Comment form for 1ˢᵗ Review Phase of the Deliverable 3c) Fast-track methodological assessment on scenarios and models Chapter 1 'Overview'

Review Editor: Beth Fulton
Institute: CSIRO
Address: GPO Box 1538, Hobart, Tasmania 7001, Australia
Email address: beth.fulton@csiro.au

Review Editor: Carlos Joly
Institute: State University of Campinas/UNICAMP
Address: Cidade Universitária "Zeferino Vaz", Barão Geraldo - Campinas, São Paulo, Brasil
Email address: cjoly@unicamp.br

Reviewers:

Emily Nicholson (EN)	Hans Keune (HK)
Patrcia Balvanera (PB)	Michel De Lara (MDL)
Rik Leemans (RL)	Marta Pascual (MP)
Florian V. Eppink (FE)	Inge Liekens (IL)
Joel Houdet (JH)	Sebastien Lizin (SL)
Tianbao Qin (TQ)	Louise Gallagher (LG)
Megan O'Rourke (MR)	Corinne S. Martin (CSM)
Stoica Dan Laurentiu (SDL)	Wei Zhang (WZ)
Sonja Jähnig (SJ)	Estelle Mawal A. Mbassa (EMM)
Kelly Heber Dunning (KHD)	Thomas Brooks (TB)
Miglena Zhiyanski (MZ)	Charlotte Simon (CS)
Jasper Montana (JP)	Ramesh Krishnamurthy (RK)
Neil Burgess (NB), together with Derek Tittensor and Tim Newbold	Jan Staes (JS)
Narayan Dhital (ND)	Gautam Talukdar (GT)
	Audrey Coreau (AC)

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
1.		General				It would be good to include quick discussions of: - The importance of model assessment (for some basis in terms of 'belief' in the model results - The limitations / problems with using models	Neil Burgess (NB)	Text added near start of Section 1.2.3 highlighting importance of communicating, and helping users to interpret implications of, levels of uncertainty associated with scenarios and models, as part of assessment and decision-support interface. Last paragraph of Section 1.2.5.3 outlines limitations and problems with using models. These issues are also addressed thoroughly in Chapter 8.
2..		General				In general, the introduction feels a little 'wordy' and overlong for a general purpose document with a wide audience. Suggest editing down wherever possible. As an example, the last paragraph on page 27 and all of page 28 could be much more compressed and succinct.	Neil Burgess (NB)	Good point, although this concern needs to be balanced against the intention for Chapter 1 to serve not only as an introduction to the rest of the document, but also as a potentially stand-alone overview of the topic, for less technical readers who don't necessarily want to read the entire report.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
3.						General: The chapter appears to cover all the key areas, and generally reads very well. My main recommendation is for more explicit definitions for clarity, in particular upfront definitions of 'model', and what that comprises in the context of the current report, and 'scenario'. Also, clearer definitions of terms such as threat, stressor, driver etc. would make the content clearer. Whether these need to go into a box or glossary at the front, or just be better defined in the text as they appear, depends on the preferences of the authors. But in the first page, the term model in particular needs clearer definition, with a reference to the longer description later in the chapter. I was left wondering all the way through the long preliminaries what exactly the authors had in mind when using the term model.

In fact, it isn't even all that clearly defined in the latter sections on models: does your idea of model encompass qualitative as well as quantitative models? On p20 line 10, qualitative models, and their potential roles, are referred to for the first time (I think). Yet on p7 line 8, it implies only quantitative models are being considered.

A statement upfront, on the first page ideally (in the introduction), summarising what modelling encompasses, including a brief description of its roles, and also scenarios, just to allow the reader to understand the scope of the chapter and indeed whole deliverable. The reader can be referred to later sections for longer definitions and modelling methods. Some text could be borrowed from elsewhere in the chapter, e.g. for models, the first paragraph of 1.2.5.3 has some useful text. As does P7 Line 8. While parts of the first paragraph of p9 has great text on scenarios (e.g. lines 5-8 and 16-18). And I like direct questions such as the first line of 1.2.2 "What exactly is mean by policy and decision-making?"

The examples in the boxes are very good, and perhaps more specific examples throughout would help elucidate some of the ideas. | Emily Nicholson (EN) | 'Model' and 'scenario' are now clearly defined in the second and third paragraphs of the chapter. |
| 4. | | | | | | This is already an advanced draft introduction chapter. It is well written (although often too many commas) and provide a good overview of the different models and scenario approaches. However, the models are framed and analysed better (c.f. Figure 1.6) compared to the scenarios, while it is probably the scenarios that get the most policy attention. The authors should try to provide a better balance between scenarios (now mostly definitions but few applications), similar to the presentation and discussion of the models. | Rik Leemans (RL) | Section 1.2.4 on scenarios has been expanded, and better linked to the quite extensive scene-setting consideration of scenarios in 1.2.1 and 1.2.2.

The role of the case studies (Section 1.2.6) in illustrating different types of scenarios is also now explained more |

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								clearly.
5.						I understand that the subsequent chapters will discuss the various approaches i more detail but I still miss a basic discussion of the apparent uncertainties. Also the purpose of making scenarios or models is not fully addressed and this defines the actual outcome.	Rik Leemans (RL)	The importance of assessing, and communicating uncertainties is now acknowledged more explicitly in Section 1.2.3. Uncertainty is also addressed extensively throughout the remaining chapters of the report. The importance of aligning scenarios and models with the needs (purpose) of different policy and decision-making processes is addressed in considerable depth in Section 1.2.2, and effort has been made to sharpen this material.
6.						**Poor punctuation**: In the text very often but not always Oxford or serial commas are used (i.e. before and or or; for example: in both "a process, or system, that" or "dependent on the quality, and relevance, of underpinning knowledge and data" all commas are unnecessary[1]) and between and after adjectives (e.g. in "using qualitative, expert-based, models" the last comma should be removed). Please use a consistent and concise punctuation.	Rik Leemans (RL)	All issues of punctuation will be resolved in the final version of the document.
7.						**Double or single inverted commas**: Double inverted commas ("...") introduce a quote, while single inverted commas ('... ') are used when a word is used out-of-context. Most of the "..." should actually be changed into '...' (e.g. 'Interface' on page 9, line 23).	Rik Leemans (RL)	As above
8.						**Use of Etc.**: Et cetera (or abbreviated as etc.) already has an et (Latin for and) and does not need a comma before. For example: "electricity, etc" should be "electricity, etc." (page 7, line 32). When you start a list with 'like', ' include' or 'such as' using etc. at the end is redundant. Remove etc.	Rik Leemans (RL)	As above
9.						Great doc! Will certainly be very useful.	Patrcia Balvanera (PB)	Thanks!
10.	General Comments					General comment is that the user perspective is not really taking into account. A discussion in details of the different user groups would be warranted, including the various factors that will affect their capacity and / or willingness to use the model outputs. For instance, there seems no consideration that probably very little will	Joel Houdet (JH)	The emphasis already placed on the importance of aligning scenarios and models with the needs of different policy and decision-making processes (Section 1.2.2) has been further sharpened.

[1] Especially when that introduces a restrictive relative clause.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						be of use to business if model do not specific target key sectors or the policy / decison-making / management process they actually use. Can these incorporate the findings of such models? If so, how? If not, what would be required?		
11.		General comment				The chapter should be simplified and targetted towards a general audience (A communication specialist may be consulted for the same). The obejectives of the chapter should be explictly stated and what is the purpose of this document in context of IPBES and other biodiversity treaties should be made clear.	Gautam Talukdar (GT)	Further effort has been made, and will continue to be made, to tailor this chapter for a more general audience than the other chapters of the report. A paragraph has been added at the start of the chapter, more clearly introducing the role of this particular chapter. The description of the purpose and scope of this assessment within the context of IPBES (in Sections 1.1.1 and 1.1.2) has been further sharpened.
12.		General comment				Congratulations to the writing team on producing good content overall	Louise Gallagher (LG)	Thanks!
13.						I only have one general comment. While the models and scenarios aim to provide the basis for proactive options, it currently appears to be based on logic based model building and it would be good if additional efforts are made involving uncertainty aspects and thus, the model outcome could be probabilistic and than deterministic.	Ramesh Krishnamurthy (RK)	Text added near start of Section 1.2.3 highlighting importance of communicating, and helping users to interpret implications of, levels of uncertainty associated with scenarios and models, as part of the assessment and decision-support interface.
14.						My overall impression is that it seems to be an extensive collection of "what is out there". In general this whole document lacks focus towards an endpoint, conclusion, way forwardIt seems all aspects are important and they should ALL be addressed. All spatial and temporal, social, economic, ethical and philosophical dimensions seem to be equally important. It even appears that it we should model the entire global socio-economic system. Therefore, I find it hard to grasp what will be the output of the whole exercise. IPBES should try to define and set standards that fit to a common framework that works at the global, continental scale. Therefore is should focus on a procedure to process lower level information to higher levels. This is a huge challenge. Although some of these conclusions are	Jan Staes (JS)	Key findings and recommendations have now been prepared across all chapters of the report. These are intended to provide explicit advice to IPBES regarding practical pathways forward in ensuring that potential benefits of scenarios and models are realised across the full range of IPBES activities. This assessment adopts the perspective on biodiversity-ES relationships already articulated by the IPBES Conceptual

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						discussed briefly in chapter 8, it is far too vague. If we want to achieve an impact like IPCC, there is a need to come up with clear definitions, procedures and priorities. A good example is the IPCC protocol to communicate uncertainty. The framework that has been put forward in part 1 covers way to many aspects and will be unworkable from a practical point of view. The framework in itself is fine, and it could be used for a future roadmap for more advanced assessments in the future with many aspect that can be added to the core questions. The biodiversity – ES relationships still lacks a scientific basis and is mixed up throughout the documents. The IPBES aims to address both biodiversity and ES (which is fine), but these are not to be generalized as "just the same" in all cases around the world. I'm very much against using ES just for Biodiversity Conservation. It should be about creating a better world in general. Landcover and landuse determine both ES and Biodiversity. ES may be related to Biodiversity, but the mechanisms can be very different and even have a different spatio-temporal dimension. This is mixed up everywhere. To my opinion, the modelling is in two directions. You can study and model the impact of biodiversity on ES (which will be usefull for some systems, species and services). In addition you need to model the impact of ES on biodiversity (many ES are not driven by biodiversity, but sure biodiversity may benefit from more integrated ES-based land management). A good stewardship and spatial allocation can benefit both ES and Biodiversity. These two different mechanisms should not be mixed up and should be the core of the framework.		Framework.
15.						Generally, I find that in the whole deliverable aspects related to freswhater are not enough represented, although they provide essential ecosystem services, host an exceptional high proportion of biodiversity (given their coverage) and are under highest threat of all ecosystems.	Sonja Jähnig (SJ)	Point taken. More effort still needs to be made to address freshwater issues throughout all chapters of the report.
16..						In Chapter 4 and 6 are various sections, which I find relevant to all scenarios/model areas – and which I would prefer to see in the overview part, e.g. a model overview, uncertainty, complexity handling (see my comments in the respective chapters)	Sonja Jähnig (SJ)	Considerable effort has now been directed towards better linking, and achieving better consistency between, all chapters of the report.
17.						I believe that Chapter 3, 4, 5 should be structured in a similar way, eg. Sections with scenarios and with models; this would help readers to get the relevant information;	Sonja Jähnig (SJ)	As above
18.						Special care should be taken to use similar terms, e.g. how are the different models classified (as outlined in Figure 1.4), different terms are	Sonja Jähnig (SJ)	As above

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						used in chapter 3 and 4, see comments there		
19.						It would have been extremely helpful to have the chapter and subchapter headers available, e.g. to compare the structure (as they were available in chapter 4).	Sonja Jähnig (SJ)	Not clear what is being suggested here.
20.	1					What an excellent piece of work! The authors are warmly congratulated for having conducted such a sweeping and informative synthesis of the subject.	Thomas Brooks (TB)	Thanks!
21.	-	-	-	-	-	Overall, the chapter is well written and logically structured, albeit a little long. I would have liked a section with 'key messages' at the beginning (like there is for Chapter 2).	Corinne S. Martin (CSM)	High-level key messages are still presented in the last section of the chapter. However Chapter 1 will be preceded by the Summary for Policy Makers (now drafted) which lays out key messages from the entire assessment.
22.	1.1-1.4					This chapter sets out to address both non-scientists and scientists, but I think neither audience is catered for particularly well: The chapter contains both too much and not enough science.

As an example, Figures 1.2 and 1.3 would probably scare off many non-scientists, but the text hardly provides the depth that a scientist getting into biodiversity and ecosystem services (ES), or even an experienced researcher, might be looking for.

It might be a good idea to limit this chapter to a summary of goals, problems and recommendations and visions from the other chapters. | Florian V. Eppink (FE) | Point well taken. Chapter 1 is indeed intended for a more general audience than the other chapters, and therefore needs to address both scientists and non-scientists. But it also has to be relatively stand-alone, and therefore of value to less technical readers who may not wish to read the rest of the report. |
| 23. | 1.1-1.4 | | | | | I would recommend reconsidering the structure of the chapter. For instance, the purpose of "this assessment" is only mentioned on page 5, line 1. Generally, the chapter seems to jump back and forth between aspects of scenarios and modelling without a clear relation to their respective roles in decision making.

I have admittedly not given it enough thought to better suggestions, but a combination of Figure 1.4 and Section 1.4 might provide starting points. | Florian V. Eppink (FE) | We have moved the purpose and scope towards the front of the chapter. |
| 24. | 1.1-1.4 | | | | | I found it surprising that TEEB does not appear anywhere. Even if TEEB was deemed to be too far removed from the IPBES goals, surely it has made specific recommendations that might be relevant. | Florian V. Eppink (FE) | TEEB is addressed extensively in other chapters of the report (particularly Chapter 5). Given the introductory nature of Chapter 1 it cannot be expected to explicitly mention all previous assessments. |
| 25. | 1.1-1.4 | | | | | The chapter could benefit from careful consideration of the (consistency of) its messages. | Florian V. Eppink | The purpose, and intended audience, of this assessment are now defined more |

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						For instance, the purpose of "this assessment" is mentioned on page 5, line 1. But then page 10, line 20 gives another purpose. Page 4, line 11 states that the primary audience is the participants in the IPBES process. Surely that cannot be true.	(FE)	clearly in Section 1.1.
26.	1					Overall very clear, useful, informative chapter	Hans Keune (HK)	Thanks!
27.	1					Two main groups of paradigms for decision support and model building can be distinguished and included for clarification, traditional and alternative paradigms, based e.g. on Rosenhead J. editor (1989), Rational Analysis for a Problematic World. Problem Structuring Methods for Complexity, Uncertainty and Conflict. West Sussex, England; John Wiley & Sons.	Hans Keune (HK)	Not clear what change the reviewer is suggesting in relation to this comment.
28.	1					Following from the previous comment, how does this deliverable explicitly take into account the deliverable on divers conceptualizations of valuation?	Hans Keune (HK)	Change made in final draft: the draft guide from this deliverable is now referred to explicitly in Section 1.5
29.	1					Based on all comparative methodological information, one might expect a methodological decision support protocol, or the announcement of the need to develop one: how can decision makers (and their supporters) choose the right methods, based on a well-structured and well-informed methodological decision making protocol, allowing to be transparent on assumptions and preferences, on pros and cons, both methodologically and practically, regarding their preferred method or methods.	Hans Keune (HK)	A decision-support protocol is presented in Chapter 2.
30.	1					How will technical/expert support of the context specific method development and application and evaluation concretely be organized?	Hans Keune (HK)	As is now outlined in Section 1.1.1, an expert group is likely to be established (2015-2017) to follow on from this assessment in providing expert support to other IPBES activities (particularly the regional and global assessments) in their application of scenarios and models.
31.	1	-	-	-	-	The chapter and assessment overall could concentrate on more explicit recognition of where gaps exist in the literature. This might be through a standardised flagging procedure. In particular sentences that use speculative or conditional language (may/might) without references should be noted.	Jasper Montana (JP)	Point taken. Some effort has been made to address this issue, but more work is likely to be required following the second review phase.
32.	1	-	-	-	-	The technical and functional elements of scenarios and models are presented in detail in this introductory chapter, however the human, economic and institutional elements of models and scenarios, and their	Jasper Montana (JP)	Section 1.2.1 and Fig 1.3 have now been extended to better convey that any use of scenarios and models to inform

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						production and use, are not. These elements are integral to the modelling and scenario analysis process and play a role in the ultimate integration of models and scenarios into decision making. This chapter could benefit from paying more attention to these other elements of models and scenarios and their relation to policy. Establishing this in Chapter 1 would provide a common basis for development in later chapters on linking models across domains and scales, and developing capacity. As a start, an overview of the modelling and scenario community and the institutional landscape would be useful. In addition, inclusion of details of modelling and scenario development teams in the case studies outlined in P21-26, and throughout the rest of the assessment, would assist an understanding of how they were produced and used.		policy and decision-making will typically occur within a much broader, and often highly complex, social, economic and institutional context.
33.		1	-	1	-	Need to define (at least roughly) 'models' and 'scenarios' prior to using the terms, as there can be a lot of confusion about these. The definition of a model doesn't come until page 17!	Neil Burgess (NB)	Scenarios and models are now defined in 2nd and 3rd paragraphs of the chapter.
34.	1.1	1		3		Scenarios and models must take into account examples of well preserved natural areas that also sustain good economic profit for the sake of demonstration and to convince decision makers and the public. e.g. a RAMSAR or Natura 2000 site that preserved nature and also has profit from ecotourism compared to neighbouring area or zones.	Stoica Dan Laurentiu (SDL)	This is one of many uses of scenarios and models. These sections do not focus on a particular use.
35.	1.1	1		3		Scenarios and models can keep track of ecosystem services valorisation by analyzing what happened in the Natura 2000 network, if there are improvements in well-being across countries from old to new designated areas.	Stoica Dan Laurentiu (SDL)	See above
36.	1.1	1		3		Likewise for the sake of comparison, scenarios and models should refer to loss of ecosystem deliverables (regulating, provisioning, cultural) resulted from deficient management or no management.	Stoica Dan Laurentiu (SDL)	See above
37.	1	1		35		It would be more convenient for the reader that key concepts and their definitions were in bold + defined again at the end of the chapter: e.g. scenarios, explorative scenarios, policy scenarios, participatory scenarios, forecasting, backcasting, plausible futures, statistical extrapolation, probabilistic scenarios	Sebastien Lizin (SL)	A consistent approach to defining key terms and concepts is being developed for the entire report, along with a comprehensive glossary
38.	1	1	1	35	18	General comment. For this whole chapter (and for the whole document), the conception used for science-policy interface (SPI) is far too simplistic: SPI is not linear (there are plenty of stakeholders, all interacting with one another), not unidirectional (from science to policy), and not neutral (scientists do have normative objectives and values, as is	Audrey Coreau (AC)	Section 1.2.1 and Fig 1.3 have now been extended to better convey that any use of scenarios and models to inform policy and decision-making will typically occur within a much broader,

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						attested for instance l. 40 : "reduce degradation of biodiversity and ecosystem services"). Social scientists (van den Hove, Latour, Mermet, etc.) in STS and other disciplines have studied since the last 50 years these SPI concluding that the model of "public understanding of science" (were you just have to bring better knowledge to take better decisions) was not sufficient to describe properly the interface between science and policy. Better knowledge is useful, but is not enough to bring action, especially when you just try to "translate" (p1. 139 for instance) it into policy decisions. Voir par exemple B. Wynne (1996), « Misunderstood misunderstanding : Social identities and the public upgrade of science » in A. Irwin and B. Wynne, Misunderstanding science ?, Cambridge University Press, pp. 19-46.		and often highly complex, social, economic and institutional context. The text also now acknowledges that policy change will rarely be driven by scenario analysis and modelling alone, and will often involve highly dynamic interactions and feedbacks between scenario and model development, knowledge and data generation, and engagement with decision makers.
39.	1	1		2		Aucune mention de la **SENSIBILISATION** pour laquelle les scénario et les models sont des outils qui permettent aux différentes cibles de faire faire des reprsentation et mieux comprendre le message véhiculer.	Estelle Mawal A. Mbassa (EMM)	Unclear what change is being suggested here.
40.	1	1	5	1	10	"Scenarios and models of biodiversity and ecosystem services play important roles in assessments, policy support and decision making because they help to "better understand and synthesize a broad range of observations; alert decision makers to undesirable future impacts of global changes such as land use change, invasive alien species, overexploitation, climate change and pollution; provide 10 decision support for developing adaptive management strategies; and explore the implications of alternative social-ecological development pathways and policy options" Can we say this for sure? Shouldn't it start out with specifics on how and when they've been used and to what degree they have been used successfully? This seems like something people say a lot, and it gets accepted but it is never tested. In the US, I would argue models of biodiversity are rarely or seldomly used in policy support. Economic values in regards to damages are used in a CBA framework within NEPA. And the ESA is key, not that of biodiverse range of species.	Kelly Heber Dunning (KHD)	The support for this statement is found throughout the document, using a wide range of examples. We agree that they are not used as widely as they could be and explain the means of overcoming some of the key obstacles. We clearly state that this assessment refers to biodiversity at multiple scales (not just the species level) and ecosystem services. We have added a box to clarify definitions.
41.		1.	5	2.		Suggest taking a more visionary tone for the introductory section of the chapter: What is the challenge to achieving Aichi Targets as it relates to the development and use of assessments, models, scenarios? **Some suggested problems presented by current approaches to biodiversity-related policy and planning to refer to:** ● Processes and decision-support tools that result in disjointed policy and planning generally, but also perhaps most	Louise Gallagher (LG)	These are good points. Effort has been directed to addressing them at a general level throughout Chapter 1. But it is felt that some of the detail suggested here is too specific for inclusion, given the high-level nature of the perspective being taken in this chapter.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						importantly in national development planning. ● Lack of holistic analysis (analysis of impacts and perspectives from many sectors in society at once) leading to poor reconciliation of costs and benefits at different scales with policy and investment choices bringing about traditional/unsustainable development outcomes as a result. ● Lack of adequate responses for a) understanding and b) identifying solutions appropriate to the complexity of the problem. What are the ultimate benefit or outcome desired from the response suggested by Deliverable 3c in entirety in improving analysis approaches and tools? Throughout the chapter the discussion relies on IPCC rather than making a solid, stand alone justification for use of models/scenarios in the case of biodiversity and ecosystem services policy formulation and implementation. Some suggested text from a Luc Hoffmann Institute working paper (attached to my email) to work with: The challenge to achieving [the Aichi targets on biodiversity and ecosystem services] is in part the lack of evidence for the role that sustainable ecosystems and natural resource management play in economic and social development (Jones, 2010). Bluntly stated, the value of maintaining natural capital is not always obvious to decision-makers and stakeholders choosing pathways to economic development (de Groot, Alkemade, Braat, Hein, & Willemen, 2010). Additionally, although the systemic linkages between economic, social and environmental dynamics are increasingly being discussed and understood at the strategic level, sectoral policies and investment decisions are still designed in silos, showing a reticence to deviate from "tried and tested" though unsustainable development pathways (Boschken, 2013). This makes a transition to balancing short-term economic benefits of infrastructure investment against the long-term needs for ecosystem integrity and equitable human development a fraught exercise. Planning development policies for maximum benefit to regional, national economies and local communities requires methods and tools that include those benefits gained from maintaining natural capital. Many such tools are being put forward to inform decision-making in various		

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						initiatives by bilateral development partners, International Governmental Organisations and Civil Society Organisations, academics (Waddell, Liming, & Xuan, 2008; Learmonth, Smith, Sherman, White, & Plank, 2011) and private sector consulting firms. By and large, these approaches attempt to analyse and estimate various dimensions of the short, medium and longer-term outcomes of policy and investment choices, including the choice to "do nothing".		
						Current explorations point to the need for more appropriate decision-support tools for development bank investors (ADB 2014) and public decision-makers (UNEP, 2014) that include quantified negative environmental externalities for both local communities and national economic priorities including sectoral development, poverty reduction, and job creation (Bassi, Bečić, & Lombardi, 2014). This is because most impact assessment tools are designed to evaluate one single dimension of development (i.e. economic, social or environmental), and only their combined use is likely to provide effective support to decision making. Moreover, many tools and methodologies are developed following frameworks that cannot be easily customized to the local context, which prevent analysts and decision makers from utilizing the results of the assessment to inform their specific development priorities (Wallhagen & Glaumann, 2011).		
42.	1.1	1	7	1	12	Long sentence; may be rewritten	Gautam Talukdar (GT)	Agree that sentence is long, but this is a quote.
43.	1	1	7	1	17	I realise this is a quote from a report, but models are also useful to fill in spatial gaps in knowledge, e.g. species distribution modelling, especially in the marine realm where it is not practical to systematically survey remote biomes.	Corinne S. Martin (CSM)	We agree and this use is outline in the report, but we can't list all of the possible uses. We've rephrase the sentence to make it clearer that this is not an exhaustive list.
44.	1.1	1	7	1	23	Introduction is generally unclear and doesn't communicate much of substance.. I expected to read about the scope of the report specifically adressing how methodologies for scenario analysis and modelling of biodiversity and ecosystem services were assessed.	Megan O'Rourke (MR)	Section 1.1 has now been re-written and expanded to better introduce the scope of the report, and the role of this chapter.
45.		1	19			Is the statement "most fundamental message emerging from this assessment" a final conclusion of the chapter or just an underlying assumption set by the whole assessment. I would appreciate if the actual aim of the chapter is better specified. Is this to provide evidence to support this statement or to assess the possibilities and limitations of models and scenarios.	Rik Leemans (RL)	This statement has been qualified and we have moved up and modified the purpose and scope section to clarify this

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
46.		1	22	1	23	There is a quote but not a reference to whom is quoted. Also IPBES/2/16/Add4?	Rik Leemans (RL)	A footnote now indicates how to access the cited IPBES documents
47.		1	38	1	40	"increasingly being used" this seems at odds with the former paragraph.	Rik Leemans (RL)	Removed "increasingly used"
48.	1	1	22			There is bit of a danger that unbalanced focus on scenarios and models can lead to a misconception that decision makers no longer need to invest in data collection and maintenance – that can be replaced by cheap scenarios and models. So, it would be wise to supplement this second paragraph with a sentence along the lines of "Such scenarios and modeling must complement (and indeed help to guide) renewed investment in the collection and maintenance of underlying data."	Thomas Brooks (TB)	A whole new paragraph (third last paragraph of 1.2.1) has been added, strongly making this important point.
49.	1	1	26	1	30	I'm unconvinced. Certainly the IPCC has been successful in popularising climate change models. Whether these have had a major influence on policy, and specifically a greater influence than that of biodiversity models, I'm skeptical. The world has a global biodiversity strategic plan and 20 Aichi Targets; with the expiry of the Kyoto Protocol there is no equivalent for climate change. (We made this point, among others, in Brooks, T.M., Lamoreux, J.F. & Soberón, J. (2014) IPBES ≠ IPCC. Trends in Ecology and Evolution 29: 543–545.) I would change "amply demonstrated the power of" to "been successful in popularising"; and change "they have yet to impact on decision making to the extent achieved in the climate domain" to read "their recognition is less clear cut".	Thomas Brooks (TB)	Point well taken. The two ideas have been included in the text. However, we stick with the idea that IPCC scenarios and models are a cornerstone of the science-policy debate. They are controversial and may not have successfully achieve their goals, but that is not the same issue.
50.	1	1	38	1	40	Again, I disagree. What is the evidence of this? To the contrary, and in addition to my previous point on global policy, many local and national level decisions are influenced by biodiversity models (e.g., PVA in managing threatened species); it's not at all clear to me what the equivalent application is of climate modeling to local decision making.	Thomas Brooks (TB)	Sentence removed
51.	1	1	42			"...biodiversity and ecosystem services..." (not "...biodiversity and ecosystems..."), i.e., "services" is missing. The same problem crops up elsewhere; I'll point it out when I see it, but please correct throughout.	Thomas Brooks (TB)	The use of "biodiversity and ecosystems" throughout this report is based directly on the IPBES Conceptual Framework, where "biodiversity and ecosystems" are used to denote the scientific conceptualization of "Nature". Also, following the CBD definition only the variability of ecosystems is part of biodiversity, not the ecosystems themselves. This will be clarified in the

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								glossary.
52.	1	1	42	1	43	In what sense are "global, regional and national environmental assessments" a kind of "decision context"? Also, what evidence do we have of "increasing use"? I recommend deleting this sentence, and the "In particular" at the beginning of the next one.	Thomas Brooks (TB)	These enter in the agenda setting part of the policy cycle. This is discussed later in this chapter and in detail in chapter 2
53.	1	1	25	1	27	There is no reference to show that scenarios and models for biodiversity and ecosystem services are a key component of environmental assessment at each global, regional, local scale. As far as I know in France, this is not the case for local assessment where expert judgment is widely used in environmental assessment, often accurately, without any modelling or scenarios.	Audrey Coreau (AC)	There are references indicating the use in regional and global assessments. We do not refer to local assessments.
54.	Overview	1	25	1	30	IPCC is mentioned, but not in the brackets for the right reference and year	Miglena Zhiyanski (MZ)	This is a general reference, specific references are given where necessary
55.		1	25	1	30	Explain the reasons for why models and scnearios have been less utilised than in climate change. Is it because of more recent development?	Neil Burgess (NB)	Added sentence
56.	1	1	38		40	Why the difference in performance compared to IPCC models? Because the IPCC already incorporates (more mature) the policy process? Or because difference in complexity, expert culture, or in IPCC there is a different kind of link with human well –being, or perhaps less complex?	Hans Keune (HK)	Clarified
57.	1	1	42			The 'also' seems odd in this sentence?	Hans Keune (HK)	Removed "also"
58.	1	2	1	2	5	The sentences in this paragraph seem to be unsupported assumptions. Can references be added to support them?	Thomas Brooks (TB)	These are supported throughout the document. We now make reference to this.
59.		2	2	2	3	"done at local scales, but some methodologies are also pertinent at national to global scales". Please refrain from using the word scale in these contexts. Global generally means world-wide and not a global aggregation. Better: "done locally, but some methodologies are also pertinent nationally to globally".	Rik Leemans (RL)	Scale refers to both resolution and extent. We use it here and throughout to refer to extent and specifically refer to resolution when appropriate.
60.		2	3			"Experience shows" References are needed to support this statement.	Rik Leemans (RL)	Examples are provided throughout the document. We now orient the readers to these.
61.		2	5			· The participation by multiple stakeholders, including key decision-makers, in early phases of model/scenario development and use is also a	Louise Gallagher	Added

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						key ingredient to successful application.	(LG)	
62.		2	7			"The first global assessment with substantial component of biodiversity scenarios" is not completely correct. The first paper accomplishing this was Sala, O. E., F. S. Chapin, et al. (2000). "Global biodiversity scenarios for the year 2100." Science 287(5459): 1770-1774. They started their work based on a research gap identified by the 1995 Global Biodiversity Assessment.	Rik Leemans (RL)	We refer to a "global assessment". The Sala paper is not an assessment, it is a research article.
63.		2	Fig 1.1			The first paper should be explicitly mentioned: Wilson, E. O. (1987). "An urgent need to map biodiversity." Scientist 1(6): 11-11. This is not 1989, but 1987!	Rik Leemans (RL)	The axis is non-linear, but the pointer does need to be move a bit. This will done when the final version of the figure is made
64.	1	2	7			Young compared to…?	Hans Keune (HK)	This was misstated. We meant to refer to the used in assessments and to use the word recent. We are assuming that most people would consider 2005 as being recent.
65.	1	2	7			The science behind scenarios is young, yes. Models – not really – models in biodiversity go back 50 years or more. I'd delete "and models" from this sentence. Actually, it would be useful to add a paragraph, immediately before this one, to summarize and discuss the long history of modeling for biodiversity (and indeed for ecosystem services).	Thomas Brooks (TB)	This was misstated. We meant to refer to the used in assessments.
66.	1	2	6	15		Dans la figure 1.2, il y a pas les **ressources génétiques** parmi les éléments de la biodiversité et des écosystèmes	Estelle Mawal A. Mbassa (EMM)	Biodiversity includes genetic resources. A box earlier in the chapter clarifies this.
67.		2	10			· It is worth mentioning TEEB and CBD secretariat work on collating data, case studies and methods in addition to the MA.	Louise Gallagher (LG)	This specifically refers to assessments. TEEB is technically not an assessment and is not referred to as such.
68.	1	2	15	2	17	Why not plot the y axis of Fig 1.1 as proportion of biodiversity-related articles, rather than absolute number. This would be much more informative, given that the total number of articles has been increasing over the same period.	Thomas Brooks (TB)	The proportion figure is much less smooth over time so isn't as nice, but it is fully coherent in terms of overall trends (note the %'s are given).
69.		2	15	2	25	· Figure might be of more use in a review chapter rather than introduction	Louise Gallagher (LG)	But the report does not include a review chapter, therefore Chapter 1 partly serves this purpose.
70.	1	2	15	2	24	Figure 1.1. the word "prediction" in the keyword is not specific to future studies. Therefore you capture in this analysis all papers that make a prediction about a past situation, or a current state.	Audrey Coreau (AC)	The study also looked in detail at a subset of papers and found that the results were coherent with what they

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								were searching for.
71.	1	2	19	13		As the traditional knowledge is associated to the topic of scenario and model, some **figure like 1.5 should be follow with an explanation figure based on a practical example (which use one of the different elements mention in the figure)** of model in other to promote better understanding by all the stakeholders particularly at the local level.	Estelle Mawal A. Mbassa (EMM)	Practical examples are provides in the Boxes.
72.		2	15	2	20	I feel that the search strategy used fort his figure can lead to very coarse overestimations of the number of papers by using OR for all search combinations. I would argue that there is a package of terms used to refer to scenarios among which the use of OR is fine, and that there is a package of terms used to refer to biodiversity among which the use of OR is fine, but there should be an AND linking scenarios and biodiversity. Also, the text emphasizes the differential development of scenarios, particular dissecting those that model ecosystem services and those that model biodiversity. The figure at present shows only the paper that model future scenarios for biodiversity according to the name of the graph and to the name of the Y axis, but looking carefully at the search procedures it is in fact confounding the modelling of biodiversity and that of ecosystem services. I just performed a quick search in ISI web of knowledge for Ecosystem services AND scenarios and 1.012 results were retrieved. It would be good to calculate, as you do for biodiversity (which I find very relevant) the % of publications on ecosystem services that use scenarios	Patrcia Balvanera (PB)	The study also looked in detail at a subset of papers and found that the results were coherent with what they were searching for. Note that the end period was 2011 (ca. 400 results for the search pattern suggested by the reviewer). In the final version of this chapter we may redo the search with an updated time frame and take into account some of the reviewer's suggestions. Change made in final draft: search strategy refined and updated.
73.		2	29	2	30	What do you mean by weak? Unfrequent? Or rather that the ecological knowledge used for such modeling is unsupported. There, some words might be needed on the types of modeling tools available and the range of robustness of the corresponding modeling approaches (at least present these if the topic is treated in greater depth later on). I did note that you address the topic of the criteria used to assess the quality of the scenarios later. Yet, at least some clarification is needed here.	Patrcia Balvanera (PB)	Clarified weak. The details concerning robustness and other issues are in subsequent chapters
74.	1	3	-	-		Does "food production" include fisheries?	Corinne S. Martin (CSM)	Yes
75.	1	3	4			Excessive reliance on citing the UK NEA (also page 15, lines 42-43). There must be examples from other countries which can be cited?	Thomas Brooks (TB)	We have now included references to the Japan and Southern African assessments as well as a review of national assessments
76.		3	6	3	10	GBO4 study falls in the 'between extremes' category as the Rio +20 scenarios were used, but the published literature also synthesized	Neil Burgess	Added

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
							(NB)	
77.	1	3	9			"...biodiversity and ecosystem services..." (not "...biodiversity and ecosystems..."), i.e., "services" is missing.	Thomas Brooks (TB)	We try to follow IPBES conceptual framework terminology.
78.		3	13			Should be "…based on a broad…"		Fixed
79.	1	3	15			Clairement souligner la dépendance des scnarios et models des contextes politique, socio-économique et surtout environnementaux (qui sont de plus en plus dynamiques), D'où la nécessité de prendre en compte, dans le cadres des scénarios et models relatifs à la biodiversité et aux services écosystémiques, une multiplicité de facteurs pour garantir l'efficacité des dcisions prises.	Estelle Mawal A. Mbassa (EMM)	We highlight this in section 1.2
80.	1	3	19	3	32	You found a few examples of scenarios at sub-national scale: this is probably because they are not published in academic literature, rather in "grey literature". In France, there are plenty of scenario exercises, especially for freshwater ecosystems (because it is asked by the law in some planning procedures), but they are not published in academic literature.	Audrey Coreau (AC)	We have not cited many sub-national analyses in this chapter, but other chapters, especially Chapter 2 provides many references;
81.		3	19	3	25	I suggest that before getting into the biases of the scenarios a paragraph addresses the range of purposes for which scenarios are used. While this is presented quickly earlier, it would be relevant to have here a section of the kind of key applications of scenarios for biodiversity and ecosystem services at a range of spatial scales. For example, global scenarios are used to contrast against the different Aichi targets (mentioned in this paragraph though not as a main focus of the discussion), for which a range of response variables relate to either biodiversity or ecosystem services. Scenarios for biodiversity or ecosystem services at national scales to design priorities for conservation, to design payments for ecosystem services, and so on. There you can link to the section already on the text about the temporal scale of the targets against which the scenarios are contrasted.	Patrcia Balvanera (PB)	The decision context is dealt with in section 1.2 and then in detail in Chapter 2. The order in which sections appear is not obvious, since they are all interdependent. We have maintained the current structure and felt that adding decision context here would be redundant
82.	1	3	19		32	Why nothing explicitly mentioned from a more social scientific perspective? On governance, decision making process, institutional context, …	Hans Keune (HK)	Sentence added
83.		3	20	3	21	This may reflect a bias in the journals considered; lots of marine modelling & scenario papers published in marine journals (some reviewed in GBO4 Target 12)	Neil Burgess (NB)	Sentence and refs added
84.	1	3	20	3	24	What about marine ecosystems? Are they well represented in scenarios and modelling analyses?	Corinne S. Martin (CSM)	Sentence and refs added
85.		3	22	3	22	Overexploitation has received a huge amount of modelling attention in the marine realm	Neil Burgess	Sentence and refs added

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
							(NB)	
86.	1	3	24			Presumably there is also a bias in taxonomic coverage, with most scenarios and models covering terrestrial vertebrates, far fewer covering fishes, invertebrates, plants, fungi, etc.	Thomas Brooks (TB)	Agree, will be addressed
87.	1	3	24	3	25	Change from "There is also a strong bias towards scenarios in the literature and assessments exploring mid- and end-21st century outcomes" to "There is also a strong bias towards scenarios that explore mid- and end-21st century outcomes"	Emily Nicholson (EN)	Agree. Changed
88.	1	3	26	3	29	It is stated from lines 2 to 3 in page 2 that the application of scenarios and models is mostly at the local level.	Tianbao Qin (TQ)	Applications to policy design and implementation are mostly at the local level
89.	1	3	34	4	42	It might be useful to set out in the Purpose of this assessment, how this assessment differs from previous assessments on biodiversity models and scenarios. In particular, what lessons have been learned from previous assessment activities on this topic and why the particular approach has been taken. In addition, it may be pertinent to make a separate section on Methodology taken by the assessment, or include a methodological note in the Annex detailing processes and lessons learned. Engaging in reflexive practice during scenario development and assessment activity provides an opportunity to optimise learning opportunities (O'Neill and Nakicenovic 2008[2])	Jasper Montana (JP)	Sentences added to put in context and provide motivation. Chapters provide background on lessons learned, perhaps the next iteration of this overview will summarize them.
90.		3	34	4	42	**: Section 112**: The purpose and scope is poorly described for an outsider. The text is framed in too much IPBES jargon and it stats with the 3 elements of Deliverable 3c and audiences. The purpose is not clearly specified.	Rik Leemans (RL)	This section have been moved, rewritten and better placed in context
91.		3	36	3	38	"A fast-track assessment of methodologies for scenario analysis and modelling of biodiversity and ecosystem services (subsequently referred to as the "assessment for scenarios and models") to be completed in 2015.". It is not clear to me from the introduction that this document actually comprises this deliverable. That could be stated explicitly.	Rik Leemans (RL)	This section has been moved, substantially rewritten and better placed in context
92.	1.1.2					The section seems to restate many times in different words what the scope, objective, and purpose of the assessment is. This is confusing and needs to be streamlined into a single simple and clear statement	Megan O'Rourke (MR)	This section has been moved, substantially rewritten and better placed in context
93.	Overvi	4	1	4	1	"... scenarios and modelling work uses..." – remove s in uses	Miglena	Changed

---

[2] O'Neill B.C. and Nakicenovic N. (2008) Learning from global emissions scenarios. Environmental Research Letters. 3.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
	ew						Zhiyanski (MZ)	
94.	1	4	12	4	24	This paragraph discusses the audience of this deliverable. But this is only about methodological assessment report. What are the audience of the follow-up work by the task force? Maybe this paragraph can be shifted after the next paragraph, adding up the discussion about audience of follow-up works.	Tianbao Qin (TQ)	This is now addressed more clearly in the statement about audience
95.	1	4	19			Change "stakeholders and policy makers" to read "policy makers and other stakeholders" (because policy makers are also stakeholders).	Thomas Brooks (TB)	Change made in final draft: change implemented
96.	1	4	26	26	30	What if places are not equipped institutionally to include these assessments into policy-making? It seems this whole report is in the realm of the hypothetical, it is useful because it is useful, but I think it would read more convincingly and not be yet another report sitting on a shelf i fit delved into a few specific examples early on.	Kelly Heber Dunning (KHD)	We have a full chapter on capacity building and on efforts that IPBES task forces need to undertake to support assessment activities in all regions.
97.	1	4	31		12	Nothing about **the way to promote (encourage) the use of scenario and models by International Organisations, Governments, NGOs** for environmental assessment.	Estelle Mawal A. Mbassa (EMM)	We now more explicitly address the need for capacity building and mobilizing the scientific community
98.	1.1.3	5		5		This section about the link to other IPBES deliverables in confusing. It seems like the order may conform to a timeline, but presenting in the order of deliverables 2,3,1,4 is not useful for the reader.	Megan O'Rourke (MR)	This section has been moved, substantially rewritten and better placed in context
99.		5	1	5	35	This section is quite interesting but a little hard to follow for non IPBES people. I wonder if there is a way to guide a bit better the reader, maybe at the beginning of the section, on the types of documents that will be mentioned later.	Patrcia Balvanera (PB)	This section has been moved, substantially rewritten and better placed in context
100.	1	5	3			Add mention of "methodological" assessments (like this one).	Thomas Brooks (TB)	Done
101.	1	5	10			It isn't clear what 'The assessment of scenarios and models" is – the document I'm reading? Is this the same as the "guide" referred to in the last sentences of the previous paragraph?	Emily Nicholson (EN)	This has been clarified
102.	1	5	14			Sentence does not make sense. Maybe replace "common" with "commonality"?	Thomas Brooks (TB)	Reworded
103.	1	5	14	5	14	Suggest changing the word 'vocabulary' for 'ontology'	Marta Pascual (MP)	Sentence reworded
104.	1	5	20			Change "require" to "required"	Emily Nicholson (EN)	Corrected

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
105.	1	5	20			"required" not "require"	Thomas Brooks (TB)	Corrected
106.	Overview	5	20	5	20	"that is require" – must be "that is required"	Miglena Zhiyanski (MZ)	idem
107.		5	20	5	20	Consider revising the sentence	Narayan Dhital (ND)	Done
108.			24		24	Consider revising "participation of ILK" as it did not make a clear sense to me.	Narayan Dhital (ND)	Changed wording
109.	Overview	5	26	5	26	Modeling – to follow one pattern in writing – in this case should be with double "ll" - Modelling	Miglena Zhiyanski (MZ)	This will be made consistent across all chapters in the final version.
110.	1.1.3	5	30	5	35	Policy support and decision-making must be targeted with the most efficient communication channels to insure finality.	Stoica Dan Laurentiu (SDL)	This would seem to address other sections of this chapter
111.	1	5	34			Separate the text on scenarios + IPBES' knowledge generation function as a separate paragraph, and move the text on scenarios + ILK (lines 22-27) down into this – it belongs here, not in capacity building. Also, add a sentence into this paragraph on the importance of renewed investment into data collection and monitoring, to support scenarios and modeling (and avoid "garbage in garbage out"), and the potential of models to guide such investment.	Thomas Brooks (TB)	Separated.

Added text. |
| 112. | | 6 | | | | · The section does not talk explicitly about the role for scenarios and tools for decision-making amongst the other influences in decision-making. It may be worth mentioning that improved science on biodiversity and ecosystem services models and assessments is not the only missing ingredient for achieving the targets. Understanding the timing of the policy cycles in countries/regions, political influencers, other options and needs of decision-makers ...etc. is also going to be critical in the scenarios and assessments. This points to a need to really bring different types of science together. This need is referred to in reference to multiple disciplines. But it might be helpful if a concrete example is discussed in a line or two. Economic and political science, for example, will help in building more realistic models and scenarios, or assist the communication of modelling results to those audiences not engaged or preoccupied with biodiversity to have the impact required of IPBES and the initiatives it aims to inspire. | Louise Gallagher (LG) | Section 1.2.1 and Fig 1.3 have now been extended to better convey that any use of scenarios and models to inform policy and decision-making will typically occur within a much broader, and often highly complex, social, economic and institutional context.

The text also now acknowledges that policy change will rarely be driven by scenario analysis and modelling alone, and will often involve highly dynamic interactions and feedbacks between scenario and model development, knowledge and data generation, and |

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								engagement with decision makers.
113.		6	7	7	4	Figure 1.2 has also been published and motivated in an extended review paper in COSUST. This paper should be cited: Díaz, S., S. Demissew, et al. (2015). "The IPBES Conceptual Framework — connecting nature and people." Current Opinion in Environmental Sustainability 14: 1-16. Similarly: page 9, line 43	Rik Leemans (RL)	Citation updated
114.	1	6	10	6	13	What are "indigenous and local knowledge systems"? If they indeed are "knowledge", why are they not scientific?	Michel De Lara (MDL)	This will be defined in the glossary, reflecting the definition adopted elsewhere by IPBES (e.g. in the Conceptual Framework)
115.		7	6	7	10	Figure 1.3 is very illustrative on how to use models and on the different purposes of models and scenarios. However, the figure strongly focusses on the future. The last statement in this sentence "based on best-available knowledge" is actually derived from observational, empirical and model-based scientific evidence that can also be frames with this figure. It is then applied to historical and recent trends and not to future trends. Expanding this paragraph with the 'scientific method' to produce knowledge would be very helpful and serves the later section on purposes of models.	Rik Leemans (RL)	A whole new paragraph (third last paragraph of Section 1.2.1) has been added emphasising the importance of data and knowledge (scientific, indigenous and local).
116.	1	7	8			Only quantitative processing of information? Why not also qualitative? Like storylines?	Hans Keune (HK)	The importance of qualitative, alongside quantitative, approaches is acknowledged throughout the chapter, and indeed the entire report.
117.	1	7	21			Not just "ecosystem". Add text to read "...genetic, species, and ecosystem properties and processes".	Thomas Brooks (TB)	See response to Comment 55 above.
118.	1	7	22			Ecosystems are part of biodiversity, so no need to specify "and ecosystem" – delete this.	Thomas Brooks (TB)	See response to Comment 55 above.
119.	1	7	30			"fall largely outside the scope of this document" – its not clear why this should be the case. Surely all aspects of IPBES should reflect the entire conceptual framework? Or maybe the conceptual framework, which at present describes the entire planetary human enterprise, has actually been established with too broad a scope, and would be better specifying those of its components ("anthropogenic assets" and "good quality of life", as specified here) which lie outside the immediate remit of IPBES?	Thomas Brooks (TB)	This statement is simply pointing out the reality that good quality of life is also determined by a diverse range of factors – e.g. built, human, social, and financial assets – that are not mediated by biodiversity or ecosystem services, and therefore fall largely outside the scope of IPBES.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
120.	1	7	34			"...biodiversity and ecosystem services..." (not "...biodiversity and ecosystems..."), i.e., "services" is missing.	Thomas Brooks (TB)	See response to Comment 55 above.
121.	Overview	7	32	7	32	Punctuation in "access to electricity, etc.)"	Miglena Zhiyanski (MZ)	Punctuation issues will be resolved in the final version of the report.
122.			33		33	Consider as instead of in	Narayan Dhital (ND)	Not clear which page this is referring to
123.	1.2					I didn't review this section in detail and don't have comments	Megan O'Rourke (MR)	Ok
124.		7	15	7	24	Sentence is not straight forward and difficult to follow. Consider revising.	Narayan Dhital (ND)	Revised
125.	1.2.1	Figure 1.2				Is this figure set in stone? I find it conceptually difficult to understand. I use many figures from MEA to teach and I would not try to present this to students (or anyone) because there is too much infomation and it is unclear. For example, why aren't there examples of natural drivers when there are examples of everything else? Why are anthropogenic assets in a separate box from anthropogenic drivers? Why is there a direct drivers box and no indirect drivers box? The cahnges over time and interacting across spatial scale parts of the figure also are too complicated in the figure. Overall, this should be simplified for easy communication purposes.	Megan O'Rourke (MR)	Yes, this is set in stone as a result of negotiations leading to the Conceptual Framework adopted by the IPBES Plenary
126.		8	Fig 1.3			The right side of the figure seems cropped. Frames of the boxes are discontinued.	Patrcia Balvanera (PB)	Corrected
127.		8	1	8	5	This figure is very helpful. I was nevertheless struck by the lack of the oval saying models in the link between ecosystem services and well-being. Indeed, those links are currently been assessed in more systematic ways and the strong mismatch in spatial and temporal scales between ecosystem services and well-being, on top of the complexities of these interlinkages, of course hinder the development of these tools. Yet, I would argue that an oval that would encompass the links between ecosystem services + anthropogenic assets is most needed. Would that be outside the scope of IPBES? I would personally not believe so. I think that while we are not able to convey messages on the consequences of loosing biodiversity in terms of impacts on the different components of well-being we will continue to have a hard time being really heard by decision-makers.	Patrcia Balvanera (PB)	This is an important point, and has been raised by other reviewers. The focus on the three types of models depicted in this figure is derived directly from the scoping document for this assessment (approved by the IPBES Plenary). However Chapter 5 of the report is nevertheless directing some attention to the modelling of human well-being as a function of ecosystem services. The suggested inclusion of an additional model oval representing this in Fig 1.3 therefore warrants further consideration.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						The text argues why models linking services + anthropogenic assests were not included yet I still feel that they should be part of the document. Also, the text does highlight the use of some indicators that can directly (or easily) link ecosystem services to some components of well-being, and these tools are extremely useful and urgently needed. I would then emphasize the need to explore all the range of links between services and well-being more explicitly in this document. Also, the figure assumes that effects of environmental drivers on ecosystem services are all mediated by changes in biodiversity. I do not think such assumption is supported at all by the literature. While there are clear examples of the effects of biodiversity change on ecosystem services, there is also a very wide literature on the direct effects of environmental drivers (in particular abiotic) on ecosystem services that should also be taken into account.		<u>Change made in final draft:</u> this issue now addressed by inclusion of "cross-sectoral integration" element in Fig 1.3 (along with explanation in caption and text), and explicit treatment of importance of modelling and assessment of human well-being in Section 1.2.2, along with explanation as to why much of this falls outside the scope of IPBES and this assessment (because it involves modelling and assessment of dimensions of human well-being not involving biodiversity and ecosystems, and therefore dealt with in other sectors – e.g. health, education). The assumption that effects of drivers on ecosystem services is mediated by changes in nature (biodiversity and ecosystems) is derived directly from the IPBES Conceptual Framework.
128.	1	8	1	8	1	Figure 1.3 might be clarified. While it is clear that the bounding grey box in the previous figure on the IPBES Conceptual Framework represents the scope of IPBES, it is not clear what the bounded blue box that contains elements of the conceptual framework interconnected with models represents in this figure. This may need revision or clarification in the Figure Legend.	Jasper Montana (JP)	Clarified
129.	1	8	1	8	4	General comment. It is not clear in this chapter what is your definitions of scenario and model. There are several definitions (not all exactly the same) in the whole document. As far as I understood what you meant, models are formalised representation of ecological systems, whereas scenarios are qualitative socio-economic elements of context for the future. This is not how future studies define scenarios. See for instance Coreau et al. 2009 – Ecology Letters, for an analysis of definitions and of the complementarities between models and scenarios. Figure 1.3. scenarios can also be useful to link indirect drivers and drivers, to link drivers and nature and nature to nature's benefit to people. Moreover, the arrow could also be drawn the other way round:	Audrey Coreau (AC)	'Model' and 'scenario' are now defined in the 2nd and 3rd paragraphs of the chapter

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						state of nature does influence direct drivers, and indirect drivers for instance. Policy and decision making can influence knowledge (scientific, indigenous and local) => see for instance Pestre 2003 – 'Regimes of knowledge production in society: towards a more political and social reading')		
130.		8	10	8	13	Message not clear	Narayan Dhital (ND)	Clarified
131.	1	8	13	8	15	Are these aggregated measures of benefits? Or a social willingness to pay?	Kelly Heber Dunning (KHD)	"Nature's benefits" will be defined in the glossary, reflecting the definition adopted elsewhere by IPBES
132.		8	14			There should be a comma after However.	Rik Leemans (RL)	Corrected
133.	1	8	14			However, policy and decision making (add comma)	Sebastien Lizin (SL)	Corrected
134.		8	14	8	26	Even if scenarios of the direct and indirect drivers are available, on still has to assume that the model based on observations holds into the future. The model uncertainty (as opposed to scenario or trajectory uncertainty) is a key point and should be mentioned, both in terms of uncertainty about the existing model parameters, and also uncertainty about how well the model will hold up when predicting into the future. Blois et al (PNAS 2013) suggest that spatial models produce reasonable predictions about temporal changes.	Neil Burgess (NB)	Point taken. Text now added near start of Section 1.2.3 highlighting importance of communicating, and helping users to interpret implications of, levels of uncertainty associated with both scenarios and models, as part of the assessment and decision-support interface.
135.		8	15			"might include, for example" For example is already implicit in might include and can be deleted.	Rik Leemans (RL)	Corrected
136.		8	17			"such as these" can be deleted when you add these before questions. The sentence then become more comprehensive because "relating" immediately relates to questions.	Rik Leemans (RL)	Corrected
137.		8	20	8	24	English not very well written. Consider revising.	Narayan Dhital (ND)	Revised
138.		Figure 1.3				This figure struck me similarly to figure 1.2. It is not pleasing to look at because it is too complicated. For example, why are there three different ovals for models? Arrows go everywhere and therefore don't provide useful information.	Megan O'Rourke (MR)	The number of boxes, and the arrows between them, are derived directly from the approved IPBES Conceptual Framework.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								The three different model ovals correspond to the three major types of models discussed in Chapters 3, 4 and 5.
139.		9				I like the characterisations of the modelling and assessments - it would be easier to read in bullet points or a table.	Louise Gallagher (LG)	Much of this typology is presented in tabular form in Chapters 3 and 4. But we feel that the initial introduction to these concepts is best done in its current form. Fig 1.4 also provides more of a dot-point representation of this information.
140.	1	9	1			Within this broad context, scenario scan play (add comma)	Sebastien Lizin (SL)	Not changed – other reviewers have been critical of the use of too many commas in the chapter
141.	1	9	1	9	11	I suggest to use two different words for the "two main roles of scenarios". A pathway, or a chronicle, is a sequence of uncertainties "not amenable to control or influence". A policy, or strategy or decision rule, produces sequences of decisions.	Michel De Lara (MDL)	Not clear what change is being suggested here
142.	1	9	1	9	25	General comment. Scenario literature is embedded among a literature in Future studies (prospective in French). Scenarios can indeed be exploratory or normative, but there are other ways of exploring futures (for instance vision exercises, or horizon scanning). Scientists and practitioners have been developing a large amount of studies (theoretical and practical), they are especially published in the journal Futures. This literature should be used in the deliverable to enhance the "scenario" part of the deliverable. See for instance Amanatidou et al. 2012. On concepts and methods in horizon scanning: Lessons from initiating policy dialogues on emerging issues Aligica. 2005. Scenarios and the growth of knowledge: Notes on the epistemic element in scenario building Van der Heijden. Scenarios – the Art of strategic conversation Van notten. 2003. An updated scenario typology	Audrey Coreau (AC)	Have now cited van Notten et al's (2012) paper in Futures on an updated scenario typology, and have adapted the existing treatment of scenario types in Chapter 1 to better reflect this thinking.
143.	1	9	1	9	25	Scenaio development can be informed by modeling as well. For example, land use modeling using historical land use change data and socio-economic data can improve our understanding of the drivers of change and how people might have reponded to incentives, which then help inform the development of scenarios.	Wei Zhang (WZ)	The role of modelling in scenario development, and in translating scenarios of indirect drivers into projections of direct drivers, now better addressed in Chapter 1, and treated in considerable detail in Chapter 3.
144.		9	4	9	5	Exploratory scenarios can also include the hopes and perspectives of	Patrcia	Agreed, this is further discussed in

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						stakeholders for the future (which has often been done for the case of ecosystem services)	Balvanera (PB)	Chapter 3
145.		9	14			"to account for uncertainties" should be "to address uncertainties" (more precise language).	Patrcia Balvanera (PB)	Changed
146.	1	9	20	9	25	What is the reference to say that the science policy interface with always be mediated by some form of assessment or decision-support system or process? I think that the interface can be very informal and difficult to describe in these terms (see for instance the work of Callon). The way the interface is described is far too simplistic. This is one way it can, sometimes, function (decision makers asking questions and modellers answering them), but in most cases, this is not the case (see all STS literature). This comment is also valid for P13. L. 28-33	Audrey Coreau (AC)	Section 1.2.1 and Fig 1.3 have now been extended to better convey that any use of scenarios and models to inform policy and decision-making will typically occur within a much broader, and often highly complex, social, economic and institutional context. The text also now acknowledges that policy change will rarely be driven by scenario analysis and modelling alone, and will often involve highly dynamic interactions and feedbacks between scenario and model development, knowledge and data generation, and engagement with decision makers.
147.	1	9	27			Describe the major components (add "the")	Sebastien Lizin (SL)	Change made in final draft: this sentence has been removed.
148.	1	9	29			- starting with …-> Make separate sentence, otherwise too long a sentence	Sebastien Lizin (SL)	Change made in final draft: this sentence has been removed.
149.	1	9	31	9	38	I believe it is important to incorporate a sub-section on "knowledge" in this Chapter, at the very least to remind users that models/scenarios are often built/derived from incomplete knowlegde (particularly in the marine realm), and/or data that were originally collected for other purposes (and hence not necessarily entirely pertinent/relevant to the question posed).	Corinne S. Martin (CSM)	A whole new paragraph (third last paragraph of Section 1.2.1) has been added emphasising the importance of data and knowledge (scientific, indigenous and local).
150.	1	9	32	9	33	Good!	Thomas Brooks (TB)	Ok
151.	1	9	40	10	3	Attributes of 'policy and decision-making' might be mentioned in a general way to help the readers to understand the scope of it, since that a clear definition of 'policy and decision-making' is not given. The attributes are discussed in pages 5 to 7 in chapter 2.	Tianbao Qin (TQ)	"Policy and decision-making" will be defined in the glossary, reflecting the definition adopted elsewhere by IPBES
152.	Overview	10	2	10	2	"…production, etc."	Miglena Zhiyanski (MZ)	Not clear what change is being suggested

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
153.	1	10	5	13	5	In this section, the influence of scenarios and model on the policy decision context is separated in 2 options: agenda setting and policy design and implementation. This could be developed a little bit. Scenarios can improve: awareness for action, action direction, responsibilities for action, strategic context understanding, etc.	Audrey Coreau (AC)	"Agenda setting" and "policy design and implementation" are defined at a sufficiently high level to encompass all of these roles.
154.	1	10	12			Why separate "policy design" from "implementation" here, if you go on to lump them (which seems sensibke to me) on page 12 below.	Thomas Brooks (TB)	Because they are separated in the report produced by the IPBES group on Policy Support Tools
155.	1	10	17	10	30	The word "scenario" is used as a synonym of "futures studies". But a model can make a projection into the future without using any scenario. What characterize scenario analysis is the quality of the way different variables, drivers, factors are intertwined in a coherent way (see for instance Schwartz – The art of the Longview ; or De Jouvenel – l'art de la conjecture).	Audrey Coreau (AC)	Change made in final draft: agree, this is now clarified in Sections 1.2 and 1.3.
156.		10	23			section 1.2.1 should be capitalized: Section 1.2.1. A reference to a chapter, figure, table or section should always be capitalized. Similarly on pg 11 line 25.	Rik Leemans (RL)	This will be made consistent throughout the final version of the report
157.		10	35	11	20	This is a very long paragraph with too much information. It can easily be cut into at least 2 different paragraphs: current conditions of biodiversity and ecosystem services and models of the effects of different drivers	Patrcia Balvanera (PB)	Changed
158.	1	10	41	10	44	This sentence is not incorrect but models do not exclusively use *remotely-sensed* information as input variables. For instance, Bio-ORACLE (http://www.oracle.ugent.be/) provides global-scale of marine environmental information, some of which are interpolated *in situ* data (e.g. dissolved oxygen [O2] concentration, pH, etc). Bathymetry is a very good predictor of some marine life, and can be mapped using *in situ* methods of data capture.	Corinne S. Martin (CSM)	Change made in final draft: replaced "remotely sensed" with "remotely derived"
159.		10		15		There is overall a gap with respect to good quality of life. I believe it is important to have this item in mind and just be mindful about how much is known to date on the final links to quality of life.	Patrcia Balvanera (PB)	Point taken – see earlier response to Comments 131 and 140
160.		10	5	15	10	I found in general the rest of the text starting in page 10, line 5 quite hard to follow. There is too much information and little guidance to the reader on what all this complexity means. Bullets with each item, with a clear definition, its importance, its potential applications, pros and cons, and so on might help.	Patrcia Balvanera (PB)	This section has been revised with these comments in mind
161.	1	11	2			Important to add something like "relative to the distribution of people receiving these benefits" to the end of the sentence here (because otherwise these are not benefits, just ecological processes).	Thomas Brooks (TB)	The sentence has already referred to the supply of ecosystem services (which, by definition, must mean to people)
162.	1	11	3	11	20	I agree wholeheartedly that modelling is great because it can enable the	Emily	Good point, and this text has been re-

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						integration of multiple indicators or variables of threat and their impacts of ecosystems. However, I don't think that is best done with composite indicators. Shouldn't it be done in a process model that, instead of modelling each process or variable on its own, integrates them such that they can interact, and their direct, indirect and combined effects can be quantified on biodiversity/ES? In this way we can (line 18) "better account for complexities and dynamics in these interactions". Composite indicators also need to have a far better model behind the aggregation of their component indicators or metrics, but that would be an additional, less important role than developing the model to bring the different threats, variables processes together into one modelling framework. In this section it is worth highlighting one of the biggest benefits of modelling, which is to bring all the relevant information data together, and make explicit assumptions about what is known and unknown – the process of developing a model and scenarios is probably the most informative part of the modelling process.	Nicholson (EN)	written accordingly
163.	1	11	12			Halpern et al. (2012) is an example, and so should be prefaced by "e,g." or, better, replaced with a citation to the generic issue of composite indices combining elements across the indicators framework.	Thomas Brooks (TB)	Changed
164.		12	Figure 1.4			Among the types of models, causal models (representing causality across variables) are not mentioned (e.g. System Dynamics). Since all models representing social and environmental systems are based on causality (which could be measured as correlations, in some cases), this should be added.	Louise Gallagher (LG)	Aren't all models essentially causal in nature?
165.		Figure 1.4				I like this figure in contrast to the previous two. It is simple and the nesting idea is clear.	Megan O'Rourke (MR)	Ok
166.		12				Like these models and the outline of the policy process, though is says it is iterative, it still has the feel of the linear policy model from the days of old.	Kelly Heber Dunning (KHD)	See response to Comment 39
167.		12	1	12	5	The figure is extremely helpful. Yet, I am not sure I was able to recognize all this complexity in the text. It might be good to have the figure first and then have bullets to help people find easily each of the items in the figure. Also, please make sure the value section is compatible with deliverable 3d (discussed at IPBES3 though now going for revision). Also, I wonder if it would be possible to add to this figure some kind of timeline on the process of choosing tools that would help the reader be clear about the different choices and what they entail.	Patrcia Balvanera (PB)	<u>Change made in final draft:</u> this figure reorganised and further refined, and is now co-located with accompanying text (in Section 1.5.1) clearly explaining all of the depicted components. <u>Change made in final draft:</u> the draft guide document from Deliverable 3d now referred to explicitly in Section 1.5.1.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
168.	1	12	5	13	5	It is designed to elaborate the role of scenarios and models in policy design and policy implementation. However, the roles scenarios and models play in decision-making are not clear enough.	Tianbao Qin (TQ)	These roles are further elaborated in Section 1.2.3 and, in even greater detail, in Chapter 2.
169.	1	12	5	13	5	The message of this paragraph is unclear.	Corinne S. Martin (CSM)	Not clear what the reviewer finds unclear about this paragraph. More specific advice would be appreciated.
170.		12	6	12	9	Sentence is not clear and difficult to follow.	Narayan Dhital (ND)	As above
171.	1	12	6	12	10	There is no perfect correspondence between 1- agenda setting and exploratory scenarios, on the one hand and 2- implementation and normative scenarios, on the other hand. In particular, exploratory scenarios can also be very useful for policy design and implementation.	Audrey Coreau (AC)	Agreed – have tried to convey the fuzziness of these relationships more clearly throughout Chapter 1, and this is further elaborated in Chapter 3.
172.	1	12	9			Add page numbers to the referral to the boxes 1.2 and 1.3 (very far)	Sebastien Lizin (SL)	Change made in final draft: this referral no longer exists (was in removed text).
173.		13	Sections 1.2.2.2 and 1.2.3			These sections are longer and more abstract than needs be. Perhaps keeping more focussed on the specific policies and interfaces for decision-support directly relevant to achievement of the Aichi targets would be more useful. Suggest looking at examples like: ● frameworks for social and environmental safeguards in regional economic integration and investment flows (development banks/large scale infrastructure projects) ● national development planning processes ● specific national policies for biodiversity and ecosystem service outcomes the use of assessments and scenarios in implementation of national policies at subnational/provincial/city-scale and/or in transboundary contexts at landscape or biome-scale.	Louise Gallagher (LG)	IPBES's interest in decision-support is not limited to achievement of Aichi targets. Change made in final draft: have tried to make this material less abstract in reworking it into new section structure
174.	1	13	19			Define "intrinsic value" very well because there is a lot of confusion around the term. It is a rather philosophical discussion. Very often confused with "existence value"	Inge Liekens (IL)	"Intrinsic values" will be defined in glossary, reflecting the definition adopted elsewhere by IPBES (particularly in the forthcoming Deliverable 3d report on conceptualisation of values).
175.	1	13	20			As above, not just "ecosystem". Add text to read "...genetic, species, and ecosystem properties and processes".	Thomas Brooks (TB)	See response to Comment 55.
176.		13	28	13	31	Message very ambiguous, consider revising.	Narayan Dhital (ND)	Not clear what is ambiguous about this message.
177.		14	4	14	7	Sentence very complex and message not clear	Narayan	As above

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
							Dhital (ND)	
178.	1	14	4	14	7	Optimisation techniques are very useful to imagine the solution that is less harmful for biodiversity – everything being equal elsewhere. But describing it as the "best solution" seems a little overrated. What is thought to be best as the result of the scientific process can be totally counterproductive in the political context.	Audrey Coreau (AC)	'best solution' is a well-accepted term in optimization science, but it's use here was not intended to imply that such a solution would also be optimal within the broader political context
179.	1	14	35			Add page numbers to the referral to the box 1.1 (very far)	Sebastien Lizin (SL)	Will implement in final version
180.		14	41	15	7	This section for example suggests a clear dichotomy that leads to a set of choices. A decision tree that would emphasize such dichotomies and the subsequent consequences of the choices would be extremely helpful. Otherwise there are just too many choices.	Patrcia Balvanera (PB)	Change made in final draft: the multidimensionality of options relating to selection of scenarios, models etc makes it very hard to represent these choices in the form of a decision tree. However, the structure of the choices that need to be made is now conveyed more clearly in a reorganised Figure 1.6, and accompanying text in Section 1.5.1.
181.		15	1	15	10	This section made me think about the above suggested diagrams and how graphical support to the above mentioned timeline and/or decision tree could be also accompanied by very graphical descriptions of e.g. multi criteria analysis. The text seems to assume that the reader is familiar with everything said in the text but I would guess it might be the opposite, with readers looking for guidance about what each of the alternatives suggested is most suited for their particular decision context.	Patrcia Balvanera (PB)	This explicit guidance, and detailed explanation of different decision-support approaches and paradigms, is provided in Chapter 2.
182.	1	15	5	10		What is going to be done to make sure that this does not become one of the hundreds of decision-making frameworks that sits on the shelved of many a practitoner and grad student? How is this different from the others? It should distinguish itself a bit better.	Kelly Heber Dunning (KHD)	The report now includes a set of concrete key findings and recommendations, with the latter targeted very explicitly at relevant IPBES deliverables, particularly the regional and global assessments.
183.		15	9	15	9	Consider change the spelling "wellbeing"	Narayan Dhital (ND)	Consistency of spelling throughout report will be resolved in final version
184.		15	10	17	35	This section was easier to understand. The information is more clearly dissected into separate types of decisions. A summary sentence for each paragraph linked to each type of decision could be extremely useful.	Patrcia Balvanera (PB)	Unsure which section is being referred to here – seems to be some mix-up in page numbering?
185.	1	15	19	15	19	Comparing scenarios to crystal gazing is not necessary. This tends to lower the credibility of the process of scenario building and analysis.	Audrey Coreau (AC)	Suggestion accepted and the word 'crystal gazing' is deleted. The sentence is now modified to read as: Scenarios

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								are a mechanism to depict or visualize….
186.	1	15	23	15	27	The examples of policy formulations given in the text (increasing protected areas, reducing fossil fuel use, or establishing hunting or fishing restrictions) seems in my sense a bit restrictive and too simple compared to the complexity of scenarios and models presented in the document. The social aspects as well as the concept of flexibility and uncertainty is quite well presented and established in the two first chapters. Therefore, I am not convinced it is good to present such precise examples as policy options and this could be well interpreted. For example, in the case of hunting, it is true that it is sometimes necessary to put more restrictions on the activity. However, restrictions can also impact negatively nature as hunters are also often conducting actions contributing to nature conservation and we don't have any concrete views on the consequences if those actions were stopped. ● To conclude, I would suggest to give more general examples such as "reduction of the pollution, increasing conservation actions and regulating the use of natural resources".	Charlotte Simon (CS)	We disagree with the comment that the examples of policy formulation given are restrictive and too simple. This document is also intended for policy makers for whom simple examples are easy to understand. For example many countries have fishing restrictions such as no-fishing zones during fish breeding seasons, types of fishing nets fishers may use etc. To your opinion that hunters are often conducting actions contributing to nature conservation we would pose the counter question. Does poaching of threatened species such as tigers contribute to nature conservation ? However to the list of examples given ,we have also added reducing pollution, regulating the use of natural resources as suggested by the reviewer.
187.	Overview	16	5	16	20	Correct cited authors according to the citation model : Spangenberg *et al.* 2012 Pereira *et al.* 2010	Miglena Zhiyanski (MZ)	Most journals and books now use et al without the italics.In any case these editing issues will be taken care of my IPBES before printing.
188.		16	9	16	11	Worth including the IPCC RCP's in this list as they are becoming very widely spread.	Neil Burgess (NB)	As suggested this is added to the list.
189.	1	16	13			Of late scenarios … (not a sentence, please edit)	Sebastien Lizin (SL)	The words "Of late" are deleted and the sentence now reads as "Recently…."
190.		16	17	16	24	The sentence is vague and the message is not clear	Narayan Dhital (ND)	Not clear what the reviewer finds unclear about this paragraph. More specific advice would be appreciated.
191.	1	16	31	16	40	Can you add examples where scenarios at global scale have been used to derive scenarios at local scales? As scenarios are very much dependant on the context and on the question that is raised by the scenario exercise, this is often very triggering and it would be very interesting for the reader to know about some successful examples.	Audrey Coreau (AC)	We have cited van Vuuren et al (2012) who have cited UNEP's global scale GEO scenarios that have been used to develop regional scale GEO scenarios in LatinAmerica, Africa for example.
192.	1	16	44	16	44	Knowledge used in scenario processes are not all peer reviewed (as is stated further in the deliverable when talking about indigenous and local knowledge). The formal steps of scenario building are rather:	Audrey Coreau (AC)	We have mentioned that scenario development involves, amongst others, exploiting and improving the

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						- Ask a question about the future - Gather data (literature, grey literature, experts' interviews, stakeholder interviews…) - Refine the question according to the data gathered - Organise data in an efficient way to explore futures (scenarios, storylines, horizon scan, etc.) – a way to organise the data can be: experts, participatory process, model, etc. - Discuss the results with scientists and stakeholders. - Strategic analysis: what should we do? (for instance Mermet – Etudier les ecologies futures).		knowledge base.This should take care of the several points suggested by the reviewer.
193.		16	45			! Scenario construction involves much more than just consulting stakeholders, if it is done well. Scenario development should reflect the beliefs and understanding different groups in society hold with regards to a) trends for biodiversity, b) likely changes in drivers and pressures impacting biodiversity, c) likely outcomes of different levels or quality of biodiversity provision in specific places, for example. Most importantly, if the scenario building is done by specific people who make decisions that impact on biodiversity, the likelihood of the model results concerning such scenarios having an impact on their decision-making is much higher. Similarly, if different groups build scenarios together, the chances of them describing the system being modelled more accurately are better as cross-sectoral discussions/learning take place.	Louise Gallagher (LG)	We thank the reviewer for the suggestions and have added these observations to the revised draft. However please note that scenario development is made by scientists/experts whereas decisions that impact on biodiversity are made by bureaucrats who may not have the expertise or capacity to undertake scenario development. Hence we have modified the statement to reflect this fact.
194.		Section 1.2.5				Not clear why some components of the first category (e.g. land-use change, fishing pressure) are assumed to be models rather than scenarios – all of these could potentially be scenario components. Needs clarification.	Neil Burgess (NB)	This sentence has been modified to reflect this
195.	1.2.5	17		19		Models should be developed to account for amount of nature deliverables lost to degradation expressed in money lost in the process of rehabilitation, bringing resources that were lost from other places, treating people from illnesses triggered by invasive species. Models should depict money lost in long term as inappropriate economic activities (mining, hydro-ameliorative interventions, introducing exotic species that become invasive, hydro-power)	Stoica Dan Laurentiu (SDL)	"Values" added to overview in 1.2.5
196.	1	17	1	17	4	Models can be used to work out the scenarios. But the relationship between scenarios and models is not clear. It can be elaborated by using figure 1.6 in page 27.	Tianbao Qin (TQ)	Agree. Sentence modified to refer to Fig 1.3. Also added box defining scenarios and models terminology as used in this assessment
197.	1	17	11	17	20	The meaning of models cannot be clarified by citing the classification of models. But it might be put after line 27 in page 17 as a background to the definition of models.	Tianbao Qin (TQ)	We may move a part to 1.2.5.2. ?

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
198.	1	17	12			As above, not just "ecosystem". Add text to read "...genetic, species, and ecosystem function", or else delete "and ecosystem function".	Thomas Brooks (TB)	We are following the terminology of the IPBES conceptual framework.
199.	1	17	15			Ecosystems are part of biodiversity. Delete "and ecosystems".	Thomas Brooks (TB)	We are following the terminology of the IPBES conceptual framework
200.	1	17	18			Ecosystems are part of biodiversity. Delete "and ecosystems".	Thomas Brooks (TB)	Following the CBD definition only the variability of ecosystems is part of the biodiversity, not the ecosystems themselves. This will be clarified in the glossary
201.	1	17	19	17	20	"ecosystem productivity, control of water flow and quality, ecosystem carbon storage". These are not good examples of ecosystem services – all three are actually ecosystem functions, and belong in the previous "component" of the IPBES conceptual framework. Replace with, e.g., "wild fisheries, provision of clean freshwater, climate change mitigation".	Thomas Brooks (TB)	In MA terminology these are all supporting services. We have, however, modified the list.
202.		17	20	17	25	! It seems to me that a 4th model typology is embedded into the 3rd- but it may be worth pulling it out explicitly as a complement the other 3: models assessing impact of changes in biodiversity and ecosystem services provision on social and economic outcomes at different scales, i.e. on productivity in agriculture sector, on risks for energy sector, on outcomes for equity/impacts on the poor, on human health. These types of models are critical to developing the scientific evidence on the interlinkages between biodiversity, ecosystem services and the other goals decision-makers are working towards that are typically considered more important or urgent than investment in maintaining natural capital/ecological integrity. Without these models, biodiversity-focused people do not bridge the gap to economic development and social outcomes, or even other environmental concerns very well. Rather than communicating a picture of the systemic connection between ecological integrity and human economic, cultural, social systems, ironically enough, we contribute to minimising the importance of biodiversity rather than placing it on the mainstream agenda. This is the missing link ecosystem service changes and human well-being at the scale of decisions being taken concerning the drivers of biodiversity loss, i.e. nationally prioritised energy infrastructure projects. See attached papers for more information.	Louise Gallagher (LG)	This is a good point and dealt with in chapter 5. We have added the words "associated values" to indicate this. However, we have not added a new class of models.
203.	Overv	17	21	17	21	Remove the additional point	Miglena	Done

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
	iew						Zhiyanski (MZ)	
204.	1	17	36	17	40	Here scientific model and mathematical model are referred to without a clear definition of what is meant. On the following page, types of models is referred to without a clear sense of what is meant – process versus pattern, qualitative vs quantitative?	Emily Nicholson (EN)	We have clarified what we mean by "scientific models". The typology in Fig. 1.5 is not intended to provide a detailed classification. This is done in chapters 3, 4 and 5.
205.	1	17	44			"or processes (behaviour)" doesn't seem to fit, maybe replace with "or how (processes)"?	Thomas Brooks (TB)	Removed the word behavior
206.		18		19		I do not find this bulleted list very appealing and comprehensive. The purpose of these key-points remains unclear to me. How are these points connected and how can they be dealt with.	Rik Leemans (RL)	This figure is meant for non-specialist who are not familiar with the range of models that are available, what they include and how they are connected. It is not comprehensive because it is an overview: details are provided in chapters 3-5. This is now stated.
207.	1.3	Figur e 1.6				Very confusing figure. Furthermore, the draft of chapter 5 does not seem to conform to the figure's boundary for chapter 5. If anthropogenic assets are not part of any chapter, why are they in the figure?	Megan O'Rourke (MR)	Figure has been revised
208.	Overvi ew	18	1	18	45	All cited authors should be corrected according to the citation model in the whole text: *et al.- Italic point* year; Author 1 & Author 2 2014	Miglena Zhiyanski (MZ)	OK, will be synchronized in the final draft
209.	1	18	1			Delete "In addition". This is a separate point, I think.	Thomas Brooks (TB)	Removed "In addition"
210.		18	4	18	6	These concepts are quite abstract for someone unfamiliar with them. Clear examples might be needed throughout the document to help the reader understand what is meant.	Patrcia Balvanera (PB)	An attempt has been made to make some of the concepts clearer using real world examples or explanations.
211.		18	5	18	6	"The types of models combine several properties." What does this mean?	Narayan Dhital (ND)	Removed
212.		18	9	18	11	Discussion of variable types seems overly technical and unnecessary for a report aimed at a non-technical audience.	Neil Burgess (NB)	While some of this is probably too detailed, other concepts may be important for some people (e.g, what is the difference between a quantitative and qualitative model?). We may remove this based on the next round of review. Change made in final draft: good

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
								suggestion – discussion of variable types now removed.
213.		18	9	18	21	This list does have examples but it might be more useful to know why such distinction ist relevant. E.g. what are the implications of discrete vs. continuous variables?	Patrcia Balvanera (PB)	We have given one example and referred the reader to specific chapters for more detail.
214.	1	18	13	1	20	It strikes me that a fifth category could usefully be recognized here, along the lines of "application of threshold approaches as rules of thumb to represent underlying mechanistic relationships e.g. protocols for extinction risk assessment Mace et al 2008" The citation is Conserv Biol 22: 1424-1442. (Box 6.1 in Chapter 6 gives a good example of why this approach is so important to reflect here.)	Thomas Brooks (TB)	This list was intended to provide examples, not to be exhaustive. We have reworded it to reflect this.
215.	1	18	15			Add text to read "...or mechanistic models of extinction risk e.g. Brook et al. 2000, or of ecosystem function..." The citation is Nature 404: 385-287.	Thomas Brooks (TB)	These are examples, more details in other chapters
216.		18	17	18	17	Terminology for category 3 a little confusing because category 2 also includes methods that assign probability to outcomes.	Neil Burgess (NB)	These have been grouped together.
217.	1	18	23	20	4	Although it may not be the main focus of this report, I think it is important to recognize the role of human behavior in conservation and ES management, underlined by social norms, attitudes and psychology. For example, high risk aversion of farmers has been shown to be an important driver of overuse of synthetic pesticides, and the lack of knowledge about biological pest control services and natural enemies has also been demonstrated to contribute to the mis- and over-use of pesticides. So bio-economic models of ES that are of use values to human need to take into account how behavioral factors affect the exploitation and manageent of ES. Studies that look into the coordination behavior of individuals and sptially explicity modeling of agent interactions and responses to incentives (e.g., agent-based models) are important for informing designing incentives for coordinated management of ES, which is common for ES that are provided at the landscape or watershed level. It appears that the study focuses more on the ecological/biphysical side, with the socio-economic side of the modeling largely missing. Swallow and Swallow (2015) provides a thorough review on "Explicitly integrating institutions into bioeconomic modeling", which may be of interest to you. http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/128985/r	Wei Zhang (WZ)	We have added a sentence on bio-economic models and the reference. We have also added a reference to models that can be used for indirect drivers such as agent-based models

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						ec/10		
218.	1	18	27			Does "Nature and Nature's benefits" really need to be capitalised? Suggest use lower case throughout.	Thomas Brooks (TB)	Will be adjusted and controlled in final version
219.		18	32	18	34	"For example, biodiversity models simulate dynamics of genes, ~~or~~ species, ~~or~~ functional groups~~,~~ or communities~~;~~, but many focus on only one of these levels and none simulate biodiversity dynamics at **and between** all these levels"	Rik Leemans (RL)	Changed.
220.		18	35			not clear what these three main components are.	Rik Leemans (RL)	Added reference to figure.
221.	1	18	35			I'm not sure that "privilaged" is the right term. Maybe replace "privileged sets of relationships between variables" with "some sets of variables which have received disproportionate attention"?	Thomas Brooks (TB)	We explain what this means below and in the figure, i.e., are most represented in the literature.
222.		18	35	18	35	What do you mean by 'priveleged sets of relationship''?	Neil Burgess (NB)	See above
223.		18	41	18	42	(arrow directly from habitat) – what is the figure?	Narayan Dhital (ND)	This indicates that models of nature's benefits typically are based on habitat models and not other levels of biodiversity
224.	1	19				Figure 1.5. I think there are some lines missing between "Nature: biodiversity models" and "Nature's Benefits Models", specifically from species (distribution, abundance), and functional group, as they are used to model fish stocks (whether at the species or functional group level), particularly in single species assessments, and timber/wood, which are specifically referred to in the Nature's Benefits box.	Emily Nicholson (EN)	Agreed, these have been added.
225.		19	Fig 1.5			As Ecosystem Functions are often seen synonymous with Ecosystem Services (e.g. de Groot 1999), I would prefer to use Ecosystem Functioning or ecosystem processes instead. This strongly relates the ecology.	Rik Leemans (RL)	Done
226.		19	17	19	20	Much redundancy in these sentences. Better: "An important set of models that are not illustrated in this figure**,** are **the broad set of** models addressing the relationships between indirect drivers and direct drivers. These models are mainly developed for purposes other than the assessment of biodiversity and ecosystem services.	Rik Leemans (RL)	Paragraph reworded to improve clarity
227.		19	22			models do not forecast but project. Better: "The most relevant models are those that project change in climate, land use and	Rik Leemans	Project used in place of forecast

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						hydrology based on economic and demographic drivers and the impacts of human management and construction."	(RL)	
228.		19	23	19	23	Missing punctuation at the end of the sentence	Narayan Dhital (ND)	Corrected
229.		19	25	19	26	When models are linked, care should be taken that the common variables have the same units. Here many mistakes are often made. This paragraph should be expanded with lessons learned and caveats.	Rik Leemans (RL)	Added sentence and referred reader to Chapter 6 where this is treated in detail
230.		Section 1.2.5.2				'Nature' is too non-specific a word – e.g. Nature's benefits should be ecosystem benefits.	Neil Burgess (NB)	We are following terminology of the IPBES conceptual framework
231.	1	19	4			Add "sometimes" to read "applications sometimes need". There are many that don't.	Thomas Brooks (TB)	Done
232.	1	19	10		15	Fig 1.5 Why no governance models?	Hans Keune (HK)	Added
233.	Overview	19	10	19	10	Citation needs correction	Miglena Zhiyanski (MZ)	Done
234.		19	10	19	10	Harfoot et al, 2014b model functional diversity rather than species diversity (though models organisms explitcly within functional groups)	Neil Burgess (NB)	Ref. removed
235.		19	11	19	11	GLOBIO is a model of biodiversity, not a model of ecosystem function in the same way as IAMs or the Madingley model	Neil Burgess (NB)	GLOBIO is typically coupled with IMAGE so that is that it becomes part of the IAM/IAV analysis
236.	1	19	12			In the Fig 1.5 box on "Nature: Biodiversity Models", in the "Species" row, add "extinction risk"	Thomas Brooks (TB)	Done
237.	1	19	12			In the Fig 1.5 box on "Nature's Benefits Models", replace "carbon storage, greenhouse gas emissions, water flow and quality, soil erosion" with "climate change mitigation, provision of clean freshwater, soil protection". Again, this component is concerned with services, not processes.	Thomas Brooks (TB)	These are supporting services, sensu MA 2005
238.		19	14	19	14	See comment 13 on 'priveleged relationships'	Neil Burgess (NB)	See response to 242
239.		19	17	19	23	This category includes the IAMs mentioned in the previous paragraph.	Neil	Agreed, but don't see that text needs to

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
							Burgess (NB)	be modified. The components referred to are not illustrated in the diagram.
240.	1	19	19	19	20	Add "currently". There are many direct drivers (e.g., invasive species, unsustainable harvest") which could greatly benefit from increased modeling attention, which will need development specifically for the assessment of biodiversity and ecosystem services.	Thomas Brooks (TB)	Reworded
241.	1	20	1	20	3	Is it wise to be calling out the names of individual models here? Why these and not others? The best citations here would be to review papers of these classes of approaches (e.g., "single modelling frameworks"), rather than "e.g." citations and (especially) naming individual models.	Thomas Brooks (TB)	Names removed
242.		20	5	20	30	This section could come much earlier before the long description of tons of concepts that are hard to grasp. Yet, at present it is again quite overwhelming. Tools such as the use of bullets, decision trees, timelines and so on (as suggested above) could certainly help introduce this section and use it as a backbone for the presenting all the above complexity in a context that is easier to grasp for a non specialist.	Patrcia Balvanera (PB)	Not clear why this should come earlier. The role of models is already introduced earlier, as one of four major components from Fig 1.3, before working through each of these components in turn. This seems logical. Change made in final draft: section structure now greatly reorganised to address this and related concerns. Have also made much more use of bullet points, highlighted text-boxes etc.
243.		20	11	20	13	Very confusing sentence.	Neil Burgess (NB)	Unclear which sentence this refers to.
244.		20	16	20	17	"It is the position taken throughout this methodological assessment that ..." is poor English starting with an empty 'it'. Better: "The position taken throughout this methodological assessment is that ...".	Rik Leemans (RL)	Done
245.		20	16	20	31	Would be good to list some of the benefits of the different modelling categories. Note that multi-model comparisons is not done just because they have more weight; it also leads to greater understanding about the causes for differences between models, and gives an idea of the uncertainty range of outcomes.	Neil Burgess (NB)	Comparing tradeoffs is too much for this chapter. It is dealt with in detail in following chapters. The benefits for understanding are stated in the previous sentence
246.		20	25	20	31	Model comparisons is good and appropriate but should not be limited to just model comparisons. This leads to model inbreeding (i.e. degradation of the genetic or algorithmic diversity of models) and this is not desirable. When comparing models, a clear	Rik Leemans (RL)	This issue is treated in detail elsewhere. We have added a brief reference to this issue.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						benchmark validation dataset must be defined that all models are tested against. This is currently done in the various CMIPs programs of WCRP and IGBP for climate, carbon, ecosystem and agricultural models. Only such a process weeds out the mediocre models. This insight should be added.		
247.		20	39	20	43	This paragraph is very short and should be expanded. The uncertainty of models and their application deserve a little more room for discussion, especially when they are used for scenarios development.	Rik Leemans (RL)	Text added near start of Section 1.2.3 highlighting importance of communicating, and helping users to interpret implications of, levels of uncertainty associated with scenarios and models, as part of assessment and decision-support interface.
248.		Boxes				Box 1 has several references pointing at the details of the study, while the other Boxes have few or no references. This should be corrected. In Box 1, the concept of 'policy gap' should be explained. The text in the diagrams of Box 2 is too small and grey to be readable. In Box 3, the last paragraph on page 25 give the main lessons learned (great!) but the next paragraph on page 26 only states that possibilities are explored. Please, you must provide the actual findings and a reference to them to be relevant for this chapter.	Rik Leemans (RL)	Added a sentence on 'policy gap'

The diagram in Box 2 was improved. Citations and references for case 2 were provided.

References were added for the case study 3. Last paragraph of case 3 changed in order to provide particular findings (results) and made references to it. |
| 249. | | Fig 1.6 | | | | great that the different types of models are classified according to this central figure. Are the anthropogenic assets not modelled? Are they ignored? | Rik Leemans (RL) | Figure revised.

Modelling of anthropogenic assets affected directly by socio-economic drivers, without any mediation by biodiversity or ecosystems, are largely outside the scope of this assessment. However, Chapter 5 does consider anthropogenic assets as inputs to modelling of ecosystem services and human well being. |
250.	1	21				Remove bullet point	Sebastien Lizin (SL)	Not clear which bullet is being referred to?
251.	Overview	21	1	21	50	Citations need corrections	Miglena Zhiyanski (MZ)	Corrected both in text and reference sections.
252.		21	35	26	35	This section is interesting but would be much more helpful is it had a	Patrcia	A brief introduction on case studies was

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						structured that mirrored the above discussion allowing the reader to understand why in the contrasting examples a particular set of choices were made and what are the implications of such choices. This section highlights for the first time the particular names of the types of models used. It might be helpful to have an early table showing how all the above discussions summarized in figure 1.4. link to very specific tools. Then the use of study cases would help understand the operationalization of their use.	Balvanera (PB)	provided. All full names were provided when these terms were first mentioned (pages 19, 20, 21).
253.		22		22		Please consider reformulation as there is redundancy in the caption of Figure Box 1.1	Narayan Dhital (ND)	Reduced the text of the caption. Repeated texts were deleted.
254.	1	24				The text in the box for "Nature's Benefits to People" is about ecosystem function and so belongs in the box for "Nature". The text in the box for "Good Quality of Life" is about ecosystem services and so belongs in the box for "Nature's Benefits to People", and should be replaced by something like "Rural incomes" (I suppose).	Thomas Brooks (TB)	To be consistent with this framework, we retain the text in the box for "nature" but text for "nature's benefits" was replaced by flood mitigation & clean water for drinking and the text for good quality of life was replaced by living in a safe environment and sufficient rural incomes (as recommended)
255.	1	24				Also, the inclusion of the economic modelling here ("Econ. Model: RIOS") raises again the question posed earlier about why the linkage between "Nature's Benefits to People" and "Good Quality of Life", from the IPBES conceptual framework, is omitted from this Chapter.	Thomas Brooks (TB)	The economic model: RIOS was included in text.
256.	Overview	24	1	24	10	Figure box 2.1. needs of improvements in respect to its quality	Miglena Zhiyanski (MZ)	Figure is edited and vectorized. Original for print layout is available as separate file.
257.	1	27	12			Again, why are models of the relationships between "Nature's Benefits to People" and "Good Quality of Life" lumped in with those considering the relationships between "Nature" and "Nature's Benefits to People"? – rather than being tackled explicitly (indeed, at the Chapter level, here), as per the IPBES conceptual framework.	Thomas Brooks (TB)	See earlier response to Comments 131 and 140
258.	Overview	27	12	27	20	The figure 1.6. needs of many improvements – there is cutted text, many arrows etc.	Miglena Zhiyanski (MZ)	Figure revised
259.	1.3	27		28		The distinctions between the chapters ares not particularly clear from the descriptions. For example, I can sort of understand the intended distinctions among the chapters by carefully examining figure 1.6 but comparing my understanding to the verbal descriptions just confuses me. I also reviewed chapter 5 and the description of chapter 5 on page 28	Megan O'Rourke (MR)	The chapter structure was locked in at the start of the process, constrained largely by the structure specified in the scoping document for this IPBES deliverable.

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						lines 11-19 does not seem consistent with its actual structure or content. Should some chapters be combined such as 4&5?		Descriptions of chapters in Section 1.3 have been updated to better align with their actual content.
260.		27	10	27	30	I was pleasantly surprised by the fact that good quality of life is encompasses in section 5, but according to the name of the section and to the previous text there does not seem to be an explicit link to the final assessment of the consequences to the quality of life.	Patrcia Balvanera (PB)	Description of Chapter 5 now includes reference to "human well being and good quality of life".
261.	1	27	23	27	26	This sentence illustrates the fact that definitions of model and scenario are unclear ("It explores approaches to modelling plausible or alternative trajectories (…) such scenarios etc." => are this modelling results or scenarios?)	Audrey Coreau (AC)	Text revised. Also - 'model' and 'scenario' are now clearly defined in the second and third paragraphs of the chapter.
262.	1	28	8	31	18	It would be good to add a paragraph into this important section to caution that scenarios and modeling must complement (and indeed help to guide) renewed investment in the collection and maintenance of underlying data.	Thomas Brooks (TB)	Section now completely revised.
263.	1	28	12			Ecosystems are part of biodiversity. Delete "and ecosystems".	Thomas Brooks (TB)	See response to Comment 55.
264.	1	28	14			As above, not just "ecosystem". Add text to read "...genetic, species, and ecosystem properties and processes".	Thomas Brooks (TB)	See response to Comment 55.
265.		28	25	28	26	I would not use "scales and domains" here but "dimensions and domians". Scales are often only related to spatial and temporal scales, but there are ecological (i.e. individual, species, communities, ecosystems, landscapes, biomes and the whole globe), social (i.e. individual, family, community, municipal, state, country, region and global), or economic (i.e. local, regional, international) dimensions, each with their specific scales, resolutions, levels and units of analysis. See: Kok, K. and T. Veldkamp (2011). "Scale and Governance: Conceptual Considerations and Practical Implications." Ecology and Society 16(2).	Rik Leemans (RL)	"Scales" here is indeed meant to be referring to spatial and temporal scales, and "dimensions" would therefore not be appropriate.
266.	1	28	30			As above, not just "ecosystem". Add text to read "...genetic, species, and ecosystem properties and processes".	Thomas Brooks (TB)	See response to Comment 55.
267.		Section 1.4				I like the bold overall messages. However, under the last on challenges, I would like to see a short summary of the major	Rik Leemans (RL)	Messages now completely revised

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
						uncertainties/robustnesses and limitation of model–based scenarios analysis		
268.	1	29	18			Ecosystems are part of biodiversity. Delete "and ecosystems".	Thomas Brooks (TB)	See response to Comment 55.
269.	1	29	19			Ecosystems are part of biodiversity. Delete "and ecosystems".	Thomas Brooks (TB)	See response to Comment 55.
270.	1	29	21	29	25	Scenarios are not only about socio-economical alternative or policy options. They can also explore uncertainties about natural dynamics, knowledge paradigm shifts, and the interactions between these dynamics and socio-economical alternatives or policy options. (see Coreau 2009 – PhD dissertation (in French))	Audrey Coreau (AC)	This section now completely rewritten.
271.		30	20	30	35	I wonder how much the messages here should come in the discussion and not at the very forefront of the chapter. I would suppose that having the implications of these tools at the very beginning of the chapter would help the reader navigate the huge complexity tackled here.	Patrcia Balvanera (PB)	See response to Comment 22.
272.	1	30	20	30	21	It is desirable that scenario development and analysis are carried out with a participatory approach that involves iterative consultation or co-development with stakeholders. This ensures that scenarios are locally or context relevant and there is greater use/uptake of the findings. I realized later that this is covered in later chapters but it may be good to bring it up in the overview chapter as well (Chapter 1).	Wei Zhang (WZ)	The importance of participatory approaches is already mentioned several times throughout the chapter. Also see response to Comment 39.
273.	1	30	31			As above, not just "ecosystem". Add text to read "...genetic, species, and ecosystem properties and processes".	Thomas Brooks (TB)	See response to Comment 55.
274.								
275.								
276.								
277.								
278.								
279.								
280.								
281.								
282.								
283.								
284.								
285.								
286.								
287.								

Nr	Chapter	From page	From line	Till page	Till line	Comment	Reviewer Initials	What was done with the comment
288.								
289.								
290.								
291.								
292.								