needs further clarification (UN-what?)\n\n (NETHERLANDS)
491	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.) (Huhtala, Anni, Government Institute for Economic Research)
492	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)
493	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 marked 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. http://dx.doi.org/10.1787/5k8zm3gxxmng-en (GERMANY)
494	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 l44 – p5 l 20. Reconsider the subheadings. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
495	17	14	30	18	9	This section is really interesting and draws more extensively on the latest literature than the preceding sections. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
496	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 (Perrels, Adriaan, Finnish Meteorological Institute FMI)
497	17	14	32	14	39	Here is some repetition in relation to p 5 l 6 – p 5 l 20. Please merge / harmonize these sections. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
498	17	14	32	14	39	As further instruments I would add the provision of local public goods and the internalisation of externalities. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
499	17	14	35	14	35	Agrawala and Fankhauser, 2010 --> should be Agrawala and Fankhauser, 2008\n\n (NETHERLANDS)
500	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)
501	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)
502	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 (Michaelowa, Axel, University of Zurich)
503	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 (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
504	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)
505	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)
506	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\n\n (NETHERLANDS)
507	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\n\n (NETHERLANDS)
508	17	14	48	14	48	National Round Table on the Environment and the Economy, 2012 not in reference list\n\n (NETHERLANDS)
509	17	14	52	14	52	Aakre et al., 2010 --> should be Aakre et al., 2009\n\n (NETHERLANDS)
510	17	15	1	15	2	In 2010 globally about 30% of …were insured --> needs Linnerooth-Bayer et al., 2011 as reference\n\n (NETHERLANDS)
511	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.\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
512	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)
513	17	15	4	15	4	The sentence introduces direct and indirect effects of insurance-related instruments, whereas the previous paragrapgh (lines 44 p.14 to line 2 p. 15) has already spoken of different aspects of direct effects.\n\n (NETHERLANDS)
514	17	15	4	15	29	Too little attention is paid to the moral hazard which is only mentionned in one sentence while it poses a real problem in insurance area\n\n (NETHERLANDS)
515	17	15	7	15	7	Hoeppe and Gurenko, 2006 --> should be Hoppe and Gurenko, 2006\n\n (NETHERLANDS)
516	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)\n\n (NETHERLANDS)
517	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 beacause of expectations of high insurance compensation on case of disaster.\n\n (NETHERLANDS)
518	17	15	13	15	13	Kunreuther and Michel-Kerjan, 2009 not in reference list\n\n (NETHERLANDS)
519	17	15	13	15	13	Kunreuther --> add year to reference\n\n (NETHERLANDS)
520	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)
521	17	15	19	15	19	World Bank, 2007 not in reference list\n\n (NETHERLANDS)
522	17	15	20	15	20	Linerooth-Beyer and Mechler, 2011 --> should be Linerooth-Beyer, Hochrainer and Mechler, 2011\n\n (NETHERLANDS)
523	17	15	23	15	23	Kunreuther et al., 2009 not in reference list\n\n (NETHERLANDS)
524	17	15	27	15	27	Kunreuther 1996 is not the appropriate reference for moral hazard. Bring an old and orginial reference, or no reference. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
525	17	15	27	15	27	Kunreuther, 1996 --> Should be Kunreuther, 1998\n\n (NETHERLANDS)
526	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 (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
527	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)
528	17	15	29	15	29	Please use an orginal reference to the Samaritan's Dilemma, Gibson, Andersson, Ostrom, Shivakumar (2005) The Samaritan's Dilemma: The Political Economy of Development Aid, Oxford University Press. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
529	17	15	32	15	52	This subsection covers less than the similar aspects considered in p 15 l 32-49 and p 5 l 6-20. Please harmonize and please extend here. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
530	17	15	32	15	52	Please supply more references to this subsection. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
531	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 introductive part for section 17.5. (CANADA)
532	17	15	34	15	43	Citations should be provided in support of these statements. (Mach, Katharine, IPCC WGII TSU)
533	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.\nReference:\nB. Smit, 2011, Adaptation to climate change in the context of sustainable development and equity;\nK. Bruin, 2011, An economic analysis of adaptation to climate change under uncertainty;\nM. Stadelmann, et.al, 2012, Equity and cost-effectiveness of multilateral adaptation finance – are they friends or foes?\n (CHINA)
534	17	15	34	15	52	The section on Incentives design needs to be expanded (Nair, Malini, Indian Institute of Science)
535	17	15	47	15	47	In order to provide completely meningful 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. (Cremades, Roger, University of Hamburg)
536	17	15	49	15	49	Roy, 2000 not in reference list\n\n (NETHERLANDS)
537	17	15	50	15	52	Source of the statement should be specified\n\n (NETHERLANDS)
538	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. (Duan, Juqi, National Climate Center, Chinese Meteorological Administration)
539	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)
540	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). (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
541	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)
542	17	16	3	16	3	PPPs have gained popularity since the 90s, thus not so long ago\n\n (NETHERLANDS)
543	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?\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
544	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? (Pauw, Willem Pieter, German Development Institute (DIE))
545	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)
546	17	16	15	16	15	Please clarify how ES can contribute to adaptation\n\n (NETHERLANDS)
547	17	16	15	16	15	Daily (1997) --> reference not in reference list\n\n (NETHERLANDS)
548	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
549	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)
550	17	16	16	16	16	Heal (2000) --> should be Heal et al. (2001) or Heal (2009)\n\n (NETHERLANDS)
551	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?\n\n (NETHERLANDS)
552	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)
553	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] (Locatelli, Bruno, CIRAD-CIFOR)
554	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 (Schultz, Karl, The Higher Ground Foundation)
555	17	16	30	16	30	PES schemes they offer --> delete "they"\n\n (NETHERLANDS)
556	17	16	30	16	30	Butzengeiger-Geyer et al., 2011; Schultz, 2012 --> references not in reference list\n\n (NETHERLANDS)
557	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)\n\n (NETHERLANDS)
558	17	16	31	16	31	Please explain more extensively what "Payments for Environmental Services" means for adaptation. (GERMANY)

#	Ch	From Page	From Line	To Page	To Line	Comment
559	17	16	31	16	31	Chishakwe et al. (2011) --> should be Chishakwe et al. (2012)\n\n (NETHERLANDS)
560	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)
561	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). (Perrels, Adriaan, Finnish Meteorological Institute FMI)
562	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
563	17	16	37	16	53	The section on resource pricing needs to be expanded (Nair, Malini, Indian Institute of Science)
564	17	16	40	16	40	Adler (2009) --> should be Adler (2008)\n\n (NETHERLANDS)
565	17	16	42	16	44	Source of this statement should be specified\n\n (NETHERLANDS)
566	17	16	44	16	44	household sector instead of domestic sector (domestic suggests national or country-level)\n\n (NETHERLANDS)
567	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)
568	17	16	53	16	53	...pricing, (Griffin, 2012) --> delete the comma after pricing\n\n (NETHERLANDS)
569	17	17	2	17	2	Title mentions Land Taxes, but the text covers other types of taxes only\n\n (NETHERLANDS)
570	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"). (Pueyo, Salvador, Institut Català de Ciències del Clima (IC3))
571	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. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
572	17	17	7	0	0	taxes (not axes) over subsidies (Huhtala, Anni, Government Institute for Economic Research)
573	17	17	7	17	7	...for axes over subsidies... --> axes should be changed to taxes\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
574	17	17	7	17	7	Axes should be "taxes." (Mastrandrea, Michael, IPCC WGII TSU)
575	17	17	9	17	9	...resources at below… --> delete preposition at\n\n (NETHERLANDS)
576	17	17	10	17	10	The most obvious example here would be fossil fuel-based energy sources rather than hydro… (Mastrandrea, Michael, IPCC WGII TSU)
577	17	17	11	17	11	better priced should be"optimally priced." (UNITED STATES OF AMERICA)
578	17	17	11	17	12	Source of this statement should be specified\n\n (NETHERLANDS)
579	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)
580	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.\n\n (NETHERLANDS)
581	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)
582	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)
583	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)
584	17	17	28	17	28	Fischhoff et al., 1978; Slovic, 1997 --> not in reference list\n\n (NETHERLANDS)
585	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)
586	17	17	33	17	33	Weber et al., 2004 --> not in reference list\n\n (NETHERLANDS)
587	17	17	33	17	33	under-optimal should be "sub-optimal." (UNITED STATES OF AMERICA)
588	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. (Mach, Katharine, IPCC WGII TSU)
589	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)
590	17	17	38	17	38	Christensen et al. (2011) --> not in reference list\n\n (NETHERLANDS)
591	17	17	38	17	38	Reference to Christensen, 2011, is missing in the list of references. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
592	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\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
593	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)
594	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)
595	17	17	41	17	42	Dutz and Sharma, 2012 --> in reference list (p.26 l.4-5) as Dutz and Sharma, 2102\n\n (NETHERLANDS)
596	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.\n\n (NETHERLANDS)
597	17	17	49	17	49	IPR should be explained in full form before it is abbreviated\n\n (NETHERLANDS)
598	17	17	50	17	50	Should be specified that we talk about improved/ drought-resistant/ genetically modified seeds\n\n (NETHERLANDS)
599	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? (Heilmayr, Robert, Stanford University)
600	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\n\n (NETHERLANDS)
601	17	18	1	18	9	This section seems to contain only general statements derived from the theoretical literature, but no paper that explictly study adaptation. Please improve the references with respect to innovation for adaptation. (Eisenack, Klaus, Carl von Ossietzky University Oldenburg)
602	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))\n\n (NETHERLANDS)
603	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)
604	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)
605	17	18	12	18	12	The costs of adaptation should always be considered along side the value of the impacts that would be avoided (Hay, John, University of the South Pacific)
606	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)
607	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. (Olhoff, Anne, UNEP Risø Centre on Energy, Climate and Sustainable Development)
608	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
609	17	18	15	0	0	what is the second level of costing? (Schwarze, Reimund, Helmholtz Leipzig)
610	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 2010 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.\nA 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)
611	17	18	21	19	8	Somewhere in this section it would be helpful to point out different definitons 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. (Moore, Frances, Stanford University)
612	17	18	22	18	27	Please insert adaptation funding needs by developing countries as estimated by the organizations mentioned in this paragraph. (CHINA)
613	17	18	24	18	24	World Bank, 2006 --> should be another year\n\n (NETHERLANDS)
614	17	18	24	18	24	UNDP, 2007 --> should be UNDP, 2008\n\n (NETHERLANDS)
615	17	18	24	18	24	UNFCCC, 2008 --> not in reference list\n\n (NETHERLANDS)
616	17	18	24	18	25	The estimates have been done for developed countries too.\n\n (NETHERLANDS)
617	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). (Moore, Frances, Stanford University)
618	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 then $100 billion in 2050 (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
619	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"\n\n (NETHERLANDS)
620	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. (Mastrandrea, Michael, IPCC WGII TSU)
621	17	18	26	0	0	Is this $75 or $75 billion? (UNITED STATES OF AMERICA)
622	17	18	26	0	26	Please check the numbers. The lower number is $70 in the table. (Glanemann, Nicole, University of Hamburg)

#	Ch	From Page	From Line	To Page	To Line	Comment
623	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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
624	17	18	26	18	26	Instead of 75-100 billion, the table seems to support a range of 70-100? (Mach, Katharine, IPCC WGII TSU)
625	17	18	29	0	0	Please revise table 17.2, adding one column to list the adaptation financial needs by developing countries. (Duan, Juqi, National Climate Center, Chinese Meteorological Administration)
626	17	18	31	18	31	Please add reasons why IPCC considers only a low confidence. (GERMANY)
627	17	18	31	18	31	IPCC (2012) --> should be IPCC (2011)\n\n (NETHERLANDS)
628	17	18	31	18	31	World Bank (2006) --> not in reference list\n\n (NETHERLANDS)
629	17	18	33	18	33	UNDP (2007) --> should be UNDP (2008)\n\n (NETHERLANDS)
630	17	18	34	18	34	World Bank (2010a) --> in reference list not determined which reference is 2010a\n\n (NETHERLANDS)
631	17	18	34	18	34	Please introduce the acronym for investment and financial flows (used on the next page without introduction). (Mastrandrea, Michael, IPCC WGII TSU)
632	17	18	39	18	39	The described "seeming convergence" is not all that apparent in the table. (Mach, Katharine, IPCC WGII TSU)
633	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. (Mastrandrea, Michael, IPCC WGII TSU)
634	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)
635	17	18	44	18	45	Add detail on the specific types of costs omitted from adaptation cost estimates. (UNITED STATES OF AMERICA)
636	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\n\n (NETHERLANDS)
637	17	18	50	18	52	Figure could be in higher quality, the crosses are very small. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
638	17	18	51	18	52	Reference Parry et al. (2009) should be mentioned in the table\n\n (NETHERLANDS)
639	17	19	1	19	1	The practical challenges…. Are apparent in the literature --> Which literature? References are missing\n\n (NETHERLANDS)
640	17	19	11	0	0	Sect. 17.6.2: Make a true claim that there is a convergence of numbers. But is 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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
641	17	19	13	19	13	inform --> should be underpin/justify\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
642	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. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
643	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)
644	17	19	18	19	19	Assessments have predominantly been conducted in a developed country context' while table 17.4 shows as leasts as many local studies focused on a developing country as local studies with a focus on developed countries\n\n (NETHERLANDS)
645	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. (Mach, Katharine, IPCC WGII TSU)
646	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. \n\n (NETHERLANDS)
647	17	19	21	19	22	Figure 17-3: The tickmarks should be qualified. What is the meanting of one, two or three tickmarks? What is the scale? 1-3, with 1 being low and 3 tickmarks being high? (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
648	17	19	26	19	26	What is a I&FF methodology? (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
649	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 associeted 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. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
650	17	19	26	19	26	Acronym I&FF not specified (Investment and Financial Flows?)\n\n (NETHERLANDS)
651	17	19	32	19	32	World Bank (2010b, 2010c, 2010d) --> in reference list not specified which of 2010 are b, c, and d\n\n (NETHERLANDS)
652	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".\n\n (NETHERLANDS)
653	17	19	33	19	33	This study is over what time frame? (UNITED STATES OF AMERICA)
654	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)
655	17	19	34	19	34	Elbehri et al. (2011) --> Not in reference list\n\n (NETHERLANDS)
656	17	19	37	0	0	17.6.3 Selected studies on sectors and regions. This is a very good methodogy overview that is very welcome as it helps to understand the differences in assessment approaches. However these descriptions belong rather to the methodolgy selection and what is needed here are the economic results that could be well related to the approaches and their constraints. (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)

#	Ch	From Page	From Line	To Page	To Line	Comment
657	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. http://www.eea.europa.eu/publications/adaptation-in-europe (Kentarchos, Anastasios, European Union DG Research, Directorate Environment Climate Change & Environmental Risks Unit)
658	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. www.nyserda.ny.gov (UNITED STATES OF AMERICA)
659	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)
660	17	19	44	19	50	It would be helpful to point out here that differenc 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). (Moore, Frances, Stanford University)
661	17	19	44	20	29	The text can be improved by clearer separating the two approaches. Perhaps including subheadings on "Economietric approach" and "Simulation approach". (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
662	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\n\n (NETHERLANDS)
663	17	19	48	19	48	Schlenker et al. (2005) --> differs from year in reference list\n\n (NETHERLANDS)
664	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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
665	17	19	49	19	49	Not clear: Effect of climate on which impacts?\n\n (NETHERLANDS)
666	17	19	49	19	49	Seo and Mendelsohn (2008) --> 2008a, 2008b or 2008c\n\n (NETHERLANDS)
667	17	20	3	20	3	Schlenker et al., 2005 --> year is not correct with reference in reference list\n\n (NETHERLANDS)
668	17	20	3	20	49	Dinar and Mendelsohn, 2011 --> not in reference list\n\n (NETHERLANDS)
669	17	20	7	20	42	Further citations should be provided for these statements. (Mach, Katharine, IPCC WGII TSU)
670	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? (Mastrandrea, Michael, IPCC WGII TSU)
671	17	20	18	20	18	Schlenker et al., 2005 --> year is not correct with reference in reference list\n\n (NETHERLANDS)
672	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\n\n (NETHERLANDS)
673	17	20	29	20	29	Dinar and Mendelsohn, 2011 --> not in reference list\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
674	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)
675	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 adatpation studies. See comment on page 18 line 21. (Moore, Frances, Stanford University)
676	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)
677	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 (Moore, Frances, Stanford University)
678	17	20	49	20	49	Lempert and Kalra, 2009 --> not in reference list\n\n (NETHERLANDS)
679	17	20	54	20	54	World Bank, 2010 --> which 2010?\n\n (NETHERLANDS)
680	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: http://www.intechopen.com/books/international-perspectives-on-global-environmental-change/linking-sea-level-rise-damage-and-vulnerability-assessment-the-case-of-greece). (Dimitris Damigos, Mining and Metallurgical Engineering, NTUA, Greece) (GREECE)
681	17	21	3	21	3	Watkiss, 2011b --> 2011b is not in reference list, 2011 is\n\n (NETHERLANDS)
682	17	21	6	21	6	Lemper et al., 2006 --> not in reference list\n\n (NETHERLANDS)
683	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. (Mastrandrea, Michael, IPCC WGII TSU)
684	17	21	15	21	15	[Table 17-4] Butt and McCarl (2006) --> should be Butt, McCarl and Kergna (2006)\n\n (NETHERLANDS)
685	17	21	15	21	15	[Table 17-4] Sutton et al. (2013) --> not in reference list\n\n (NETHERLANDS)
686	17	21	15	21	15	[Table 17-4] Neumann et al. (2010a) --> which 2010?\n\n (NETHERLANDS)
687	17	21	15	21	15	[Table 17-4] Margulis (2011) --> should be Margulis et al. (2011)\n\n (NETHERLANDS)
688	17	21	15	21	16	Table 17-4: First row, second column "... In the face of climate ..." Is there the word "change" missing? (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
689	17	21	18	21	18	A concluding or research needs section would be extremely helpful to included here. (UNITED STATES OF AMERICA)
690	17	21	19	21	19	The answers to the FAQs should be more concise (Hay, John, University of the South Pacific)
691	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)

#	Ch	From Page	From Line	To Page	To Line	Comment
692	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. (Chatterjee, Monalisa, IPCC WGII TSU)
693	17	21	21	21	21	The "effectiveness" of adaptation, rather than the "effects" of adaptation (Hay, John, University of the South Pacific)
694	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)
695	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. (Mach, Katharine, IPCC WGII TSU)
696	17	21	21	22	31	FAQ section is very nice for bring economics back into the broader decsision making context. (Förster, Johannes, Helmholtz Centre for Environmental Research - UFZ)
697	17	21	28	21	28	Expected value may not be an appropriate decision criterion for low-probability, catastrophic events. (UNITED STATES OF AMERICA)
698	17	21	33	21	33	Please clarify that by "acceptable" you mean a pre-defined or agreed upon level. (UNITED STATES OF AMERICA)
699	17	21	38	0	38	Please provide references. (Glanemann, Nicole, University of Hamburg)
700	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. (Chatterjee, Monalisa, IPCC WGII TSU)
701	17	21	43	21	44	Add subsistence economies (Hay, John, University of the South Pacific)
702	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)
703	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. (Chatterjee, Monalisa, IPCC WGII TSU)
704	17	22	11	22	11	The instruments used rather than the way they are deployed (Hay, John, University of the South Pacific)
705	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 "structual 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.\n\n (NETHERLANDS)

#	Ch	From Page	From Line	To Page	To Line	Comment
706	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 neccessarily 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. (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
707	17	36	53	36	53	The exact title of the article in a published version is: Inter-temporal…\n\n (NETHERLANDS)
708	17	39	0	0	0	Table 17-2: It would be good to include a column "Spatial coverage" (Global or only developing countries?) (Osberghaus, Daniel, Centre for European Economic Research (ZEW))
709	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. (Akimoto, Keigo, Research Institute of Innovative Technology for the Earth (RITE))
710	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)
711	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)
712	17	39	0	0	0	Table 17-3: Please explain how the check marks are being used in the table. (UNITED STATES OF AMERICA)
713	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. (Heilmayr, Robert, Stanford University)
714	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? (Mach, Katharine, IPCC WGII TSU)
715	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? (Mach, Katharine, IPCC WGII TSU)
716	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? (Mach, Katharine, IPCC WGII TSU)
717	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? (Mastrandrea, Michael, IPCC WGII TSU)
718	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. (Mastrandrea, Michael, IPCC WGII TSU)
719	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. (Heilmayr, Robert, Stanford University)

#	Ch	From Page	From Line	To Page	To Line	Comment
720	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. (Mach, Katharine, IPCC WGII TSU)
721	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 very 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? (Mach, Katharine, IPCC WGII TSU)
722	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? (Mastrandrea, Michael, IPCC WGII TSU)
723	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. (Moore, Frances, Stanford University)
724	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. (Oberlack, Christoph, University of Freiburg)
725	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. (Huhtala, Anni, Government Institute for Economic Research)
726	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)
727	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)
728	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)
729	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. (Heilmayr, Robert, Stanford University)
730	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. (Estrada, Yuka, IPCC WGII TSU)
731	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. (Estrada, Yuka, IPCC WGII TSU)
732	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? (Mach, Katharine, IPCC WGII TSU)
733	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. (Mach, Katharine, IPCC WGII TSU)
734	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. (Mastrandrea, Michael, IPCC WGII TSU)

#	Ch	From Page	From Line	To Page	To Line	Comment
735	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)
736	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)
737	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? (Mach, Katharine, IPCC WGII TSU)
738	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? (Mastrandrea, Michael, IPCC WGII TSU)