

Comment form for 2nd Review Phase of IPBES Deliverable 3c) Fast-track methodological assessment on scenarios and models Chapter 2 ‘Decision making’

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Thomas Brooks

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Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Full Name	What was done with the comment
1	2	General				Overall: Generally a good discussion. Suffers a little from inconsistent use of terminology and some repetition. For example in Key recommendations, use of the term ‘policy modellers’ (pg 203 line 9) and similar mash-up versions of the common terms elsewhere. A few typos were also spotted in the text.	Shane Orchard	This comment was addressed by undertaking a complete review of terminology throughout the chapter, including alteration or removal of inconsistent or unnecessary terms.

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2	2	General				<p>Chapters 2; 3; 4; 5; 6; 8: The issue of dealing with uncertainty in models and scenarios (identifying, managing, communicating) is considered in almost every chapter in an explicit and broader part (see 2.3.4, 2.4.3, 3.5, 4.6, 5.5, 6.5, 8.2.3) This causes overlaps in content. Moreover, chapter-specific aspects of uncertainty are difficult to identify.</p> <p>We propose to deal with general aspects of uncertainty only in one or two chapters. The chapter-specific aspects of uncertainty might be additionally described in other relevant chapters.</p> <p>You may also wish to consider analysing the language used in the IPCC when discussing uncertainty and elaborating further steps in dealing with uncertainty.</p> <p>The IPCC uses qualitative “levels of confidence (comprised of “levels of evidence and agreement”) and quantitative “levels of likelihood”, if possible. Please see https://www.ipcc.ch/pdf/supporting-material/uncertainty-guidance-note.pdf. Such terminology might also be helpful for IPBES.</p>	Germany	Our uncertainty section is now very short and restricted to consideration of uncertainty only where it is explicitly addressed in the context of decision support tools. In our chapter we are not specifying how uncertainty should be communicated, so the IPCC language is not particularly relevant to us. Note that this is only a chapter 2 response.
3	2	General				<p>Chapters 2; 3; 4; 5: Chapter 3, 4 and 5 treat general aspects (importance, types etc.) of models and scenarios. This causes redundancies and inconsistencies. The given conceptualisations should be adjusted and common aspects should be placed together (e.g. in chapt 2).</p>	Germany	In chapter 2 we aim to avoid any detailed description of model types, importance etc. Our aim is to document how models are used in the policy cycle under the banner of families of decision support methods and approaches. It is most appropriate that general aspects of models and scenarios be introduced in other chapters.
4	2	General				<p>GENERAL COMMENT: The case studies used in the chapter tend to be largely from North America. Was it due to absence of experts from other regions that could contribute to case studies? Having a broader representation of case studies, it might help with broadening understanding.</p>	Fundisile Mketeni	3 of 7 boxed case studies are from North America. This partly reflects the bias in published (rigorously documented and reviewed) example applications. Nonetheless, the many applications of models and decision support we document in Appendix 1 draw on a much broader geographic sample. None of our authors

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5	2	General				<p>General: This is a useful review of models and their application- but it is text heavy and could be more useful if greater use was made of tables, like table 2.3, so that users can quickly find and compare information. Imagine, if someone wanted to prepare a brief for policy makers to attract funding and support-it would take a long time to read through to find the persuasive bits. A table, like table 2.3 with the model names, short model description, and situations for its use, data needs, output types, strengths, weaknesses and supporting evidence (references) would help under subheading for model applications. The information is there, just not readily accessible or comparable.</p>	UK Government	<p>are from North America.</p> <p>Note that this is a multi-faceted comment that we have broken until several rows to ensure answers correspond to each facet.</p> <p>We have sought where possible to create appropriate summary tables and figures (see Table 2.1 and Figure 2.6 for examples).</p> <p>“A table like table 2.3 but with model names, short descriptions, etc...” While this is a good idea, we concluded that it would overlap too much with tables in chapters 3 and 4 that outline the various modeling approaches available... Our current table (now 2.3) does list decision support families, methods and now mentions explicitly the types of models that were applied...</p>
						<p>It is good to have the summaries of key findings and recommendations at the start, but it would also be good to state the aims and objectives of this chapter first, these appear sporadically in the text, eg p206 line 10-15. It would also help to give an indication of the volume of literature reviewed and search methodology, so it is clear how much was covered and limitations of the search.</p>		<p>We considered bringing the Aims and Objectives to the front – however, we believe it is necessary to first introduce the topic a little. We have tidied up all other references to aims or objectives throughout the text so that they are fully contained in the dedicated section.</p> <p>The volume of literature reviewed is immense, but the</p>

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								searches were ad-hoc, not systematic. The purpose was to draw on the expertise and diverse backgrounds of the country experts.
						<p>Care must be taken to make sure that findings do not read like recommendations. Findings are what the evidence showed. Recommendations are what to do to engage others on model and scenario use-based on the findings, and must start with action words.</p> <p>As for other chapter comments- the recommendations do not really give much for policy makers. What do you want them to do? What will they gain? Why should they use models and scenarios? What would they need to do so?</p> <p>The model needs for data input is not covered very well, the adage 'rubbish in =rubbish out' effect. Data input is crucial, and must be reliable or limitations understood which links to the management of uncertainties. There should also be some mention that for ecosystem services, we often have to rely on proxy- e.g. habitat type as we do not have ways of measuring and recording the range of ES delivered by ecosystems. The descriptions make some models appear quite static-at geographical levels-when it is also important to consider stocks and flows, particularly when working at large scales- eg county, regional, continental or global. Did the literature come across any references for stocks and flow models?</p>		<p>We have completely reworded the findings and recommendations in line with this recommendation.</p> <p>We have attempted to make our recommendations more pragmatic so that they will be of use to policy makers. However, given the diversity of readers and of contexts in which people may wish to learn more about decision support approaches, we have to walk a fine line between providing specific advice and maintaining generality so that the report is relevant to the breadth of the key audience.</p> <p>Stocks and flows models are certainly useful – they are mentioned in Chapter 3 – however, they are not a decision protocol – they are models.</p>
						The models described seem to be biased towards projections and exploration, when quite often we need simply to improve our understanding of how systems work now, or have in the past- ie advance ecological understanding to better inform projection models.		This is certainly true. However, this chapter is seeking to describe decision support frameworks – not to describe models per se (see chapters 3, 4, 5).
						There is not much to help us to appreciate sources of data, or skills and computing power required to run the models described- which could lead people into thinking that it is quite easy to		We take this comment as referring to technical demands on undertaking decision

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						download a model, put in data and get a result. The interpretation of results also needs to be discussed- users need to understand how the model works, not just some kind of black box that spits out answers to questions. This is not just about uncertainties and assumptions, but what the results mean- which is still about making choices.		support work using the methods or families of methods described in this paper. We have attempted to provide some general statements about the technical demands of certain approaches. For example, we make it clear that optimization approaches suffer from high technical demands and are often limited by the number of 'states and options' that can be considered. A detailed run down of the full technical and human demands of decision support frameworks is not possible here... Readers need to explore approaches that seem relevant to their decision context after they have been introduced to them here.
						<p>Style comments:</p> <p>The use of 'we' is inappropriate, it would be better all in passive voice otherwise it seems too much like opinions of the authors rather than a summary of the evidence.</p> <p>The use of 'sensu' - is this necessary? Just give the reference.</p> <p>Throughout the documents, there is frequent use of 'key'. It would be good to reserve this for key findings and recommendations, and be more careful in choices of words for strongly evidenced, important, common, frequent, overarching, main etc. findings/ results.</p> <p>Definitions- seem to be a problem across all the chapters- perhaps another handy chapter with a glossary would help overcome this? E.g. Direct, indirect, model, scenario etc.</p>		<p>Done. Sensu also removed. 'Key' and other useless words have been culled wherever possible.</p> <p>A 3C deliverable glossary will be provided. Definitions alignment across chapters has been attempted.</p>
6	2		32		33	delete 'On reviewing a large number of assessment and 32 decision processes, we find that a key ingredient for the'	UK Government	Done.
7	2	General				Mainly biologists consider that protecting ecosystems is a matter of societal choice and not an issue of market. They claim that taking care of ecosystem services should be a matter of policy, not of money, just like health, safe drinking water and so many others. They argue that values are extremely difficult to	Francisco Ramón Barbarán	We defer all matters relating to drivers to chapters 3, 4, and 5. This chapter is about decision support methods for achieving trade-offs.

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						<p>assess...and values tend to lose when compared to - and competing with - other drivers operating in the opposite direction, for example in Argentina, the international price of soybean. In that point, I agree with Martin (2009) “issues of economic and political governance become more critical as drivers of biological outcomes than biological criteria themselves. This is hard for biologists to swallow”.</p> <p>Is possible to separate markets from policy? Who’s paying the policy?</p> <p>The task of a government body in any country is to collect taxes, define priorities and allocate the money accordingly. To open a national park or to give subsidies to culture and nature preserving land for subsistence trapping are political decisions, paid by contributors playing a role in the market. Even when the objective to create a national park is not to make money, the opportunity cost to preserve lands suitable for agriculture is paid by the entire society: goods and taxes that should be produced by that land will not be available to pay for education, health, and other goods and services.</p> <p>The government pays for the maintenance and management of the national parks (unless they cover their costs with their own income), universities invest money in research, NGOs raise funds to develop projects and tourism entrepreneurs make investments there. So while agriculture production is rejected, other players have their opportunity to make a living with this circumstance. In consequence, the important thing here is not the environment by itself, but the business that can be made with the environment, preserving it, depleting it or using it in a sustainable way. In any circumstance there will be winners and losers....and always somebody pay.</p> <p>Who decide which priority will prevail? The result of the fight between of opposite forces like the price of commodities, the sensitivity of urban people with capacity to pressure the politic power, different lobbies for and against the agricultural production and the political and economic circumstances, no evidence based policies in most of the cases.</p> <p>Considering that, is possible to think the main challenge is to put sustainable use in the policy agenda, evolving from nice words to tangible actions on the ground, but even that is not enough in countries with weak institutions, because they don’t have implementation no monitoring power.</p>		<p>The economics governance role of governments is beyond the scope of this chapter.</p>

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						Literature Cited: Martin, R. 2009. From sustainable use to sustainable development. SASUG document. IUCN.		
8	2	200				Mapping of stakeholders and geospatial assessment should assist to identify key drivers, areas and localities important for provision of ecosystem services and their main users. Mapping of stakeholder will enable policy maker to identify the key drivers and to assess their specific interventions for land use and ecosystem services, taking into account both economic and conservation perspectives.	Norbert Francois Tchouaffe Tchiadje	Mapping of drivers of primary interest in chapters 3, 4, 5. Mapping of stakeholder will is important for setting up participatory decision making approaches. However, we are reviewing decision frameworks. Whether or not a decision is participatory or top-down is a decision context variable. We have provided a couple of references to participatory approaches that describe how stakeholders should be identified and incorporated in decision processes.
9	2	201	21	201	22	Also knowledge and education, risk management and vulnerability reduction.	Mahmood Yekeh Yazdandoost	Risk assessment is referred to in a number of the methods used here. Education is not addressed per se, other than through identifying the need for improving capacity in modeling, scenarios and decision support.
10	2	201	10	201	24	I wonder, if this chapter should not focus more on practical examples of scenarios based on modelling of biodiversity and ecosystem services which have supported or could support particular decision-making (page 232, lines 14-17), and to explore their limits in decision-making processes due to which reasons, e.g. the systemic complexity and dynamic of ecosystems and their values related to them. The whole Chapter 2 is rather theoretical and often descriptive, including mentioning different techniques, which could be shortened, but what can decision-makers practically conclude from it (see more concrete, for instance, TEEB - The Economics of Ecosystems and Biodiversity for Local and Regional Policy Makers (2010): http://www.teebweb.org/publication/teeb-for-local-and-regional-policy-makers-2/ , and pages 217, lines 1-42, 218 Box 2.3)?	Marcus Zisenis	We have attempted to distill more sharply our analysis of which methods work best in which circumstances, recognizing that almost every decision process is unique in some ways. For example, we have tried to characterize which sorts of decisions are most amenable to optimization approaches, versus those that are more amenable to deliberative or more integrated decision support approaches.

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						<p>It is also relevant to all IPBES reports to focus on what is newly concluded or proposed apart from reviewing existing ideas and methods?</p> <p>Last not least, as shorter the report is going to be (this Chapter 2 is already far too long with 233 pages in total without references), as more likely it is to be read by a wider audience.</p>		We have certainly tried to provide new insights relevant to IPBES and policy makers that go beyond what can be found in any individual existing publication. We are under our word limit of 20000 words.
11	2	201	17	201	19	Decision support approaches and assessments often utilize biodiversity and ecosystem service scenarios and models in characterising cause-effect pathways and exploring the consequences of policy, planning and management long term options, in the framework adaptive management and ecosystem approach into the wider landscapes and seascapes.	Marina Rosales Benites de Franco	We're not convinced that bringing in more detail to this very introductory material will increase clarity for readers. It is hoped that the sorts of decision approaches the reviewer has in mind here are dealt with by our decision support tool families and in our case study section.
12	2	201	28	201	30	'... a lack of willingness on the part of modellers to properly engage in real-world decision-making.' This may very well be true for some modellers, but this sounds like all modellers are in this category. Is this true?	Derek Tittensor	Clearly not. The statement is meant to highlight that not only should managers and policy makers expend effort to get more out of models and scenarios, but that modellers need to work to increase their relevance to managers and policy makers. We have softened this statement to 'some modellers'...
13	2	201	26	201	26	<p>The identified key barriers as referred to in the key findings cannot be found easily in the descriptions within chapter 2. A special section that is explicitly directed towards barriers might be useful.</p> <p>One additional barrier is that models can be too complex for users, such as policy makers, who are often non-experts. Kindly include this aspect in the key finding as well as a corresponding note where appropriate in chapter 2</p>	Germany	Good point. We have created a new subsection under 2.5 to address this directly.
14	2	201	26	-	-	Sentence starting with "We identify seven key barriers...". Suggest that authors use the third person and rephrase this and other sentences in this chapter to, for example, "seven key barriers were identified..." Another example is: "We	Fundisile Mketeni	Adopted throughout.

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						recommend....” CHANGED to “It is recommended...”		
15	2	201	29			This is a very good point. Modellers need to adapt their models not only to the needs of decision makers (as indicated), but also to international statistical standards (see reference above to SEEA Expert Forum))	Michael Bordt	Yes, this is a point worth making... seeking credibility through consistency and adherence to standards of best practice. We have acknowledged this as a gap in 2.5
16	2	201	1	12	13	‘The most appropriate decision support approach and model of biodiversity or ecosystem services to apply in any given decision depends on the decision context’ As an opening statement this needs to much clearer and punchier. The use of word ‘decision’ three times is not helpful to the non-expert eg the decision makers that might be reading this chapter.	UK Government	Simpler statement is now provided.
17	2	201	19		21	should say ' A modelling typology is presented based on a set of 16 attributes including political scale, ecological complexity, temporal scale, cultural context, complexity of governance arrangements, and types of uncertainty considered for using models in the policy cycle for agenda-setting, policy, planning and management decisions. '	UK Government	Done.
18	2	201	22		23	should say 'Decision support and assessment approaches were identified that are relevant to characteristic combinations of attributes in this typology.'	UK Government	Done.
19	2	201	26			delete we, delete key, so it reads seven barriers were identified	UK Government	Done.
20	2	201	34			change is to depends on	UK Government	Sentence altered.
21	2	201	36			delete we find that	UK Government	Done.
22	2	201	29			Another key barrier? Willingness of modelers to properly engage in participatory processes, i.e. understanding, accepting, fully integrating other knowledge traditions and translation of model outcomes to other knowledge traditions (including policy); engaging in capacity building activities before, <u>after</u> and during modeling.	Melanie Paschke	Incorporated. Good point.
23	2	201	16		16	‘policy development’ to be substitut to ‘policy design’ according others chapters	Fátima Lopes Alves	Done.
24	2	201	36	202	8	Another impediment is a lack of understanding (by the decision makers) the technical and scientific outputs from models in the way they are presented. The Scenarios geovisualization should be used often and improve in order to show how and in what way the ES functioning.	Fátima Lopes Alves	Yes. We believe that is covered by “ ...a lack of understanding and technical knowledge among decision makers to allow them to understand outputs and

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								appreciate the positive role” and then “...and communicate in a non-technical way.”
25	2	202	38	202	40	Should be more precise: For instance, one of the original ideas of IPBES was to establish a network of networks of equal decision-making fora of decision-makers, scientists, and other stakeholders, as well as the public directly and indirectly concerned (see Zisenis, M. (2015). The International Platform on Biodiversity and Ecosystem Services gets profile. <i>Biodiversity and Conservation</i> 24(1), 199-203). This would allow integrating their particular knowledge (page 211, lines 10-13) and winning their increasing support also for developing scenarios and models of biodiversity and ecosystem services in a continuously updated exchange process of practical and latest information, instead of limited top-down decisions of a certain group (see page 208, lines 15-17) of nominated “experts” by the government, particular parties or other groups in power. These common decisions of the wider scientific and stakeholders' community could serve to gather scenarios based on modelling on different scale for policy decisions also on regional and global level.	Marcus Zisenis	Yes. We have attempted to expand the interpretation of what needs to be done here ... though in the ‘key findings’ we are not able to fully incorporate this comment. We have attempted to expand on these comments in a new section in 2.5 addressing barriers to uptake of models, scenarios and decision support.
26	2	202	1	202	8	<p>of policy, planning and management processes, a lack of data or systematic data to underpin the models and scenarios of most interest to policy makers and managers, a lack of willingness on the part of modellers to engage fully in real-world decision problem and develop the most relevant scenarios and models for the problem at hand, a lack of transparency for long term policies in approaches to modelling and scenario development, and complex and biased political agendas that are not amenable to the transparency ideally associated with good modelling and scenario analysis. Increased collaboration between models and decision makers will lead to understand this matter useful in economic, social and nature secure management, will increased trust, better and more relevant models and scenarios, and a culture of decision support based on models and scenarios that is robust to complex political agendas.</p> <p>I would like to share some thoughts about this, I see that policy and managers do not use the models and scenarios since they have short term priorities on the excuse economic growth, the models or scenarios do not fit their short term interest, on behalf of economic priorities. I feel the transparency and models and scenarios shows them a tool as mechanism to their economic</p>	Marina Rosales Benites de Franco	Thank you. This is pretty much what we’re trying to say in a way that is not antagonistic to policy makers.

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						interest will be secure in long term and their well being, they will accept and start to work on this. I agree with the transparency will enhance stakeholders to manage the biodiversity and ecosystems, in the framework the stochasticity of socio-ecological systems.		
27	2	202	12	202	15	In general I agree with this statement, but the ultimate outcome of this may be a tendency to restrict the development of new and improved indicators. Therefore, while the onus should be on fulfilling the needs of policy and decision makers, care should be taken to ensure that those who develop the models and should also have input (for example, explaining why a new biodiversity metric should/could be implemented).	Derek Tittensor	Yes. Good point. Dialogue between policy and science about what is needed, not just one way (policy tells science what to do). This is now mentioned here and in section 2.4.1 ('what do we want from our models').
28	2	202	25	202	27	This sounds like uncertainties can all be addressed, whereas some level of uncertainty and unpredictability may always remain (as specified further on). Suggest weakening the phrasing here.	Derek Tittensor	Done. The comment is addressed through the references to reducibility.
29	2	202	10	202	23	Also cross-sectoral (or cross-ecosystem) linkages to demonstrate the need to move away from decision-making silos to a more holistic integrated approach to decision-makers. At the same time scenario and modelling approaches need to progress to address the systemic cross-sectoral interactions and feedbacks that lead to ES flows.	Paula A Harrison	Done – dealt with in key findings and 2.4.2 (which scenarios)
30	2	202	10	202	23	Data collection should be consistent with state of the art to ensure relevance in modern age especially in developing countries	Peter Elias	Yes. Hopefully it is understood that data collection be state of the art. However, data costs vs information gained will determine at least in part, data collection approach.
31	2	202	25	202	31	It is not only the nature of the uncertainties that is important but also the underlying factors.	Peter Elias	Yes. Do you mean underlying stochasticity?
32	2	202	33	202	40	The format for representing traditional knowledge may not be amenable for modeling tools/techniques. How do transform such important information archived in traditional systems.	Peter Elias	The need to ensure models can be converted to form amenable to traditional owners and vice-versa is recognized in key findings and recommendations.
33	2	202	33	202	41	I don't really understand this sentence "The issues of scale serve as impediments to integrating indigenous and local knowledge systems ..."	Dandan Yu	This has been changed.
34	2	202	6		8	not a finding but a suggestion or recommendation	UK Government	True. Moved to recommendations about

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								capacity building.
35	2	202	10		11	says models need to be improved- again, not a finding but a recommendation. A finding would have been that models to not currently match spatial and temporal requirements of policy makers	UK Government	Agree. Re-worded.
36	2	202	12		15	not a finding but a suggestion, the finding would be that models that were developed with policy and decision maker input were fit for purpose?	UK Government	Agree. Re-worded.
37	2.1	203	29	203	40	An explanation is missing that models differ from scenarios in being uncertain (see page 206, lines 17-22, page 235, lines 15-32), but are used to develop different scenarios for policy decisions. Models and scenarios should not be equally mentioned in the report, because they serve different functions.	Marcus Zisenis	A very good point. We have attempted to clarify the different role of models and scenarios throughout and be clear about when we are referring to one, the other, or both (where appropriate). See chapter 1 for working definitions of models and scenarios.
38	2	203	30	203	40	I strongly agree with the introduction.	Marina Rosales Benites de Franco	Thank you!
39	2	203	3	203	26	Chapter 2 has recommendations in a different format to other chapters; here, they are shorter paragraphs of 1-3 sentences. Recommendations in other chapters tend to be longer and more detailed. I prefer this format, but regardless, a consistent approach needs to be used throughout the report.	Derek Tittensor	Good point – currently with Co-chairs for decision...
40	2	203	26	203	26	(at the end). Including the use of the ILK Participatory Mechanism in order to create a dialogue between the modern science and ILK in the context of the assessment of scenarios and models for ecosystem functions and services.	Diego Pacheco	Done.
41	2	203	30	203	33	The idea of these lines are not clear. I suggest emphasizing the importance of decision-making supports	Noelia C. Calamari	We have added ‘decision support’ before ‘protocol’ to be clearer.
42	2	203	35	203	35	I suggest change the term cause-effect and use potential impacts.	Noelia C. Calamari	Impacts are different to cause-effect pathways. The effect can be an impact – but what is an impact tends to be subjective. We prefer the current text.
43	2	203	8	203	10	Please explain reference to “Facilitators”	Fundisile Mketeni	Text has been deleted.
44	2	203	14	203	17	This recommendation states: “We recommend that IPBES task force on Knowledge, Information and Data	Fundisile Mketeni	We have changed ‘collect data’ to ‘should promote data

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						engage with funding agencies to collect data targeted towards decision-making needs, at multiple organisation levels and to monitor impacts of decisions on composition, structure and function of biodiversity and ecosystem services.” This recommendation falls outside the scope or terms of references for the Knowledge and Data Task Force.		collection’.
45	2	203	30	203	31	In this sentence “To the extent that they capture sound logic...”, "they" who refer to?	Dandan Yu	They are the decision support protocols (or tools). We believe this is clear.
46	2	203				Delete all the 'we recommend', start each recommendation with action words	UK Government	Done.
47	2	203	4			remove 'take into' change consideration n to consider' insert' model typologies for policy applications in...'	UK Government	Done.
48	2	203	5			delete typology, change 'presented here' to 'given in this chapter'	UK Government	Compromised to – ‘developed in this chapter’.
49	2	203	16			funding agencies- add and data providers!	UK Government	Done.
50	2	203	22			Deliberation? What about some sort of standard setting for communicating and comparing uncertainties where possible? This is hinted at in later text.	UK Government	Agree. Done.
51	2	203	30		31	change to Decision support protocols have advantages over unaided decision-making because they capture the logic behind the decision.	UK Government	Done. Almost as recommended.
52	2	203	34			1) says policy agenda setting- what about planning and management? V) row 39 should be after 1) or you are muddling model advantages between policy applications.	UK Government	It does say agenda setting, policy and management. However, we have changed to ‘agenda setting, policy design, implementation and review.’
53	2	203	39			v) move up to line 34.	UK Government	This segment has been completely re-worked.
54	2	204	4	204	27	Different terminology on the policy cycle to the SPM and chapter 1. Can this be made consistent?	Paula A Harrison	Policy cycle terminology has been unified across chapters.
55	2.1.1 - 2.2.1	204	1	205	42	What is the main structure for the decisions making context used in this assessment? – “Agenda setting/ policy – Planning – Management” as explained in the Overview (2.1.1 p. 204 line 4- 27 or the policy cycle as described in 2.2.1 and shown in fig.2.1 (the only figure in this chapter that refers to a structure of the decisions making context).	Germany	The decision making context is described in detail in our decision making context typology. The policy cycle provides a useful way to identify what sorts of decision

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								need to be made (that can be aided by models and scenarios). The various decision support protocols all have their own 'frameworks'. It is not our intention to say which framework is 'correct' nor to impose a single framework.
56	2	204	19	204	21	The authors mention only one example about support land-use planning at multiple scales. I suggest incorporating other examples	Noelia C. Calamari	We have mentioned other examples now, but we are unable to provide significant details given the number and diversity of decision support case studies we provide.
57	2	204	42	204	42	I suggest explain "structured way" and add literature.	Noelia C. Calamari	'Structured way' removed.
58	2	204	14	204	15	I recommend just citing the MA here, for which a reasonable case can be made for it having had a key role.	Thomas Brooks	MA is cited, but the other two papers support that story.
59	2	204	1	204	27	Please add Monitoring and Evaluation as an important step in implementation of decisions and interventions. It thus needs to be defined like Policy, Planning, and Management in this section.	Fundisile Mketeni	Monitoring and evaluation is now captured under the general heading of policy review.
60	2	204	4			delete first bit-Within the relatively small scope of decisions that are made with regard to biodiversity and ecosystem services	UK Government	Done.
61	2	204	23			trivial? Management is the process of controlling things towards defined goals or desired states, and often involves interventions.	UK Government	Definitions have been largely deleted from the main text and what text remains is heavily altered. This section has been removed.
62	2	204	29			change should to could	UK Government	This text has been deleted.
63	2	204	1			misleading title- should say Overview of Policy Making and Knowledge Needs	UK Government	Title changed.
64	2	204	13			delete key- all parts of the policy cycle are equally important	UK Government	Agreed.
65	2	204	14			change key to important	UK Government	Removed.
66	2	204	26			after management is- add 'transparent',	UK Government	Done.
67	2	204	30			figure#	UK Government	Fixed.
68	2	204	30		38	Several pages in and we discover what this chapter is about- Should go at start of this section, with other information suggested, on page 201, lines 8-9	UK Government	A short statement about purpose and target audience now at front of chapter.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
69	2	204	41		42	some aims mentioned and the purpose of this document- should go up front, page 201	UK Government	Done
70	2	205	6			Please, include the stakeholder mapping before Stakeholder engagement to identify the key drivers. Determine the role of each stakeholder which will figure out in line 38 of 2.2.2	Norbert Francois Tchouaffe Tchiadje	Done.
71	2	205	38			Determine of each stakeholder here (Stakeholder Analysis matrix(SAM) could be helpful.	Norbert Francois Tchouaffe Tchiadje	Stakeholder identification now central in the policy cycle.
72	2.2.1	205	10	205	42	As Figure 2.1 shows a policy development diagram, the high overlaying common influence of lobbying is missing (see page 207, lines 5-9), which is generally based on particular interests rather than on scientific facts. However, the main focus should be as seemingly intended on which stages scenarios based on models can support the policy-making process. Thus, a different diagram would serve this intention better, because first there is a policy question with regard to biodiversity and ecosystem services. Then different scenarios can be developed based on modelling. One or parts of them are chosen for policy implementation, and the cycle starts again with adapting the scenarios to policy development and resulting questions.	Marcus Zisenis	The policy cycle has been changed and standardized across chapters. It does not explicitly include lobbying. Numerous decision frameworks are described in chapter 2.
73	2	205	10		22	cut most of this	UK Government	Cut.
74	2	205	1		6	audience- should go up front p 201. delete 'however'	UK Government	Done.
75	2	205	16			change 'our ' to 'the'	UK Government	Removed.
76	2	205	17			change plethora to many	UK Government	Done.
77	2	205	19			change representations to publications	UK Government	Done.
78	2	205	20			change to agenda setting and review (evaluation), change to policy design, formulation and planning. Consistency is needed with terminology in rest of chapter	UK Government	Now moved to agenda setting, policy design, implementation, and review – attempted to standardize throughout.
79	2	205	21			delete 'our use of' and 'particular'	UK Government	Done.
80	2.2.2	206	18	206	18	Insert after the end of the sentence: “Models most commonly do not quantify and communicate uncertainty or estimated levels of uncertainty.”	Brian Kastl	Done
81	2	206	33	206	36	In the context of policy development between nations that have bilateral or multi-lateral agreements, there must be effort to harmonize national policies in support of the transboundary interests.	Fundisile Mketeni	Yes. This is a recommendation that cannot be incorporated at this point in the text.
82	2	206	10		15	a few objectives thrown in- need these up front at start of chapter,	UK Government	Done.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						along with brief method, so we are clear on the evidence that was sought and limitations		
83	2	206	8		9	is an aim to categorize decisions impacting on biodiversity	UK Government	No. Removed. This was an error.
84	2	206	10		12	is another aim to reduce complexity and confusion-would be better to set out aims as bullets at the start?	UK Government	Yes. Done.
85	2	206	12		15	change to: Understanding the attribute of decision making and their context helps in scoping approaches to decision making, relevant tools and identifying the roles that models and scenarios can and could play.	UK Government	This section has been removed. However, this text is useful in the aims and audience section.
86	2	206	16			list the attributes of decision making- note that I have changed the order in which they are presented:1, uncertainty;2,spatila and temporal scales;3ecosystem and geographical domain;3, socila and cultural complexity;4 , governance system.	UK Government	As there are many, referring to Table 1 seems more sensible. This is now done early in this section.
87	2	206	21			change to passive voice	UK Government	Done.
88	2	206	27		29	delete, repeats what was written earlier in a different way	UK Government	Done.
89	2.2.2	207	1	207	1	It would be appreciated if the structure of table. 2.1 was more self-explaining.	Germany	The structure of Table 2.1 has changed significantly and we have attempted to clarify the attributes of the table in the caption.
90	2	207	3	207	10	What is the role of perception, local knowledge/experience?	Peter Elias	From section 2.2.1 – “Cultural norms, values, practices, ideologies and customs shape people’s understanding of their needs, rights, roles, possibilities and hence on their actions, including engagement in policy design and implementation (Borrini-Feyerabend et al. 2004)”... A new section on ‘Knowledge’, including indigenous and local knowledge (ILK) has been added.
91	2.2.2	207	1	207	1	Add a fourth in the table: “Ecosystem service model complexity” “1st order estimates → physically-based model representating levels of uncertainty”	Brian Kastl	It is not clear where in the table this would fit.
92	2	207		207		In the table on this page “Ecological complexity” and “Landscape complexity” need to be exchanged in the first column.	Axel G. Rossberg	In the new table, the new section labeled ‘Ecology’ makes better sense of these

№	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
								terms.
93	2	207	1	207	2	Table 2.1 categories in the table are not correct or so vague that do not provide any useful information. Biophysical attributes are totally limited and conceptually wrong (just one example you do not measure landscape complexity in terms of species see Wiens 1999; Wu J. and Hobbs R. 2002) Why not consider heterogeneity that is a crucial measure for biodiversity, same for several other key variables that are missing. Delete table or consider a major revision	Sandra Luque	The table has been significantly revised, including correcting the errors in the landscape/ecosystem heterogeneity sections.
94	2	207	1	207	1	I don't really understand variables in Table 2.1 . The variables in the light blue part represent "Governance attributes", the variables in the light green part represent "Biophysical attributes". Thus, what properties do variables in the light purple part represent?	Dandan Yu	Table 2.1 has been significantly altered. Hopefully the attributes are more self-explanatory.
95	2	208	25	208	26	I would like to express my disagree with this statement: The complexity associated with achieving a working adaptive management process in all but the simplest of resource management problems may be partly to blame. I think the problem is the lack of governance system interconnected between national, sub national and local scales.	Marina Rosales Benites de Franco	This statement has been deleted.
96	2.3	208	32	208	32	What is the concrete theme of section 2.3? - decision support tools/approaches in general (as lines 34 -35 might suggest) or assessments as decision support (as the headline says)?	Germany	It is an overview of decision support approaches, not a critique of assessment as a decision support approach as the heading mistakenly implied. This has been altered.
97	2	208	41	209	2	Consider cut the words 'some' and 'perhaps' from the sentence.	Fátima Lopes Alves	Done.
98	2	210				Figure 2.2. - This analysis (yielding the relationships shown between spatial scales, phase in the policy cycle and scenario type) is not supported. These might be better thought of as cross cutting considerations I believe. For example, the setting of target and objectives is clearly a process for which decision support, for the actors involved, would be important. Taking the Aichi targets as an example, the schematic depicts decision support at the opposite end of the spectrum of applicability, creating the impression that there was no decision support role for scenarios	Shane Orchard	This is a very interesting point and one on which we may differ in opinion. It is our view that there is (or should be) a role for formal decision support protocols to make the most of models and scenarios in Aichi deliberations (for example). However, we could find no evidence that such approaches to decision support

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						and models in setting these targets		were used. It is true that the models and scenarios may have been used in an ad-hoc way to help set targets, but not using structured or formal decision support approaches like those reviewed in the sections following this figure. See qualifier now at the end of the 2.2 caption.
99	2.3.1	210	11	211	8	Line 10 and 11 plus Box 2.1 are not mentioning the Common Fisheries Policy which was introduced 1982 to regulate fisheries in the region (today European Union). This means that the CFP is much older than the MSFD but biodiversity issues were and are not sufficiently addressed. However, the CFP now supports the implementation of the MSFD.	Ralf Doering	This point has been updated in the text.
100	2	210	1	210	1	<p>Include in addition the following graph referring to scenarios and models related to ILK specifically, while the other depicts scenarios of models based on modern science exclusively.</p> <p>Figure 2.2A. The relationship between spatial scales in the policy cycle considering the Aichi targets and the evaluation of collective action of ILK in the context of conservation of biodiversity.</p>	Diego Pacheco	Given space constraints we were limited to noting in the caption that mechanisms should be instituted to ensure that ILK is incorporated into the phases of decision making at different spatial scales. Our figure aims to represent what is happening, not what should be happening. That comes in later sections.

№	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
101	2	210	24	210	25	<p>The list of references “Baird et al. 1991; Baird and Milne 1981; Baird and Ulanowicz 1989” for models that underpin MSFD indicators seem to be rather narrow. Please have a look at [Piroddia et al. (2015). Using ecological models to assess ecosystem status in support of the European Marine Strategy Framework Directive. Ecological Indicators, pp. 175—191.] where models underlying MSFD indicators have been compiled and evaluated more systematically.</p>	Axel G. Rossberg	Added.
102	2	210	1	210	1	<p>I know that this isn’t intentional, but the way Fig 2.2 is developed makes it appear that GLOBIO is the only modelling approach in use at broad scales. Please balance this. It would be appropriate to add: “IUCN Red List of Threatened Species” into the centre-left</p>	Thomas Brooks	Partially adopted. See figure 2.2. Constraints on space in figure.

No	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						box for Global/Assessment; “IUCN Red List Categories & Criteria” into the bottom-left box for Global/Models + Scenarios; “European Red List” into the centre box for Regional/Assessment; “Guidelines for Application of IUCN Red List Criteria at Regional and National Levels” into the bottom-centre box for Regional/Models + Scenarios; “South African Red List” into the centre-second-from-right box for National/Assessment; and “Guidelines for Application of IUCN Red List Criteria at Regional and National Levels” into the bottom- second-from-right box for Regional/Models + Scenarios.		
103	2.3.2	211		222		Principally I like this very condensed overview of the different methods and approaches (including table 2.3 at page 229). Maybe this would go beyond the scope but on the other hand it would be interesting to mention whether or not some experiences already exist in the context of Ecosystem Service or if this would be a complete new field of application.	Werner Rolf	There is a whole chapter dedicated to ecosystem service modeling and decision making (chapter 5). We seek to minimize overlap with that chapter.
104	2	211	11			Pg 211 line 11 - some confusion introduced by the sentence “The use of national scale input data and refinement of locally relevant scenarios allows local assessment to 12 inform local policy options” unless there is an accompanying discussion on down-scaling. It might be better to drop this sentence. Within this paragraph a mention of the use of locally derived (ie. bottom up) approaches to this topic would be appropriate.	Shane Orchard	Agreed. Text now deleted, but explicit reference to down and upscaling made in the figure captions – with referral to chapter 6.
105	2	211				Pg 211 Section 2.3.2.1 - idea in the first two paragraphs could be rearranged for better flow, leading up to the section on Consequence tables. The sentence “If estimates of likelihood and consequence are unbiased, then decisions based on risk should lead to more effective allocation of resources” appears isolated ie biased to what? It could be appropriate to re-connect back to the realities of decision contexts here eg by introducing mention of the role of planning horizons in making choices / dealing with risk preference concepts.	Shane Orchard	We have maintained the sentence about efficient allocation of resources because it is central to the concept of risk. However, we have attempted to simplify the language. We have connected to the decision context at the start of the next paragraph.
106	2	211	7	211	8	The statement “All of these measures are dependent on habitat and ecosystem models as none are directly measurable at broad scales in the marine environment.” is not correct. Almost all indicators used by EU member states under Descriptors 1 and 4 derive directly from	Axel G. Rossberg	Point taken. Revised to “many measures are...”

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						monitoring data. Only minimal statistical modeling is applied in indicator computation, e.g. to fill data gaps. Process-based models are generally only used to describe pressure-state relations.		
107	2	211	21			Sub-Section 2.3.2: it is not clear how this section fits in. It is preceded by a sub-section on scenarios in agenda setting (GBO etc), and then also includes a sub-sub section on “scenario-based approaches”. The typology and hierarchy is again unclear. Perhaps the word “scenario” is being used with different connotations in each case? (a narrower sense here – scenarios done through workshops, line 36?)	David Cooper	The logic is: Section 2.3 Provides an overview of assessment and decision support approaches. The aim is to separate the role of agenda setting [2.3.1] (not decision making) from decision making [2.3.2]. We acknowledge that this is challenging. We have attempted to clarify this logic with some changed subsection headings AND a revised paragraph at the start of 2.3 that sets a roadmap for the section.
108	2	211	-	-	-	2.3.2. Families of decision support tools: There must be consistency in the way this section is developed. A number of the decision support tools have case studies but others do not. I suggest that all DSS should have a box describing a case study where such a tool was applied.	Fundisile Mketeni	Unfortunately our space requirements do not allow this. Not only do we not provide a box per decision support system (DSS), but our DSS list is far from exhaustive. This is simply an artefact of this work being a short overview, not a book. We hope that we have mentioned a large range of the available DSS throughout, but giving them all a full description and box is not possible.
109	2	211	20			Reference to Thompson et al. 2014 missing from reference list	Brenda McAfee	Added.
110	2	212				Table 2.2: In general this seems reasonable, but does it make sense to have ‘do nothing’ and ‘A1’ have ‘high’ tourism impact and ‘low’ economic impact? This seems conflicting.	Derek Tittensor	Changed economic ‘impact’ to economic ‘cost’ implying (this is a hypothetical example) that the cost is borne by whoever is implementing the options. Fits together better that way.

№	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
111	2	212	29			what are poor outcomes?	UK Government	Added... “such as environmental impacts that could have been avoided at little cost to development”.
112	2	212	30		33	explain 'strictly non dominated and practically dominated'	UK Government	Done.
113	2	213	39	213	41	I am not clear on why MAVT is not applicable when there is uncertainty in the estimation of consequences. In fact in this case, $v_i(x_i)$ could be, for example, an expected value.	Alain Billionnet	<p>The normative analyst (who believes decisions should comply with the axioms of utility theory and probability theory) has a choice between multi-attribute VALUE theory (MAVT) or multi-attribute UTILITY theory (MAUT).</p> <p>MAVT is simpler, but will only use point estimates (usually the mean or median) in the analysis of trade-offs. Implicitly it assumes risk-neutrality. Note that sometimes analysts use MAVT on some specified percentile(s) to account (roughly) for risk attitude. But it's still an analysis built on point estimates. Sometimes they'll do several analyses with different sets of point estimates (best case, worst case, best estimate).</p> <p>MAUT accounts for the full distribution, but is turgid, and makes far more onerous demands on (a) elicitation or modelling to obtain full distributions, and (b) decision-makers' capacities to articulate trade-offs between objectives, together with risk attitude. The essence of this is captured with some minor</p>

No	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
								changes to the text.
114	2.3.2.1	213	1	213	7	The problem of intangible values, difficult to monetize and that for specific types of ecosystem services, monetisation is being discussed as inadequate or even misleading could be underpinned with recent literature f.i. “Ecosystem services and ethics” Jax, Barton, David, Chan, Groot, Doyle, Eser, Görg, Gómez-Baggethun, Griewald, Haber, Haines-Young, Heink, Jahn, Joosten, Kerschbaumer, Korn,Luck, Matzdorf, Muraca, Neßhöver, Norton, Ott, Potschin, Rauschmayer, Haaren, Wichmann, 2013 , DOI:10.1016/j.ecolecon.2013.06.008	Werner Rolf	This reference is now cited. Thank you.
115	2	213	1			Pg 213 line 1 - perhaps exchange ‘economic analysis’ for ‘benefit-cost analysis’ here as BCA techniques are typically defined as not relying exclusively on monetisation. Remainder of 2.3.2.1 is very good.	Shane Orchard	We do mention that BCA or CBA (cost-benefit analysis) doesn’t have to be monetary – but it is mostly done that way.
116	2	213	30	213	34	How do we resolve the concern for developing mutually acceptable unit of analysis and the criteria for evaluating metrics?	Peter Elias	This is a difficult topic, unfortunately beyond the scope of this brief overview, though references are provided.
117	2	213				Monetization of social and environmental outcomes is a relatively new, but growing methodology. In this connection, many monetization methods and standards are currently being developed (e.g. the United Nations System of Environmental-Economic Accounting). In Canada, Statistics Canada recently conducted specific research on ecosystem accounting (see Canada. Statistics Canada. Environment Accounts and Statistics Division. Human Activity and the Environment. Measuring Ecosystem Goods and Services in Canada, Ottawa, 2013, http://www.statcan.gc.ca/pub/16-201-x/16-201-x2013000-eng.pdf).	Boris Stipernitz	In looking at the web documentation on UNSEEA, it does not appear that they are proposing much monetization at all, but rather environmental accounting systems that are both (and separately) physical and monetary... but only monetary for the goods that are traded on markets or provide services that have monetary value (e.g. timber and pollination).
118	2	213	10			Much of this could be tabulated which would make it more accessible, readers want to know what the models are, situations for application, strengths, weaknesses, and supporting evidence (i.e. reference)- putting tis in a table will enable users to have a look across and see the range and choice of models easily.	UK Government	Yes. A good idea which we have adopted.
119	2	215				Box 2.1 could do with an illustration.	Derek Tittensor	Agreed. Added.
120	2	215				Box 2.2 could do with an illustration (e.g. a map or an image of the area) to mitigate the wall of text.	Derek Tittensor	Agreed. Added.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
121	2	216	26			General comment – scenarios as noted are probably the most user friendly tool in this armoury of tools. When done well, they create a space that allows for more effective dialogue and engagement across wide ranging stakeholders, breaking down positional barriers. They are useful for engaging civil society and countries with limited capacity in a way that modelling never will. More needs to be made in this report of the value that scenarios have in behaviour change and engagement as a way forward for effective management of BES.	Geoff Hicks	Chapter 3 seeks to provide an extensive review of scenarios. Here we have attempted to avoid focusing too much on individual models (of drivers etc) or scenarios, but rather set the general decision making scene. Scenario planning is given its own section – and the role of scenarios is dotted throughout the various examples in the chapter.
122	2	216	1	216	4	Successful optimization approaches also include specific Heuristics and Metaheuristics such as Simulated Annealing, Tabu Search, Evolutionary and Genetic Algorithms,... (see, e.g., J. Dreo, A. Petrowski, P. Siarry, E. Taillard, Metaheuristics for hard optimization, Springer, 2006). Graph theory is also a powerful tool for modeling and solving optimization problems (see, e.g., S. Krichen and J. Chaouachi, Graph-related Optimization and Decision Support Systems, ISTE-Wiley, 2014). Many articles published in the literature of biological conservation and related to biodiversity protection use Metaheuristics and/or Graph Theory.	Alain Billionnet	Text used with thanks.
123	2	216	5	216	9	Linear programming (LP) and Stochastic Dynamic Programming (SDP) are very special cases of mathematical programming. For example, Integer Linear Programming (ILP) is able to adequately address many nonlinear optimization problems by using linearization techniques and powerful ILP solvers are commercially available. In addition, substantial progress was made over the past years in the field of nonlinear mathematical programming with continuous or integer variables and, again, efficient solvers are available. Numerous optimization problems can be formulated within this framework and many articles published in the literature of biological conservation and related to biodiversity protection are based on these techniques (see, e.g., A. Billionnet, Mathematical optimization ideas for biodiversity conservation. European Journal of Operational Research, 231, 2013, 514-534).	Alain Billionnet	Text used with thanks.
124	2	216	26			Pg 216 line 26 – inconsistency in numbering here.	Shane Orchard	Done.

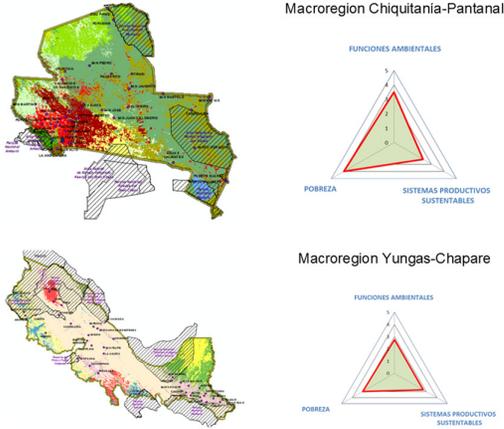
Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
125	2	216	27	216	40	Repeat of text in chapter 1 and not completely consistent. Cross-reference chapter 1 and focus more on the information in lines 41-42. Here, more could be added in relation to stress-testing and wind-tunnelling approaches, e.g. Brown et al. (2015). Identifying robust response options to manage environmental change using an Ecosystem Approach: A stress-testing case study for the UK. <i>Environmental Science and Policy</i> , 52: 74-88.	Paula A Harrison	Chapter 5 deals with Scenarios. Text dramatically reduced here to focus more on scenario planning by decision makers, rather than scenarios by academics.
126	2	216	26	216	39	The relationships between models, practice and policies to be emphasized.	Peter Elias	We feel that through our revisions we have done our best to strengthen this emphasis.
127	2	216	27	216	35	Review for consistency use of terms like prediction, forecasting and planning in an explorative sense.	David Cooper	Done.
128	2	217	11	217	12	“multi-criteria analysis” how does this relate to section 2.3.2.1?. explain what are these other three techniques (agent based; actor-based; IAM).	David Cooper	Text is deleted and significantly altered to avoid confusion with multiple modeling and other decision support tools.
129	2	217	31	217	38	This paragraph reads as if it should be in the introduction to the whole report.	David Cooper	Deleted as part of our attempt to focus in on scenario planning (decision tool) – as distinct from scenarios per se that are dealt with at chapter 3.
130	2	216	31			unlike forecasting' does this mean modelling to forecast?	UK Government	Yes – with the explicit aim of being as accurate as possible about particular aspects of the future. e.g. predicting the probability of rain tomorrow. I'm not sure we can make this section much more clear about the difference between scenarios and predictions.
131	2	217				Box 2.3 could do with an illustration (e.g. a map or an image of the area) to mitigate the wall of text.	Derek Tittensor	Agreed. Table added for illustration.
132	2	217	31	217	42	The disconnection between data availability/accessibility and methods of forecasting. This is more applicable to data poor areas. What incentives can be developed to encourage data available/access? What capacity need to be built to ensure continuity?	Peter Elias	Tackled in sections 2.4 and 2.5 as well as chapter 7.
133	2	217	32	217	38	Scenarios definition should be at the beginning of this chapter	Noelia C. Calamari	Provided in chapter 1.

No	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
134	2	217	31	217	38	No mention is made of spatially explicit scenarios.	Noelia C. Calamari	“In recent years, there have been many applications of scenario planning on a landscape scale with a focus on biodiversity and ecosystem services”. It is implicit that they’re spatially explicit. Scenarios are described in chapter 3.
135	2	217	10		14	sudden shift from writing about scenarios to modelling techniques, but does not explain how scenarios are used in these.	UK Government	Section deleted. Focus still very much on decisions – how scenarios are used in decisions. Not models.
136	2	217	27		29	scenarios in the policy cycle- move forwards to line 27 p 216	UK Government	Done.
137	2	217	31		38	to go with line27	UK Government	Done.
138	2	217	39		41	to go with line27	UK Government	Done.
139	2	218	12	218	14	The ineffective methods of integrating and interpreting interdisciplinary studies/approaches could affect the modeling outcomes.	Peter Elias	Yes.
140	2	218	8	2018	9	I guess it will appropriate to include the assumed definition of the word “watershed”. There are many definitions, depending on the field you work. At the same time, I believe it will be very useful to explain the difference with the word “basin”, since this Report will be readen by people all around the world. Perhaps this observations could be attended in Chapter 1, because the term is previously mentioned in that Chapter.	María Isabel Delgado	These words are clarified in the Glossary.
141	2	218	11	219	2	In p216 line 11, MCA is presented alongside three other approaches (agent based; actor-based; IAM); here it is presented alongside SDM and MAUT. (and earlier there was a whole section devoted to it 2.3.2.1). Very confusing!	David Cooper	Multi-criteria decision analysis (MCDA) does get used in concert with other approaches. It is appropriate that we described it as stand-alone so it could be understood. I acknowledge that the discussion at pg216 was confusing – now clarified. The mention of MCDA here is unnecessary (deleted), but MAUT has to be mentioned as it does underpin Structured Decision Making. Sorry.
142	2	218	2	218	7	There must be acknowledgement of the fact that scenario	Fundisile Mketeni	All decisions must be

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						development might have limitations in the context of emergencies or disasters where decision making might need to be responsive to political pressures or the expediency of the emerging situation at hand.		responsive to political pressures – otherwise they are unlikely to be relevant or enduring. For reasons of space we can't afford to provide a separate section on emergencies.
143	2	218	16			Annex #	UK Government	This section has been removed
144	2	218	1		8	to go with line27	UK Government	Deleted.
145	2.3.1.4.	219	1	221	Box 2.4	The abbreviation SDM which is used in this chapter for 'Structured Decision Making', is commonly used for 'Species distribution models' – even in the same report, e.g. in chapter 2.4.1.(p. 234ff), 4.2 (408ff),4.3(p425ff), 4.5 (p.448). This is somewhat problematic in chapter where it is not clear which of these two SDM is meant (e.g. p451, line 30)	Jens Mutke	To avoid confusion, we now refer to 'structured decision making' in full throughout chapter. The abbreviation 'SDM' is reserved exclusively for the term 'species distribution model'.
146	2	219	14			say what 'normative' means	UK Government	Normative removed. Not necessary here. Defined elsewhere (earlier).
147	2	219	25			very similar to the policy cycle, and this point should be made as it helps promote the case for using models and scenarios!	UK Government	Done.
148	2	220	8	220	8	I did not find table 2.3.2.1. Where is it?	Noelia C. Calamari	This references a section – not a table.
149	2	220	13	220	16	There must be consideration of offsets in this discussion about trade offs in a way that takes into account that sometimes trade offs might mean compensation for losses that are due to actions taken by a user or users.	Fundisile Mketeni	Offsets are a particular policy – they don't represent a decision support tool.
150	2	221				Box 2.4 could do with an illustration (e.g. a map or an image of the area) to mitigate the wall of text.	Derek Tittensor	Agree. A graph has been added.
151	2	221	2	221	10	This passage borrows text from the first paragraph of [Smith, A.D.M., 1994. Management strategy evaluation: the light on the hill. Population dynamics for fisheries management 249–253.] with minimal modifications (Smith: “ <i>Management strategy evaluation (MSE) in the broad sense involves assessing the consequences of a range of management strategies or options and presenting the results in a way which lays bare the tradeoffs in performance across a range of management objectives. In contrast to some previous approaches to fisheries assessment, it does not seek to proscribe an optimal strategy or decision. Instead it seeks to provide the decision maker with the information on which to base a rational decision, given their own</i>	Axel G. Rossberg	Now paraphrased and references made explicit. Still very close – but this is a seminal reference.

No	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						<i>objectives, preferences, and attitudes to risk.</i> ” At a minimum, the reference should be acknowledged, typically the citation would be clearly highlighted as such.		
152	2	221	2	223	1	The modern understanding of MSE often reduces it to the technical setup shown in Fig. 2.4 [e.g. Gaichas, et al. 2012. Assembly rules for aggregate-species production models: simulations in support of management strategy evaluation. Marine Ecology Progress Series 459, 275–292.] The additional participatory aspect is an option, but not a defining property.	Axel G. Rossberg	Amended to: “Management strategy evaluation promotes consultation [...] though participation is not a defining feature of management strategy evaluation.”
153	2	221	1	221	1	Box 2.4. Add scientific name <i>Gila cypha</i> and cite relevant assessment: NatureServe (2014) http://www.iucnredlist.org/details/full/9184/0 .	Thomas Brooks	Done.
154	2.3.1.4	222	22	222	24	In my view this is not correct. There are many examples for MSE in fisheries management, especially for evaluations and impact assessments of long term fisheries management plans. A widely used model in the North Sea is FLBEIA. Possible Reference: Garcia, D., Urtizbera, A., Diez, G., Gil, J. And P. Marchal. 2013. Bio-economic management strategy evaluation of deepwater stocks using FLBEIA model. Aquatic Living Resources 26 (4): 365-379.	Ralf Doering	Original text has been softened to indicate that there are significant <i>challenges</i> to MSE, but it is still used.
155	2	223	29		31	Here is indicated for the first time that an understanding that biodiversity is not the Variability etc. but is a value consisting of a number of functional indices See Feest et al. numerous papers	Alan Feest	Can't find pg 223, line 29...?
156	2.3.1.4.	223	2	225	Box 2.6	Strategic Environmental Assessments, which imply different scenarios of alternatives including to abolish the project, could be used to select examples when they really have influenced or determined decision-making based on modelling scenarios with an impact on biodiversity and ecosystem services. The text is rather descriptive and on general level of procedures (Box 2.6) of theoretical considerations of the different values of biodiversity.	Marcus Zisenis	Agreed. The focus of this box has now completely changed in an attempt to provide something more instructive about the roles of models and scenarios.
157	2	223				Box 2.5 could do with an illustration.	Derek Tittensor	Done. Figure has been added.
158	2	223	11	223	19	Note that while SEA is used in plans and programmes it is still not (or very rarely) used for policies. Not even in the EU.	David Cooper	Noted and added.
159	2	223	19	223	22	Note that CBD COP has endorsed guidelines for EIA and also explicitly for SEA (Decision VIII/28) and also developed guidelines for their application in marine areas (Decision XI/18).	David Cooper	Thank you. References included.
160	2	223	23	223	23	“SEA-type”? what is this?	David Cooper	Deleted as the original text was unclear.
161	2	223	11			should say strategic assessments embedded in policies	UK Government	It is apparent that little strategic assessment appears

№	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
								to have been done for policy development – it's more in planning (policy implementation). Removed.
162	2	223	2			SEA- explain that this is a different form of model and scenario use, as the assessment involves making judgments and using expert opinion to anticipate effects of development and mitigation measures.	UK Government	Done.
163	2	224	1	224	3 And also (as noted in subsequent para to consider cumulative impacts of small interventions that would not usually require any EA.	David Cooper	Done – reference is in the first paragraph of Strategic Environmental Assessment (SEA).
164	2	224	20	224	20	“risk strategy” I think this shows a misunderstanding of SEA. It does not necessarily replace EIA. As noted above SEA is more strategic; often it is more participatory and forward looking. It can also employ scenario exercises. This section needs revision.	David Cooper	In Australia, SEA is replacing EIA by providing ‘strategic approvals’ over large programmes that then do not require individual project EIAs. Clarified intent and softened language.
165	2	224	17			delete 'on the downside' ,be more consistent in presenting strengths and weaknesses.	UK Government	Done.
166	2	224	20			risky strategy? It is risk based. Suggest delete 'be perceived as a risky strategy as'	UK Government	Removed.
167	2	224	24			change resources to resourced	UK Government	Done.
168	2	225				Box 2.6 could do with an illustration (e.g. a map or an image of the area) to mitigate the wall of text.	Derek Tittensor	Done.
169	2	226	10	226	10	Include the following: 2.3.1.5 System of life approaches. Aims to value the relationships and dynamics, either positive or negative, established among peoples and nature regarding the regeneration or reproduction of the systems of life of Mother Earth for Living-well. Holistic valuation follows a rights-based approach, taking into account that Living-well in balance and harmony with Mother Earth (relational and cosmocentric values) is based on the complementarity of the rights of Mother Earth (intrinsic values) and the rights of peoples to their holistic development and eradication of poverty (instrumental values) (Bolivia 2010, Bolivia 2012, Pacheco, 2014a). This method will be more accurately applied when rights of indigenous peoples and local communities and principles or rights of Mother Earth have been	Diego Pacheco	We were unable to find sufficient documentation of these ideas in order to incorporate them.

№	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						<p>included as intrinsic part of the national legislation or public policy frameworks. In this regard, the holistic valuation of systems of life can be developed at different levels (national, subnational, and local) assessing to what extent there is in a given jurisdiction a positive relationship and interactions between the conservation of environmental functions, development of sustainable production systems, and peoples' access to basic needs and services for poverty eradication, inherently entwined as systems of life in Mother Earth. This approach is developed using participatory planning and intercultural dialogue techniques, among others, in the context of deliberative multi-actor processes that help to evaluate the extent to which there are systems of life settled in practice in a given jurisdictional territory. An example of a holistic-based valuation is the “Systems of Life of Mother Earth” approach being developed in Bolivia, which includes the identification and characterization of systems of life, the establishment of complementary agreements with Mother Earth, and actions for the harmonization of systems of life of Mother Earth (Pacheco, 2014a, b).</p> <p style="text-align: center;">Situation of systems of life in different macroregions of Bolivia</p>  <p>Figure X. Systems of life of Mother Earth.</p>		
170	2	226	29			Discussion of the Delphi technique in Chapter 3 (Box 3.1) indicates that the Dephi technique was developed by the Rand	Brenda McAfee	It was developed in the 50s and published in 1964. Both

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						Corporation in the 1950's while in Chapter 2 the development is cited as the late 1960's.		statements are correct..
171	2	227	19	227	28	Do we have enough case studies to make these assertions? If we yes, what is the distribution, for example between the global north and the global south? This is because an uneven distribution of case studies may influence the decision context being depicted especially given that the global north typically dictate paradigms.	Peter Elias	Good point. We have considered a broader range of case studies than those documented here. However the point is taken that this is still a small sample and this limitation is now acknowledged.
172	2	227	15	227	15	The location of the table 2.3 is not easy. I suggest placing it on page 228	Noelia C. Calamari	Done.
173	2	227	12	227	13	"... pre-empt..." what does this mean??	David Cooper	This has been removed.
174	2	227	12			delete 'In the previous section we explored'	UK Government	Done.
175	2	227	13			after context, add 'have been presented'	UK Government	Done.
176	2	227	29			delete 'above'	UK Government	Done.
177	2	228				In Figure 2.6 it is hard to identify the position of the numbered circles in three-dimensional space. For example, is number 6 at the top-right of the front square, or the middle of the back square? Dashed lines, or similar, need to be added.	Derek Tittensor	This figure has now been redesigned by the graphic designers of the chapter, to increase clarity.
178	2	228	3	228	18	Circles 3, 4, and 6 do not appear to be labeled in Fig 2.6.	Thomas Brooks	As mentioned above, this figure has now been redesigned to increase clarity.
179	2	228	23			Annex #	UK Government	The section has been removed
180	2	228	20		24	change to passive voice	UK Government	Done.
181	2	229	1			We support the use of this table and believe that more tables should be included in this document to compare the various tools and techniques for modelling, including who they are most applicable for, whether or not they can operate when there is data deficiency, ease of use and interpretation etc. This way countries can chose the most appropriate tool for the decision and level of engagement.	Geoff Hicks	We have added one more table that summarizes strengths and weaknesses of different approaches – although that now brings us to 4 tables and 6+ figures, so there is little room for expanding further.
182	2	229	7	229	18	Standardisation of classification of scales: How does scale affect unit of analysis e.g. cities, ecosystems, etc? How does process affect scale especially in the context of urban expansion? Does scale determine data needs/requirements e.g. the drivers may have different levels of importance depending on the scale or unit of analysis?	Peter Elias	Yes, these are all good points. We've tried to add in more detail about the role of scale in decision context in section 2.2.1 and table 2.5.
183	2	229	1	229	20	Why distinguishing PUBLIC and PRIVATE decision making entity if it is not used in the corresponding column?	Cécile Leclere	Suggestions adopted to increase clarity.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						The form has really to be improved to ease the reading of the table (for example, why not putting the signification of coding letters directly in the columns of the table ? or at least including a paragraph break for each category)		
184	2	229	1			Table 2.3 is very useful.	UK Government	Thank you.
185	2	230	4	230	5	Most of these are scientific papers, not “applications of modelling and scenario analysis in policy agenda setting”. The only one which should really be cited here is SCBD GBO4 2014.	Thomas Brooks	Done.
186	2	230	37	230	43	GENERAL COMMENT: Authors must acknowledge that there is a big divide between developed and developing countries and/or those with economies in transition. This can lead to polarization of biodiversity and ecosystem service issues. The divide can also be simply a question of decision making taking place in data rich or data poor environments. Lack of data will certainly increase uncertainty among others.	Fundisile Mketeni	Now explicitly acknowledged in ‘Ingredients for success’ segment and section 2.6: Barriers and knowledge and capacity-building needs.
187	2	230	1			how many documents were reviewed? Delete 'key' and 'here'	UK Government	Suggested edits made. Literature search was ad-hoc. We’re not aiming for meta-analysis or quantitative findings. Searched documents are in the hundreds, but it would be disingenuous to put a number in the text.
188	2	230	16			change clout to power	UK Government	Done.
189	2	230	37			delete 'wicked'	UK Government	Done.
190	2	230	40			Balint et al: Reference missing in literature list	Melanie Paschke	Added.
191	2	231				Box 2.7 could do with an illustration (e.g. a map or an image of the area) to mitigate the wall of text.	Derek Tittensor	Done. Figure added.
192	2.3.4	231	8	231	9	Adaptive fisheries management is now tested and implemented in many fisheries. Therefore, to cite Hilbourne 1992 seems to be a bit outdated. A good source would be the OECD where e.g. a workshop was conducted 2010. Also: Walters, C.J. (2007). Is adaptive management helping to solve fisheries problems. <i>Ambio</i> , 36, 304-307 (in the References list on page 245)	Ralf Doering	Amended as suggested. Thank you.
193	2	231	15	213	15	Add scientific name <i>Anas platyrhynchos</i> .	Thomas Brooks	Done.
187	2.3.5.	232	1	233	14	This important analytical section could be extended. However, it is not clear for me on which particular results in the former sections of Chapter 2 the conclusions are based on? Chapter 2 gives a little bit an impression of a patchwork, and could be	Marcus Zisenis	This section has been totally restructured and the evidence to support conclusions is better qualified.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						improved by shortening the 233 pages and more clearly structuring.		
188	2	232	23	232	25	It may relate to the complexity of such systems to understand , a general lack of trust in data and measurement methods, or a willingness to invest the time and increase national budget or financial resources into making it work well.	Marina Rosales Benites de Franco	Yes. Agreed.
189	2	232	5			successful applications? In what way were they successful- the models and scenarios reflected reality, dealt effectively with a problem?	UK Government	Language changed to successful only where substantiated – e.g. findings were adopted and stakeholders were happy.
190	2	232	25			insert lack of willingness	UK Government	Done.
191	2	232		233		Good points raised, but text heavy- would be better to bullet out ingredients for success, and identified impediments.	UK Government	This section was reduced.
192	2	233	9	233	11	This implies several key challenges. There is the challenge of educating policy makers and industrial enterprises to understand that involvement in decision processes doesn't have to mean relinquishing power.	Marina Rosales Benites de Franco	Done.
193	2	233	25	234	31	It would be great if more information could be added on how ecosystem service models could be useful in different decision contexts as well as biodiversity models.	Paula A Harrison	Yes. We've tried to reduce emphasis on biodiversity models, but still defer largely to chapter 5.
194	2	233	36			emphasizes should be emphasized	UK Government	Done.
195	2.4.1	234	10	234	27	The abbreviation SDM is used as well in chapter 2.3.1.4 for 'Structured Decision Making'. However, most chapters (2.4.1, 4.2, 4.3, 4.5) use it in the sense of species distribution models. Nevertheless, on page 451, chapter 4.7 it is not directly clear, which SDM is meant.	Jens Mutke	Fixed. Structured decision making expanded throughout.
196	2	234	35	234	35	Another 4 categories	David Cooper	Done.
197	2	234	1			<u>A</u> amazon	UK Government	Done.
198	2	234	3			delete in the amazon basin	UK Government	Done.
199	2	234	14			references	UK Government	Done.
200	2	234	27		31	should be final para	UK Government	Done.
201	2	235	30	235	32	The need for open platform that encourages science-policy forum at multi-levels. Likewise, there is need for a robust outreach plan for disseminating model outputs considering the dynamism of the political space.	Peter Elias	This is beyond the scope of this work.
202	2	235				Mastrandes et al 2010: reference missing in literature list, please check if other references also missing, this was found by a	Melanie Paschke	Thank you. Resolved.

Nº	Chapter	From page	From line	Till page	Till line	Comment	Reviewer full name	What was done with the comment
						random check with some of the references		
203	2	236	34	236	38	However, the challenge of increasing uptake of decision support approaches is not only based on the availability of technical expertise and equipment. A larger challenge is a cultural one, and do not consider the sustainable development as part of our wellbeing.	Marina Rosales Benites de Franco	Agreed, however, this is a value judgement and beyond the scope of this work.
204	2	236	11		24	repeats what was already said- delete and get to the point- what are gaps, knowledge and capacity building needs?	UK Government	Done.
205	2	236	34		35	delete	UK Government	Moved to a more relevant place.
206	2	236	38			Change title to few- I am not quite sure this is substantiated by the evidence. Many of our academics help us to stay cutting edge and demonstrate policy applications of their work.	UK Government	Done. Agreed. There are some rewards. But largely these don't figure in career development compared with publishing Nature papers about blue sky science.
207	2	236	14	236	26	Between the impediments to the widespread and productive use of models and scenarios in policy, the lack of commitment with long term goals and weak institutions in developing countries, should be included.	Francisco Ramón Barbarán	Done.
208	2	237				How many references in the reference list? They seem to cover a wide range of dates- 1982 onwards. Was the search restricted to dates?	UK Government	No, as described above (addressing comment 187) the literature search was ad-hoc.
209	2.3.3	227	25			Do you really mean "large-scale" (local) or "small-scale" (regional/global)? Referring to the other descriptions (f.i. Fig. 2.6 you could also use local, regional, global scale to avoid misunderstanding	Werner Rolf	Done.