

**Intergovernmental Science-Policy
Platform on Biodiversity and
Ecosystem Services**Distr.: General
3 February 2017

English only

**Plenary of the Intergovernmental Science-Policy
Platform on Biodiversity and Ecosystem Services
Fifth session**

Bonn, Germany, 7–10 March 2017

Item 5 of the provisional agenda*

**Report of the Executive Secretary on the implementation
of the work programme for the period 2014–2018****Progress report on the guide on the production of assessments
(deliverable 2 (a))****Note by the secretariat**

1. In section III of decision IPBES-2/5, on the work programme for the period 2014–2018, the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) requested the Multidisciplinary Expert Panel, in consultation with the Bureau, and supported by a time-bound and task-specific expert group, to develop a guide to the production and integration of assessments from and across all levels. The guide was intended to address the practical, procedural, conceptual and thematic aspects of undertaking assessments, drawing on the work of the task forces and other expert groups.
2. In section III of decision IPBES-3/1, on the work programme for the period 2014–2018, the Plenary took note, on the basis of document IPBES/3/INF/4, of the development of a draft guide to the production and integration of assessments from and across all levels, and requested that the guide be completed as provided for in decision IPBES-2/5, with a view to its becoming a living document that would be regularly reviewed and updated as necessary, building on lessons learned and best practices gleaned from the implementation of the work programme of the Platform.
3. In section III of decision IPBES-4/1, on the work programme of the Platform, the Plenary welcomed the review and updating of the guide as described in the note by the secretariat on the production and integration of assessments from and across all scales (deliverable 2 (a)) (IPBES/4/INF/9) and the plan to make the guide available as an e-book on the Platform's website and update it regularly.
4. The annex to the present note provides an update on the progress of the guide on the production of assessments. It is presented without formal editing.

* IPBES/5/1/Rev.1.

Annex

I. Update on Progress

1. The technical support units of the regional assessments and of the assessment of land degradation and restoration discussed the further development of the guide at an IPBES team meeting (1-3 June 2016). In consultation with the respective assessment expert groups, the technical support units provided additional feedback to the secretariat headquarters on 1) the uptake of the guide by the assessments expert groups, 2) the parts that are particularly helpful and 3) potential gaps or areas for improvement.
2. A workshop was held from 29 June to 1 July 2016 in Cambridge with members of the IPBES Bureau, the IPBES secretariat and the technical support unit providing support to the development of the guide, in order to prepare a revised version of the guide based on the feedback received. In response to a request for a more concise and focused version of the guide, it was decided to produce a core version of the guide, which focuses on what an IPBES assessment is and what the different roles of experts that are part of the assessment are, to be supported with a series of modules. The content of the modules has been generated from the chapters of the previous version of the guide (for example on the conceptual framework, values, etc.) and from new IPBES guidelines and material (such as the IPBES terrestrial and aquatic units of analysis). In this way, experts can easily find guidance on specific topics. This restructuring allows for additional modules to be added easily and for existing modules to be updated to reflect IPBES' ongoing work, without updating the full guide. Such an approach should be more flexible and cost effective to maintain in the long term.
3. A draft of the core version of the guide was made available to the experts of the global, regional and land degradation assessments on 8 August 2016 and subsequently used for the respective first and second author meetings of those assessments.
4. A further workshop was held on 8-10 November 2016 in Cambridge with members of the IPBES Bureau and technical support staff. This workshop began the development of a draft summary and infographic for the guide.
5. The new outline of the guide including its modules can be found in appendix I. The latest draft of the core version is contained in appendix II. The draft is to be finalized in the first half of 2017, and will then be edited by a graphic designer. Subsequently the updated core version of the guide as well as its modules will be made available on the IPBES website.
6. Additional modules have been identified and are currently in development including the IPBES Glossary (para 11), a list of the terrestrial and aquatic units of analysis of IPBES (para 12), and a list of the classification of nature's contributions to people (paras 13 to 17).
7. The development of the IPBES glossary is overseen by the Glossary Committee, which consists of members of the MEP and representatives from the current IPBES assessments. The Committee supervises the inclusion of new terms and the development of their definitions, to be used by all IPBES assessments.
8. An initial list of 11 terrestrial and aquatic units of analysis was developed by the MEP, in consultation with regional and land degradation and restoration experts starting in 2015, and considered by the MEP at its 7th meeting (June 2016). This list was subsequently reviewed by the experts of the global assessment at their first author meeting (Bonn, 15-19 August 2016), who, taking into account the needs of the global assessment, expanded the list to a total of 17 units. This revised expanded list was reviewed by experts attending the joint second author meeting of the land degradation and restoration and regional assessments (Bonn, 22-26 August 2016). As a result of these discussions and of further subsequent email exchanges, the units were refined and definitions added. The MEP at its 8th meeting endorsed this list of 17 units, which is set out in appendix III. The units with their definitions will be added as a module to the guide for assessments and further shared with all assessment expert groups.
9. Concerning nature's contributions to people, the MEP, at its 8th meeting (October 2016) agreed to rename the classification (formally called "nature's benefits to people"), and the respective box in the IPBES conceptual framework, "nature's contributions to people", for two reasons: 1) The word "benefits", with its positive connotation, wrongly conveyed the idea that negative contributions would be excluded; 2) The different meaning of the word "benefits" in common speech as well as in the social sciences and the valuation literature represented potential sources of confusion. Within the context of IPBES, the concept of nature's contributions to people (NCP) replaces and includes that of ecosystem services. IPBES assessments should report in units of NCP.

10. The classification of nature's contribution to people, set out in Appendix IV, includes three broad groups: regulation, material and non-material contributions. These represent different facets of the complex flow from nature to a good quality of life, ranging from indispensable direct biological connections (e.g. oxygen, water), to symbolic components that give meaning to the identity of different social groups and their relationships with nature.

11. The NCP are further divided into 18 categories that are broad enough to be meaningful to most stakeholders, as well as conceptually solid and straightforward to report against. In accordance with the IPBES inclusive vision, the proposed system intends to embrace categories used within the framework of existing assessments such as the Millennium Ecosystem Assessment, The Economics of Ecosystems and Biodiversity Common International Classification of Ecosystem Services, and the United Kingdom National Ecosystem Assessment and at the same time broaden the scope to accommodate other perspectives. The present broad categorization of NCP is an evolution, still strongly rooted in the Millennium Ecosystem Assessment (MA) and its system of categorization of ecosystem services but reflecting some key modifications based on more than a decade of interdisciplinary thinking, with increasing involvement from the social sciences and humanities.

12. Key changes include the following: (i) IPBES considers all contributions of nature to the quality of life of humans as NCP, irrespective of how much human input is embedded in them; (ii) The supporting services of the MA (e.g. nutrient cycling, production of atmospheric oxygen) are now widely considered as an ecosystem property and have therefore been included in the conceptual framework as part of the "nature" element, and not as an NCP; (iii) The classification places a major emphasis on the fact that the cultural context influences the perception and experiences by people of all NCP, and stresses the importance of socio-cultural relations between people and nature. For many people around the world, including indigenous peoples and local communities, NCP are conceived as resulting from the ethics and practices of care–reciprocity. To reflect this important dimension in the classification, cultural ecosystem services are no longer a separate category (thus departing from the MA), and the role of culture has been made explicit by including relevant sub-categories in each of these three main NCP groups.

13. The classification, importantly, recognises that many NCP do not fit squarely within the three broad groups of non-material, material or regulating contributions described above. Some, probably a minority, of the NCP are fully contained within a given group. Many other NCP, however, span multiple groups. For example, food is placed in the material NCP group for its nutritional aspect, but it also has an important cultural dimension and can also be seen as a non-material NCP. To recognise this fact, the 18 NCP have been placed within the three broad categories in a fluid manner (as illustrated in the figure in the module), which allows for them to span across more than one of the three groups.

14. The nature contributions to people classification is presented to the fifth session of the Plenary (March 2017) for information, and will be published as a scientific paper in 2017. It will be set out in its entirety in a module to the guide following finalisation.

Appendix I Outline of the IPBES Guide on the production of assessments

Appendix II only includes the first part, that is the core version of the Guide. The modules listed below are under development and therefore not presented in this document.

First Part: Core version of the IPBES Guide on the production of assessments

1. Introduction to IPBES
 - 1.1 What is an IPBES assessment?
 - 1.2 What are the operating principles, functions and rules followed by IPBES?
 - 1.3 How to use the Guide?
2. Introduction to the IPBES assessment process
 - 2.1 Step 1: Requests and exploration
 - 2.2 Step 2: Scoping
 - 2.3 Step 3: Implementation
 - 2.4 Step 4: Endorsement and outreach
3. References
4. Illustrations

Second Part: Modules

Module A: Addressing conceptual issues

Module A1: The IPBES conceptual framework and how to use it

Module A2: IPBES assessments across scales

Module A3: IPBES terrestrial and aquatic units of analysis

Module A4: IPBES system of nature's contributions to people

Module B: Using various methodologies in assessments

Module B1: Assessing values of nature and its benefits

Module B2: Using scenarios and models in assessments and as support to decision making

Module B3: Working with indigenous and local knowledge systems

Module C: Identifying and assessing data, information and knowledge resources and gaps

Module C1: Data

Module C2: Knowledge, information and data gaps

Module C3: Indicators

Module D: Enhancing the utility of assessments for decision-makers and practitioners

Module D1: Policy support tools and methodologies

Module E: Strengthening capacities in the science-policy interface

Module E1: Identifying and addressing capacity building needs through assessments

Module F: Glossary

Module F1: IPBES glossary for assessments

Appendix II The IPBES Guide on the production of assessments

First Part: Core version of the guide

The IPBES Guide on the production of
assessments
Core version

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I. Introduction to IPBES

The world's *biodiversity* generates a wide range of benefits to society, often termed *ecosystem services**. Many of the services are under threat due to unsustainable human practices. Policies for rectifying such practices often benefit from a legitimate and credible bridging of science and policy and the establishment of the confidence level of the knowledge at hand. This is why the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established in 2012 as a parallel to the Intergovernmental Panel on Climate Change (IPCC).

IPBES aims to *strengthen the science-policy interface for biodiversity and ecosystem services* in support of the Strategic Plan for Biodiversity 2011-2020 and its Aichi Targets prepared under the auspices of the Convention on Biological Diversity, the 10-year strategic plan and framework (2008-2018) of the United Nations Convention to Combat Desertification (UNCCD), and the *2030 Agenda for Sustainable Development* and its Sustainable Development Goals (SDGs) of the UN General Assembly. Knowledge on how biodiversity contributes to humanity is vital to achieve sustainable development. These contributions - termed ecosystem services or nature's contribution to people - are maintained through policies for conservation and sustainable use of biodiversity.

IPBES *critically assesses the state of knowledge* on the interactions between human societies and the natural world.† An IPBES assessment is initiated by the Plenary and performed by experts from multiple disciplines‡ and all regions of the world who contribute their time freely. IPBES synthesises and assesses available policy-relevant knowledge regarding biodiversity and its contribution to human well-being, in response to requests from governments and other stakeholders. These assessments include a summary for policy makers, made of policy relevant key messages, drawn from a report made of detailed technical chapters. The bulk of the work is performed by dedicated experts from all regions of the world contribution their time freely. This Guide§ aims to help address conceptual, procedural and practical aspects of IPBES assessments at all scales, and to promote consistency across different scales. The Guide serves as a 'Roadmap' and focuses on key elements assessment practitioners may want to take into account when undertaking an assessment within the context of IPBES.

The Guide has been developed for experts who are taking part in assessments approved under IPBES be they thematic, methodological or general assessments of biodiversity and ecosystems at global, regional and sub-regional level. The Guide is also meant to assist those who might want to undertake IPBES inspired assessment at sub-regional, national and local level and to help ensure that such assessments are compatible with larger scale IPBES completed assessments.

1.1 What is an IPBES assessment?

IPBES assessments synthesises and critically assess peer-reviewed scientific literature, grey literature and other available knowledge such as indigenous and local knowledge. The assessments include a review and synthesis, as well as an analysis and an expert judgement of available knowledge. Experts are guided in this work by a conceptual framework outlining the interaction between people and nature and by guidance on the conceptualization of values of biodiversity and nature's contributions to people. An assessment does not involve the undertaking of new primary research but may include re-analysis of data and models to address specific questions. Findings should be policy relevant but not policy-prescriptive. They could feed into and be guided by the work on policy support tools and its catalogue.

IPBES assessments need to be credible, legitimate and relevant. They typically:

* These ecosystem services - many times enhanced by human efforts - include the provision of food and fibre; the production of oxygen and soil; the regulation of diseases and climate; and the contribution to human innovation, culture and spirituality. Within IPBES the term Nature's contributions to people is used

† See <http://ipbes.net/images/Functions> operating principles and institutional arrangements of IPBES_2012.pdf

‡ Currently including the thematic assessment of *pollinators, pollination and food production* and methodological assessment of *scenario analysis and modelling* (both completed in 2016); thematic assessment on *land degradation and restoration* (completion in 2017); regional assessments of biodiversity and ecosystem services for *Africa, the Americas, Asia-Pacific, Europe and Central Asia* (completion in 2018) and a *global assessment of biodiversity and ecosystem services* (completion 2019).

§ The first IPBES programme of work 2014-2018 was agreed in December 2013 setting out a number of deliverables, including the development of guidance materials and the scoping and completion of thematic and regional assessments. This Guide is deliverable 2(a) of the first work programme of IPBES.

- Involve governments and other stakeholders in the initiation, scoping, review and adoption of the assessment reports (this involvement promotes credibility, legitimacy and relevance at policy level);
- Operate through an open and transparent process, run by a group of experts that has a balance of disciplines, geography and gender. They use agreed conceptual frameworks, methodologies, and support tools and are subject to independent peer review (this process promotes credibility, legitimacy and relevance at scientific level); and
- Present findings and knowledge gaps that are policy relevant but not policy prescriptive, where the level of confidence and the range of available views are presented in an unbiased way (this approach promotes relevance at both scientific and policy level).

IPBES assessments focus on what is known, but also on what is currently uncertain. Assessments play an important role in guiding policy through identifying areas of broad scientific agreement as well as areas of scientific uncertainty that may need further research.

IPBES may undertake different types of assessments at sub-regional, regional and global levels. It also encourages and helps catalyse other assessments at lower scales such as those with a local, national and a more limited sub-regional scope. IPBES is currently engaged in or has planned to undertake:

- **Global assessments** to assess biodiversity and ecosystem services and their interlinkages at the global scales. The global assessments will draw upon the work undertaken by the regional assessments.
- **Regional assessments** to assess biodiversity and ecosystem services and their interlinkages at the regional and, as necessary, sub regional levels. Regional assessments will provide the building blocks for the global assessments.
- **Thematic assessments** to assess a particular theme at an appropriate scale or a new topic.
- **Methodological assessments** to assess the availability and use of methods in relation with a specific topic (e.g. valuation, scenarios and models) so that these methods can then be used in IPBES assessments and other activities.

1.2 What are the operating principles, functions and rules followed by IPBES?

IPBES is defined by a set of operating principles and functions and is implemented thanks to institutional arrangements, procedure programmes and other resources, as set out in Box 1.1.

1.3 How to use this Guide?

This assessment Guide is aimed at those who are involved in an IPBES assessment, such as co-chairs, authors, review editors and members of the technical support units (TSUs). The core part of the Guide sets out the four stages of an IPBES assessment and their different steps. It then sets out the roles and responsibilities of the different actors involved in an assessment. Additionally, guidance is provided on developing a Summary for Policy Makers (SPM) and on using confidence terms. The Guide is supported by a series of modules, which contain further information for those involved in IPBES assessments, and other resources such as webinars, e-learning modules, and the IPBES Catalogue for Policy Support Tools and Methodologies.

Within each of the modules, assessment practitioners can find information around concepts, recommended practical steps and key resources, as well as guidelines, plans, strategies and approaches. The modules can be downloaded individually from: www.ipbes.net/guidance-and-conceptual-framework/guide-for-assessments .

The Guide including the supporting modules is considered as a living document. It will be updated periodically to reflect the ongoing work on the Platform and new sub-modules will be added as required. Therefore, users should always ensure that they have the latest version of the Guide, which is downloadable from the IPBES website. The Guide is also complemented by other key resources; which assessment authors might find useful (Box 1.2).

2. The IPBES assessment process

This chapter presents the different steps involved in performing an IPBES assessment, summarised in Figure 2.1:

- requests and exploration,
- scoping and design,
- implementation, and
- endorsement by the Plenary and outreach.

2.1 Step 1: Requests and exploration

An assessment begins by a request received from a Government (or input and suggestions received from a stakeholder), which is considered by the Plenary. The procedure for receiving and prioritizing requests represents the first stage in defining a new work programme. It has so far taken place once, in order to define the first work programme of IPBES, for 2014-2018. The Plenary will decide at its 6th session (2018) on a process to call for requests and assemble a second work programme, starting in 2019. The first set of requests led the Plenary to carry out a set of thematic, methodological and regional assessments, as well as a global assessment.

NB: The mechanism described below was followed to produce the first work programme. The Plenary may decide, for building the second IPBES work programme, to make a number of adjustments based on lessons learnt. This means that some of the steps described below might be modified as lessons are learnt.

2.1.1 Requests by members and observers

The first stage in the IPBES assessment process is for requests, inputs and suggestions to be submitted to the IPBES Secretariat no later than 6 months before an IPBES Plenary **. Submissions should include information on:

- Relevance of the objective, function and work programme of the Platform;
- Urgency of action in light of imminent risks caused by the issues to be addressed in the action;
- Relevance of the requested action in addressing specific policies or processes;
- Geographic scope of the requested action, as well as issues to be covered by such action;
- Anticipated level of complexity of the issues to be addressed by the requested action;
- Previous work and existing initiatives of a similar nature and evidence of remaining gaps, such as the absence or limited availability of information and tools to address the issues, and reasons why the Platform is best suited to take action;
- Availability of scientific literature and expertise for the Platform to undertake the requested action;
- Scale of the potential impacts, and potential beneficiaries of the requested action;
- Requirements for financial and human resources, and potential duration of the requested action;
- An identification of priorities within multiple requests submitted.

The list of requests, inputs and suggestions are compiled by the IPBES secretariat for prioritisation by the Multidisciplinary Expert Panel. The MEP will then produce a report for consideration by the Plenary.

2.1.2 Consideration by MEP and Bureau

As part of the preliminary evaluation and prioritisation process, the MEP and Bureau will undertake an initial scoping of an assessment, including examining feasibility and estimated costs. This initial scoping study may also contain pre-scoping material, usually provided by the body making the original request for the assessment. Using this information, the MEP, in conjunction with the Bureau, will prepare a report containing a prioritised list of requested assessments to be submitted to the Plenary. The report will contain an analysis of the scientific and policy relevance of the requests, including the implication of the requests for the Platform's work programme and resources requirements.

** The Bureau may consider requests after the deadline on an extraordinary basis.

2.1.3 Consideration by Plenary

The Plenary has two options: fast-track (based on initial scoping by the MEP) or detailed scoping. A fast-track assessment can go ahead without the detailed scoping study and proceed to implementation without the Plenary needing to consider the outcome of a more detailed scoping exercise. In a majority of cases, the Plenary will request a detailed scoping before agreeing to undertake an assessment

2.2 Step 2: Scoping

2.2.1 Scoping by MEP, Bureau and experts

If the Plenary decides to proceed with scoping out an assessment, then a call for nomination of experts to assist in the scoping process is made. A detailed scoping document, overseen by the MEP and Bureau is developed by the group of experts. Typically, a meeting is convened where the scoping document is developed. An electronic consultation can also take place with experts self-selecting themselves to participate.

A detailed scoping document will usually consist of the following information:

1. Scope (include policy relevant questions)
2. Geographic boundaries of the assessment (if relevant)
3. Rationale (including the potential impact of the assessment)
4. Utility (including who the end users of the assessments are)
5. Assumptions
6. Methodological approach
7. Chapter outline (including a short paragraph on the potential content for each chapter)
8. Key Datasets (this is not an exhaustive list but rather key datasets which should be mobilised)
9. Strategic partnerships and initiatives (this is not an exhaustive list but could either highlight the types of partnerships which will be required to deliver the assessment or include a short list key partners)
10. Operational structure (includes if a technical support unit will be required)
11. Process and timetable
12. Cost estimate
13. Communication and outreach
14. Capacity-building (highlights what capacity may need to be built to undertake the assessment)

Members and observers of IPBES can then be invited to review and comment on the draft detailed scoping report. Based on the results of the detailed scoping exercise and comments received from members of the Platform and other stakeholders, the MEP and the Bureau then decide whether to proceed with the submission of the scoping report to the Plenary.

2.2.2 Consideration by Plenary

The draft scoping document once finalized is presented to the Plenary, which examines it paragraph by paragraph. The Plenary can then decide between the following options:

1. approve the assessment and request its undertaking (including related budget and timeline)
2. approve the assessment but delay its undertaking
3. not approve and request further scoping
4. not approve

2.3 Step 3: Implementation

2.3.1 Nomination of experts by members and observers and selection by the MEP

The Rules of Procedure for IPBES set out the nomination process for the different roles within an IPBES assessment (see IPBES/2/17 and Annex I to decision IPBES-4/3) and are summarised in Table 2.1. The chair of IPBES, following the Plenary which requested the undertaking of an assessment, issues a call for nomination, explaining some of the requirements, particularly in terms of disciplines to cover all chapters of the assessment. From the nominations received the MEP will select the report

co-chairs, coordinating lead authors (CLA), lead authors (LA) and review editors (RE). The MEP will take the following into consideration when making these selections:

- ✓ 80% of the selected experts should be nominated by governments, and 20% by an organization
- ✓ The selection should reflect a range of scientific, technical and socio-economic views and expertise
- ✓ The selection should have a good geographic representation, with appropriate representation of experts from developing and developed countries and countries with economies in transition
- ✓ The diversity of knowledge systems (including indigenous and local knowledge) should be represented
- ✓ The selection should aim at reaching gender balance

While every effort should be made to engage experts from the relevant region on the author teams for chapters or assessments that deal with specific regions, experts from other regions can be engaged when they can provide an important contribution to the assessment. If gaps in geographical, gender and expertise balance are identified, the co-chairs of the assessments together with their respective CLAs can identify potential additional experts to fill in these gaps. These experts will then be retroactively nominated following the approved procedure for **filling gaps** among groups of experts approved by the fourth session of the Plenary (February 2016; see IPBES/4/19, page 107).

MEP or Bureau members that would like to participate as an expert in an assessment can be nominated for such a role, but they will have to resign from their duties as MEP or Bureau member when accepting the new role.

The co-chairs, CLAs, LAs, Review Editors, Fellows and Contributing Authors (CAs) have different responsibilities within a particular IPBES assessment. These roles are described in Table 2.2, along with some advice or tips for fulfilling this role.

2.3.2 Conflicts of interest

IPBES has put in place a conflict of interest policy and implementation procedures to ensure that attention is paid to issues of independence and bias in order for there to be public confidence in the product and processes of IPBES. IPBES defines conflict of interest and bias as any circumstances that could lead a reasonable person to question either an individual's objectivity, or whether an unfair advantage has been created, constitute a potential conflict of interest. The policy further sets out the difference between conflict of interest and bias along with rules on how the policy should be applied including the Committee of Conflicts of Interest. Within an IPBES assessment all Co-chairs, Coordinating Lead Author (CLAs), Lead Author (LAs) and Review Editor (REs) must sign a conflict of interest form.

2.3.3 Assessment by experts

A majority of IPBES assessments will be undertaken over three years (Figure 2.3) and this timeline is agreed by the Plenary as part of the acceptance of the scoping report for the assessment.

Typically, an IPBES Assessment process will consist of the development of four different drafts of the technical report:

- ✓ Annotated outline
- ✓ Zero Order Draft (ZOD)
- ✓ First Order Draft (FOD)
- ✓ Second Order Draft (SOD)

The development of these drafts, including the Executive Summaries of the chapters, and the Summary for Policy Makers are supported usually by three author meetings and different review periods before being presented for discussion to Plenary. Table 2.2, sets out each stage of the assessment process as identified in Figure 2.3, and explains who should be involved and provides guidance and what should happen during that stage of the assessment.

2.3.4 Peer review process

Within an IPBES assessment there are two external review processes:

1. External review by experts, or peer review of the first order draft: experts with relevant knowledge and credentials regarding the assessment, but not involved in this assessment, will be invited to critically review one or more chapters of the first order draft.

2. External review by members, observers and experts (See table 2.3 for timing of review periods): Governments, observers, as well as any interested external expert, can provide comments on the second order draft and the first order draft of the SPM.

IPBES has three governing principles for their review process:

1. ***The provision of expert advice***: seek the best scientific and technical guidance.
2. ***Ensuring comprehensive independent representation***: Invite response from all countries and stakeholder groups.
3. ***Following a transparent and open process***: make all comments received and author responses available online.

The Chair of the secretariat will issue a call for external comments and the draft chapters will be placed on line in a password protected area. Experts and governments willing to make comments will register and commit to keep the documents confidential before receiving the texts for review.

Review comments are submitted to the relevant assessment technical support units using a standard format (see Figure 2.4). This allows for comments to be easily attributed to sections, pages and lines of the text and can be dealt with in an efficient manner.

For a national ecosystem assessment, further guidance on the external review by experts (peer review) can be found in Ash *et al.* 2010.

2.3.5 Developing Executive Summaries for chapters of an assessment report

An Executive Summary is, in principle, located at the start of each chapter to outline its key findings.

These summaries are crucial to communicate the outcomes of the assessment to its primary audience: members of the IPBES (the governments), observers, and all other stakeholders. The Executive Summaries also provide:

1. Confidence statements in support of each key finding (See section 2.3.6);
2. Links to the sections in the full chapter that contains the relevant supporting evidence and literature;
3. Input to the Summary for Policy Makers (SPM);
4. An explicit link between the SPM key findings and the sections within the full technical report providing supporting evidence (a traceable, evidence ‘paper trail’).

The summaries need to be written clearly, concisely and using simple language. This will facilitate effective communication of the key findings. Executive summaries are not the same as an abstract of a scientific paper, but they should be technical in nature and be based on the analysis set out in the chapter. One of the key differences between the Executive Summaries and the SPM is moving from setting out the technical facts to blending and synthesising the findings from different chapters into policy relevant messages. A key statement in the SPM should be readily traceable back to an Executive Summary statement(s) that in turn should be readily traceable back to a section(s) of the chapter text, which in turn should be traceable where appropriate to the primary literature through references. References to the relevant Executive Summary statement within the SPM are included in curly brackets (e.g. {1.2}).

Chapter 1 of an IPBES assessment is often introductory in nature and reflects the scene-setting objective of this chapter. Therefore, the executive summary will differ slightly from the other chapters in having an executive summary based on ‘key messages’ rather than ‘key findings’.

As a guideline, each chapter should aim for an executive summary of up to 10-12 key findings and no more than 1500 words. This will also vary depending on the nature of the chapter. The final IPBES pollination assessment, for example, had from 4 to 21 and an average of 12 key findings per chapter.

Example of key findings for Chapter 3 of the pollination assessment can be found in Box 2.2. The important points to recognise from this example are:

1. There are a total of 11 key findings that are short and indicated in bold;
2. Each key finding comes with a confidence language statement (in brackets);
3. Further explanation of each key finding is provided through additional text of about a paragraph;
4. The total word count is around 1400;

5. Each key finding includes a list of the chapter sections that contain the relevant literature/evidence supporting that key finding.

2.3.6 Using confidence terms

When we talk about confidence in assessments in relation to knowledge, we are referring to how assured experts are about the findings (data and information) presented within their chapters. Low confidence describes a situation where we have incomplete knowledge and therefore cannot fully explain an outcome or reliably predict a future outcome, whereas high confidence conveys that we have extensive knowledge and are able to explain an outcome or predict a future outcome with much greater certainty.

2.3.6.1 *Why does our communication of confidence matter in IPBES assessments?*

Knowledge and scientific data about the natural world and the influence of human activities are complex. There is a need to communicate what the assessment author teams have high confidence in as well as what requires further investigation to allow decision makers to make informed decisions. Furthermore, by following a common approach to applying confidence terminology within an assessment, authors are able to increase consistency and transparency.

IPBES assessments will use specific phrases known as “confidence terms” in order to ensure consistency in the communication of confidence by author teams. What confidence term is used will depend on whether the author team’s expert judgement on the quantity and quality of the supporting evidence and the level of scientific agreement. IPBES assessments use a four-box model of confidence (Figure 2.5) based on evidence and agreement that gives four main confidence terms: “well established” (much evidence and high agreement), “unresolved” (much evidence but low agreement), “established but incomplete” (limited evidence but good agreement) and “inconclusive” (limited or no evidence and little agreement).

The following guidance will discuss where confidence terms must be applied in IPBES assessment reports, how to select the appropriate term to communicate the author team’s confidence and to present the confidence terms in the text.

Confidence terms should always be used in two key parts of an assessment:

1. They should be assigned to the key findings in **Executive Summaries** of the technical chapters in an assessment report.
2. Within the **Summary for Policymakers**.

2.3.6.2 *How to do I select confidence terms?*

Once the author team has identified the chapter’s key messages and findings, in order to present these in the **Executive Summary** or **Summary for Policymakers**, it is mandatory to evaluate the quality and quantity of associated evidence and scientific agreement. Author teams will always be required to make **qualitative assessments** of confidence based on expert estimates of agreement and evidence.

Depending on the nature of the evidence supporting the key message or finding, **quantitative assessments** of confidence may also be possible. Quantitative assessments of confidence are estimates of the likelihood (probability) that a well-defined outcome will occur in the future. Probabilistic estimates are based on statistical analysis of observations or model results, or both, combined with expert judgment. However, it may be that quantitative assessments of confidence are not possible in all assessments due to the nature of the evidence available.

It is not mandatory to apply confidence terms throughout the main text of the assessment report. However, in some parts of the main text, in areas where there are a range of views that need to be described, confidence terms may be applied where considered appropriate by the author team. In no case should the terms be used colloquially or casually to avoid confusing readers. Only use these terms if you have followed the recommended steps for assessing confidence.

2.3.6.3 *Qualitative assessment of confidence*

This section discusses the process and language that all author teams must apply to evaluate and communicate confidence qualitatively. The following factors should be considered to evaluate the validity of the message or finding: the type, quantity, quality and consistency of evidence (the existing peer-reviewed literature and grey literature etc.), and the level of agreement (the level of concurrence in the data, literature and amongst experts, not just across the author team). The author team’s expert judgement on the level of evidence and agreement should then be used to apply a confidence term (Figure 2.5):

- **Inconclusive** – existing as or based on a suggestion or speculation; no or limited evidence.
- **Unresolved** – multiple independent studies exist but conclusions do not agree.
- **Established but incomplete** – general agreement although only a limited number of studies exist but no comprehensive synthesis and, or the studies that exist imprecisely address the question.
- **Well established** – comprehensive meta-analysis or other synthesis or multiple independent studies that agree.

The **well-established** box in Figure 2.5 is further subdivided in order to give author teams the flexibility to emphasise key messages and findings that the author team have very high confidence in:

- **Very well established** – very comprehensive evidence base and very low amount of disagreement.
- **Virtually certain** – very robust data covering multiple temporal and spatial scales and almost no disagreement.

The qualitative confidence terms discussed in this section should not be interpreted probabilistically and are distinct from “statistical significance”.

Virtually certain will not be used by the author teams frequently in the assessment report. The confidence terms used to communicate high confidence are intended to provide authors with the flexibility to emphasise issues that may be considered as fact by the scientific community but not by the non-scientific community (decision makers, media, and general public). In most cases it may be appropriate to describe these findings with overwhelming evidence and agreement as statements of fact without using confidence qualifiers.

Similarly, **inconclusive** may also be used infrequently, but is intended to provide authors with the flexibility to emphasise issues that are not established in science but that are important to policy makers or might have been highlighted by a different audience.

The degree of confidence in findings that are conditional on other findings should be evaluated and reported separately.

When evaluating the level of evidence and agreement for a statement, it is important to standardise the use of the terms within and across the author teams, and when possible, across the assessment, to ensure their consistent use. The use of the above confidence terms can be standardised by taking key messages and findings in the **Executive Summaries** and discussing, as an author team, what terms should be applied and the reasons why. When appropriate, consider using formal elicitation methods to organise and quantify the selection of confidence terms.

Be aware of the tendency for a group to converge on an expressed view and become over confident in it. One method to avoid this would be to ask each member of the author team to write down his or her individual assessment of the level of confidence before entering into a group discussion. If this is not done before group discussion, important views and ranges of confidence may be inadequately discussed and assessed. It is important to recognize when individual views are adjusting as a result of group interactions and allow adequate time for such changes in viewpoint to be reviewed (Mastrandrea et al. 2010). Whichever approach is taken, traceable accounts should be produced and recorded to demonstrate how confidence was evaluated (see section on Traceability).

It is important to carefully consider how the sentences in the key messages and findings are structured because it will influence the clarity with which we communicate our understanding of the level of confidence. For example, sometimes the key finding combines an element that is **well-established** with one that is **established but incomplete**. In this case it can be helpful to arrange the phrasing so that the **well-established** element comes first, and the **established but incomplete** element comes second, or as a separate sentence. Where possible avoid the use of the **unresolved** and **established but incomplete** by writing or rewording key messages and findings in terms of what is known rather than unknown. Author teams should focus on presenting what is **well-established** as far as possible in order to make it clear to decision makers what is known. Assigning confidence terms to our key findings will therefore often require that we re-write sentences, rather than simply adding the terms to existing text.

2.3.6.4 Quantitative assessment of confidence

This section discusses the process and language that author teams may wish to apply in order to evaluate and communicate the confidence that an outcome will occur quantitatively. Likelihood expresses a probabilistic estimate of the occurrence of a single event or of an outcome within a given

range. Probabilistic estimates are based on statistical analysis of observations or model results, or both, combined with expert judgment.

When sufficient probabilistic information is available, consider ranges of outcomes and their associated probabilities with attention to outcomes of potential high consequence. The author team's expert judgement on the magnitude of the probability should then be used to apply a likelihood term from Figure 2.6.

Categories in Figure 2.6 can be considered to have nested boundaries. For example, describing an outcome as *likely* or *very likely* conveys in both cases that the probability of this outcome could fall within the range of 95% to 100% probability, but in the case of *likely*, the larger range (66-100%) indicates a higher degree of confidence than *very likely* (90-100%). In making their expert judgement, author teams should start at *about as likely as not* and consider whether there is sufficient quantitative information available to assign either a *likely* or *unlikely* probability range. Only after thinking about this initial range should the author teams consider whether there is sufficient evidence to move to more extreme levels of probability.

Author teams should note that using a likelihood term for a specific outcome implies that alternative outcomes have the inverse likelihood e.g., if an outcome is *likely* (a range of 66-100%) than that would imply that other outcomes are *unlikely* (0-33% probability).

If the author team consider that sufficiently robust information is available with which to make a 'best estimate' of the probability of the occurrence of an event, then it is preferable to specify the full probability range (e.g. 90-95%) in the text without using the terms in Figure 2.7. Also, *about as likely as not* should not be used to communicate a lack of knowledge, only an estimate of probability based on the available information.

Author teams should be aware of the way in which key messages and findings are phrased. The way in which a statement is framed will have an effect on how it is interpreted e.g., a 10% chance of dying is interpreted more negatively than a 90% chance of surviving. Consider reciprocal statements to avoid value-laden interpretations e.g., report chances both of dying and of surviving (Mastrandrea et al. 2010).

Finally, author teams should try not to avoid controversial events, such as impacts or events with high consequence but extremely low probability, in their effort to achieve consensus within an author team.

2.3.6.5 How to present confidence terms - Presenting confidence using the four-box model

Confidence terms are communicated as part of the key findings of an assessment. The key findings are set out in the **Executive Summaries** for each of the assessment's chapters in the full technical report. The key findings are the facts and information drawn directly from the chapter. It is recommended that key findings should be set out as follows.

The first sentence of the finding should be bolded and contain a confidence term from the four-box model in italics and brackets at the end of the sentence. This first sentence is followed by two to four sentences which then supports the information contained in this first sentence. Subsequent sentences may contain confidence terms within brackets where appropriate. It is not necessary to include confidence terms with each sentence if the whole paragraph falls under the same confidence term.

The words that make up the four-box model and likelihood scale should not be used in the text of the assessment except when formally assigning confidence. If, for example, there was a sentence that used the word "likely" but not with the intended meaning from the likelihood scale, then the word should be replaced with another (e.g. probably).

2.3.6.6 Presenting confidence using the likelihood scale

In some instances, as above, author teams may wish to complement the use of the *well-established* confidence term with a term from the likelihood scale. If terms from the likelihood scale are used then they should be incorporated into the text and italicised prior to the impact or outcome the probability of which they are describing.

2.3.6.7 Traceability

The author team's expert judgment of their confidence in the key messages and findings should be explained by providing a clear traceable account. A traceable account is a description in the chapter of the evaluation of the type, quantity, quality and consistency of the evidence and level of agreement that forms the basis for the given key message or finding (Mastrandrea et al. 2010). Where possible, the description should identify and discuss the sources of confidence. In order to ensure consistency in

how the author teams classify sources of confidence within and across IPBES assessments, author teams should use the typology shown in Table 2.4 below.

A key statement in the **Summary for Policy Makers** should be readily traceable back to an **Executive Summary** statement(s) that in turn should be readily traceable back to a section(s) of the chapter text, which in turn should be traceable where appropriate to the primary literature through references.

References to the relevant **Executive Summary** statement should be included in curly brackets (e.g. {1.2}).

2.3.6.8 *Summary of Step for applying confidence terms*

The steps recommended for assessing and communicating confidence for Executive Summaries and Summaries for Policy Makers

1. Identify the chapter's key messages and findings.
2. Evaluate the supporting evidence and the level of scientific agreement.
3. Establish whether the evidence is probabilistic or not (e.g. from model predictions).
4. Where the evidence is qualitative instead or probabilistic, select a confidence term from the **four-box model** (Figure 2.6) to communicate the author team's confidence in the key message or finding.
 - a. Assess the quantity and quality of evidence and the level of agreement in the scientific community.
 - b. Establish how confident the author team is and select the appropriate term.
5. Where quantitative estimates of the probability of an outcome or impact occurring are available (e.g. from model predictions), select a likelihood term from the **likelihood scale** (Figure 2.7) to communicate the author teams' expert judgement of the range of the probability of occurrence.
6. Ensure that there is always a 'traceable account' in the main text describing how the author team adopted the specific level of confidence, including the important lines of evidence used, standard of evidence applied and approaches to combine/reconcile multiple lines of evidence. Where specific sources of confidence are prominent for a key finding, the terms used in left hand column of Table 2.4 should be included in the traceable account.
7. **OPTIONAL:** Consider using formal frameworks for assessing expert judgement for each author team.

2.3.7 **Developing a Summary for Policy Makers**

2.3.7.1 *What is a Summary for Policy Makers?*

A Summary for Policy Makers (SPM) is a short document that highlights the main messages of an assessment responding to its scoping report and tailored to the needs of policy makers. It consists of a limited number of key messages which is followed by more detailed findings and graphics. Findings are usually formulated in one or two bolded sentences each, which are further substantiated or explained in a paragraph which follows from the main message. Findings are given with confidence levels and references which makes them traceable back to the main report.

Responsibility for preparing first drafts and revised drafts of SPMs lies with the report co-chairs and an appropriate representation of coordinating lead authors and lead authors, overseen by the Multidisciplinary Expert Panel and the Bureau. See Table 2.3 for time table of development and review process for an IPBES SPM.

The features of an SPM are:

- sets out policy relevant messages from the assessment while not being policy prescriptive
- builds on the Executive Summaries (key findings) from each chapter from the technical assessment report

The development of an SPM is an iterative process as explained in the steps below. You will need to make sure that information in the Chapter Executive Summaries contains the information that underpins the messages set out in the SPM. And that the analysis set out in the assessment chapters

supports the findings in the Chapter Executive Summary. Fundamentally, no information, data or knowledge should appear in the SPM that does not appear in the technical assessment report.

2.3.7.2 *Steps to developing an SPM*

Step 1: Developing chapter Executive Summaries

The first step in developing an SPM, is the development of an Executive Summary for each chapter. The Executive Summaries set out the key findings with the appropriate confidence terms for a particular chapter (see section 2.3.5 for further guidance on applying Confidence Terms). The content of the Executive Summary should be technical in nature and be based on the analysis set out in the chapter.

Step 2: Identify the policy relevant messages

One of the key differences between the Executive Summaries and the SPM is moving from setting out the technical facts to blending and synthesising the findings from different chapters into policy relevant messages. Each message should be referenced to where the supporting evidence can be found in the assessment chapters (see Box 2.3).

To start with you might like to begin by envisaging the different decision makers receiving the SPM and assessment report. And then ask the following questions:

- What information would the decision maker expect or be surprised by from the assessment report?
- What would the questions be that the decision makers want most answered? (these are set out in the approved scoping document for an IPBES assessment)
- What information does the decision makers need in order to implement change?
- What information would help a decision maker convince others of the rationale for further action?

There is a tendency to make very general comments when aggregating key findings together, which are often not relevant for the policy agenda. It is therefore important to keep in mind who you are writing the SPM for. The importance of the IPBES review process should be highlighted here as it gives the opportunity for governments as members of the Platform to provide comment on the SPM. These insights might be helpful to continue the shaping of the SPM.

Step 3: Revisit chapters in light of the identified policy relevant messages

Remember that developing an SPM is an iterative process. Once you have identified the key policy relevant messages, it is important to revisit the technical assessment report and ask the following questions:

- Have we undertaken the analysis that would support the messages set out in the SPM and are they central to the arguments set out in the chapter?
- Have we pulled out and brought forward the necessary facts and figures that can substantiate and exemplify the findings?
- Have we identified the uncertainties and range of views that a policy maker needs to be aware of?

Step 4: Drafting the SPM

At this point you will need to think about structure of the SPM. The structure should follow the key messages identified in step 2. At this point you should reflect again on the storyline for the SPM (e.g. if you were to read only the key messages does it tell the story/macro-story you want policy makers to understand). It is important to identify facts and figures that can be used to illustrate, exemplify and help tell the story.

You might consider presenting the policy relevant key messages as a set on the first page of the SPM. This set of short and succinct key messages should then be backed up with a more detailed summary (8-15 pages) which substantiate the key messages. The main message should be the first sentence of a paragraph and be bolded. This should be followed by text including key facts and figures and examples. Confidence terms should be applied and the range of views on a topic that a policy maker should be aware of presented. If appropriate, then use bullet points to present lists and also include key graphics or develop graphic synthesis that help to illustrate the key messages of the assessment. The context of the assessment should also be included in the SPM. Once you have drafted the SPM it is

suggested that you reflect once again on the questions posed by the assessment and ensure that the SPM addresses these.

Remember that the SPM for IPBES assessments will be approved line by line within the Plenary, therefore it is important to develop a succinct summary based upon the analysis of the assessment. Use confidence terminology to ensure that no ambiguity appear in regards to the messages and analysis in the SPM. Each finding should also contain a footnote with a reference back to the number of the section or sections of the main report that the finding is drawn from.

2.4 Step 4: Endorsement and outreach

An assessment report is comprised of a summary for policy makers, which the Plenary will approve line by line, and a set of chapters (sometimes referred to as the technical report), which the Plenary will only accept. The chapters will be revised, following the Plenary, to reflect the changes made to the SPM during the Plenary.

2.4.1 Acceptance of reports by the Plenary

The set of chapters presented to the Plenary has been prepared and reviewed as discussed above. While the large volume and technical detail of this material places practical limitations upon the extent to which changes to the reports can be made at sessions of the Plenary, “acceptance” signifies the view of the Plenary that this purpose has been achieved. The content of the chapters is the responsibility of the coordinating lead authors and is subject to Plenary ‘acceptance’. After ‘acceptance’ by the Plenary, chapters are edited by the authors to reflect the changes made by the Plenary to the summary for policymakers, and thus ensure full consistency between the SPM and the underlying chapters and their executive summaries.

Reports accepted by the Plenary will then be formally and prominently described on the front and other introductory covers as a report accepted by IPBES.

2.4.2 Approval of SPM by the Plenary

The SPM is presented to the Plenary for approval, in the presence of the co-chairs and some of the experts of the assessment, who will be able to address the questions of the Plenary and discuss whether proposed changes are compatible with the science contained in the report. Sessions of the Plenary where SPMs are being discussed are closed to the media, including social media. The summary for policymakers will then be formally and prominently described as a report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

2.4.3 Outreach and support for use

A communication strategy will be developed by the assessment Management Committee and approved by the Bureau. The aim of the communication strategy is to ensure that the assessment results are appropriately communicated, and reaching the target audience.

The communication strategy may include the following steps:

- Communication ahead of the Plenary session of IPBES where the SPM will be accepted
- Selection and hiring of a media consultant to assist with implementation of the strategy
- Finalisation of the communication strategy with the media consultant
- Preparation of press releases
- Preparation of other media materials (including press kit, mini videos explaining the SPM content, PowerPoint presentation of the outcome of the assessment)
- Mobilisation of all partners and stakeholders to help promote the assessment reports and expand their overall reach and impact
- Webinar with key journalists ahead of Plenary
- Outreach with social media
- Media training for IPBES authors, selected MEP, Bureau and secretariat staff
- Communication during the Plenary
- Press conference to announce the approval of the SPM

- Interviews with press, TV, radio in response to requests
- Outreach with social media
- Communication after the Plenary
- Publication of printed versions of the SPM and technical reports
- Additional press conferences as appropriate
- Outreach with social media
- Media monitoring and follow up
- Presentations over the course of the year to different audiences following the approval of the SPM, including conference and events

3. References

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4. Illustrations

Figure 2.1
The four stages of the IPBES assessment process

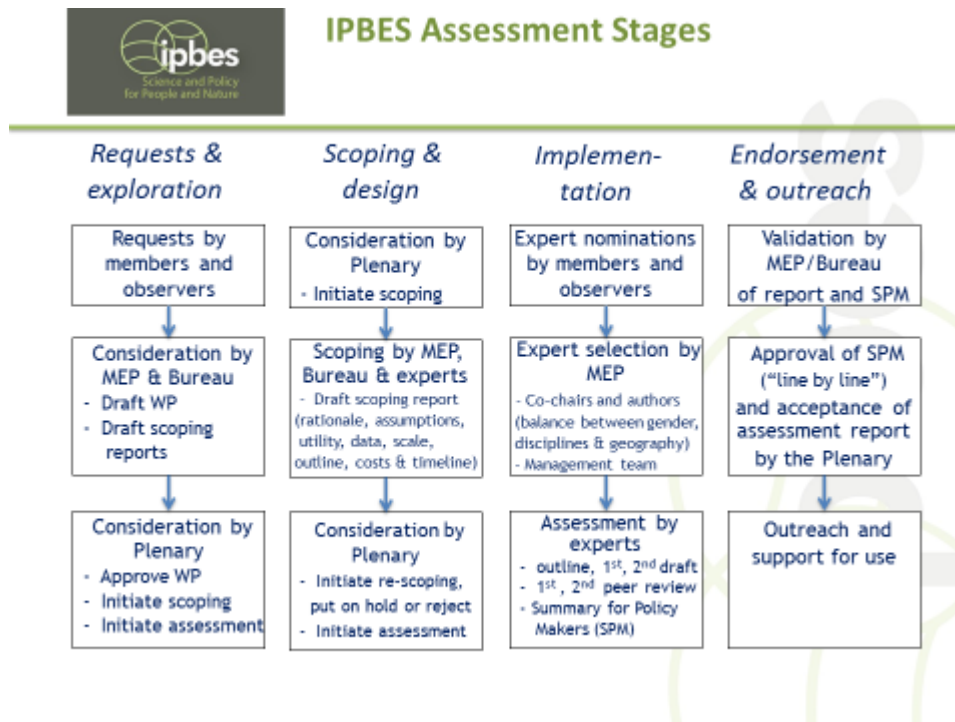


Figure 2.2
IPBES assessment scoping process (blue outline: Exploratory stage; orange outline: Design stage; green outline: Implementation stage). Source: adapted from IPBES/2/9.

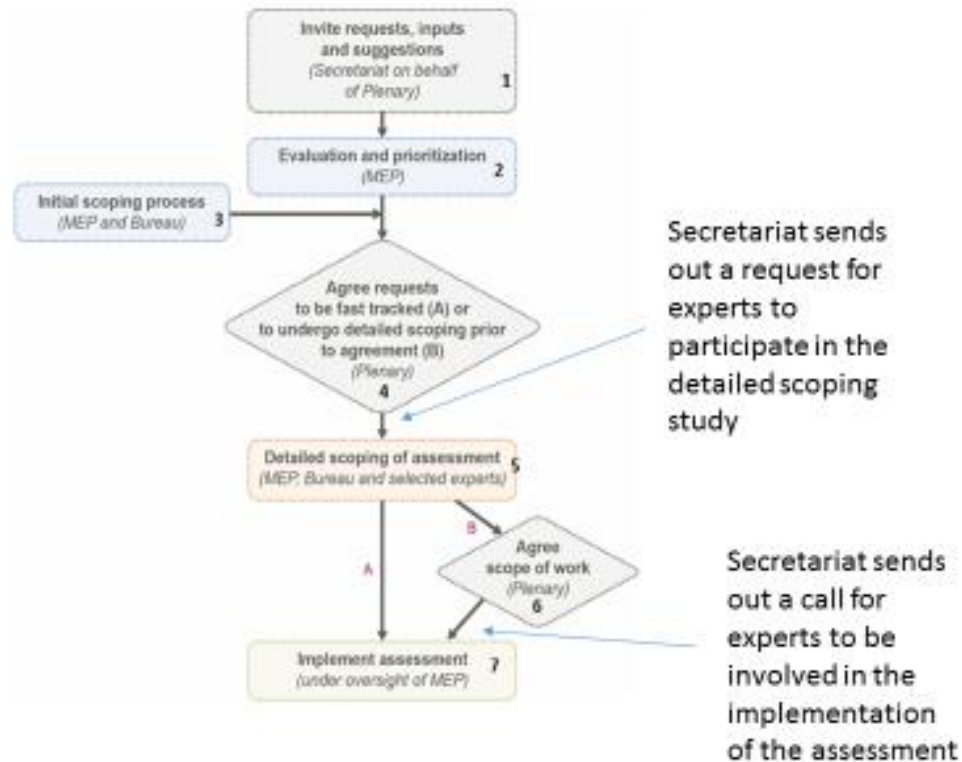


Figure 2.3
A typical three-year process for an IPBES assessment

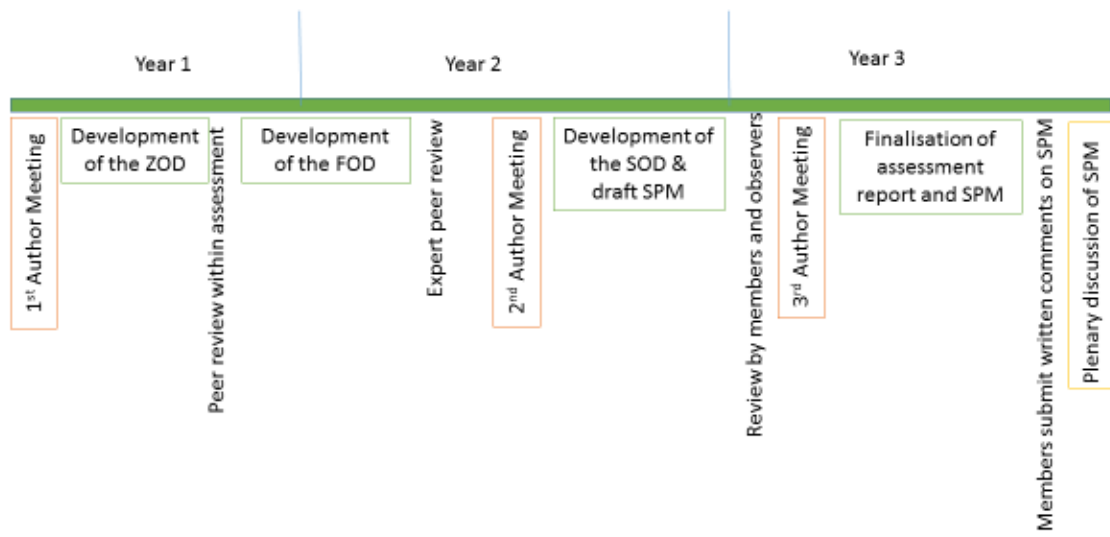


Figure 2.4
Example of a review template

Reviewer Name	Chapter	From Page (start)	From Line (start)	To Page (end)	To Line (end)	Comment
<i>I</i>				2	3	<i>x</i>

Figure 2.5

The four-box model for the qualitative communication of confidence. Confidence increases towards the top-right corner as suggested by the increasing strength of shading. Source: IPBES, 2016

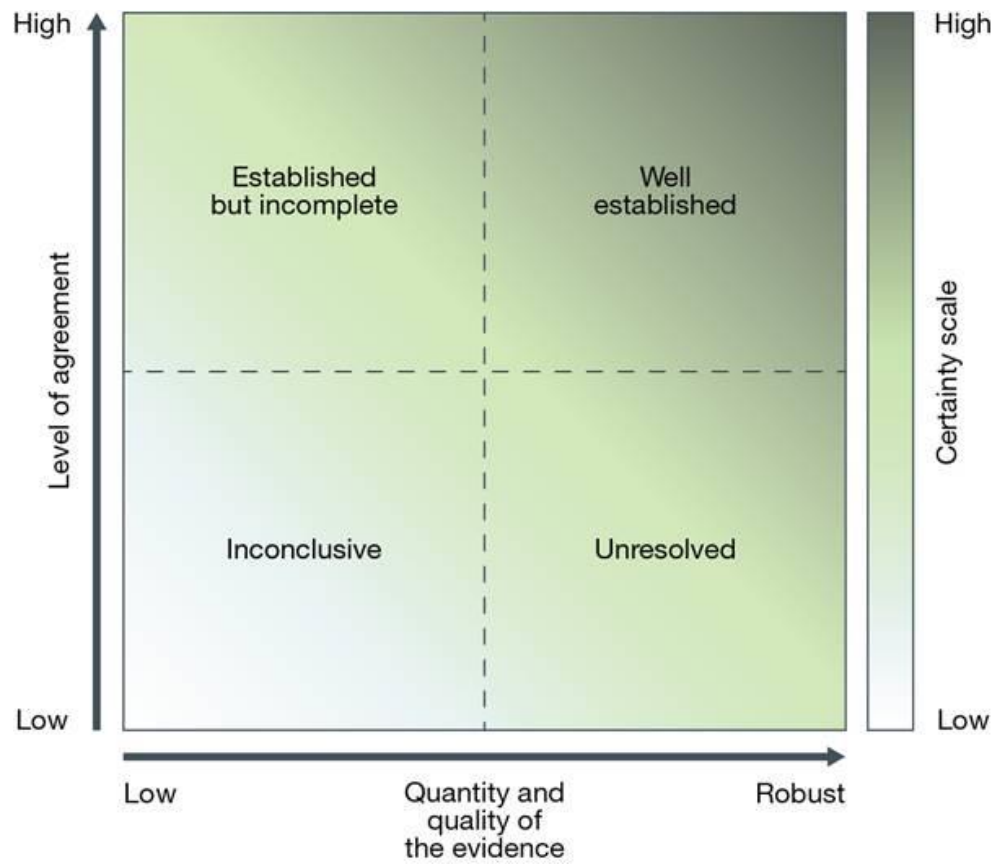


Figure 2.6. Likelihood scale for the quantitative communication of the probability of an outcome occurring. Note that the extreme levels of probability are nested within the broader levels of “likely” and “unlikely”. Source: modified from Mastrandrea et al. 2010.



Table 2.1

Nomination and selection processes for different roles in assessments.

Role in Assessment	Nomination and selection process
Assessment co-chair	<p>Governments, the scientific community and other stakeholders are able to nominate appropriate experts for the roles of Co-chairs, CLAs, LAs and review editors in response to requests from the Chair of IPBES.</p> <p>In addition to a call for nominations Members of the Multidisciplinary Expert Panel and the Bureau will contribute, as necessary, to identifying relevant experts to ensure appropriate representation from developing and developed countries and countries with economies in transition as well as an appropriate diversity of expertise and disciplines, gender balance and representation from ILK holders. If the pool of original nominations is not balanced enough, additional nominations can be initiated by the procedure for filling gaps among groups of experts (Annex I to decision IPBES-4/3).</p>
Coordinating Lead Author (CLA)	Nominations will be compiled in lists that are made available to all Platform members and other stakeholders and maintained by the Platform secretariat. Experts with the most relevant knowledge, expertise and experience may only be chosen once an assessment topic has been fully scoped.
Lead Author (LA)	Every effort should be made to engage experts from the relevant region on the author teams for chapters that deal with specific regions, but experts from countries outside the region should be engaged when they can provide an important contribution to the assessment.
Review Editor (RE)	<p>The nomination process will follow these steps:</p> <ol style="list-style-type: none"> 1. Nominees will be invited to fill out an Application form and attach their Curricula Vitae through the dedicated web portal 2. The Application Form will automatically be sent to the Nominating Government or Organisation (Nominator) indicated by the Nominees with an email which will provide a link to a Nomination Form inviting the Nominators to approve and submit their nominations. 3. Nominators and Nominees will receive an acknowledgement message once the Nomination Form confirming the nomination is submitted.
Fellow	Nomination process is handled by the TSU for Capacity Building and is made by the fellow's home institution. A call for nominations is made by the secretariat and utilises an online process through the IPBES website for submission of applications. Selections is made by the Management Committee.
Expert reviewer	Expert reviewer are self-selected and register through the IPBES website following a call for expert reviewers by the secretariat.
Contributing Author (CA)	The coordinating lead authors and lead authors selected by the Multidisciplinary Expert Panel may enlist other experts as contributing authors to assist with the work.
Management Committee	There is no nomination process for the management committee as it consists of the Co-Chairs, MEP and Bureau members, TSU and secretariat.
Technical Support Unit (TSU)	Offers to host a TSU for an assessment are made to the Bureau. The Bureau will discuss the offers made and select a TSU.

Table 2.2

Who is who in an IPBES assessments: roles and responsibilities

Role in assessment	Function	Advice for playing this role
Assessment co-chair	<p>The role of co-chair is normally shared between two and sometimes three experts. An assessments co-chair's role is to assume responsibility for overseeing the preparation of an assessment report, as well as its summary for policymakers (SPM) and ensuring that the report is completed to a high standard. A co-chair is senior in their field and has experience in coordinating work of experts. Besides overseeing the development of the assessment, the co-chair can also contribute text to one (or more) chapters.</p> <p>The co-chair is also responsible for collaborating and coordinating with the coordinating lead authors to ensure that the chapters are delivered in a timely manner and with a high standard. The co-chair will ensure that the chapters feed into each other and that their messages are not contradicting.</p> <p>The co-chair participates in the setting of the agenda and the chairing of the author meetings. He/ she will work together with the management committee of the assessment to ensure that issues within the assessment are being solved and that the assessment is prepared according to the decisions and guidelines of the IPBES. Once the assessment and summary for policy makers are finalized, co-chairs also engage in the outreach for those deliverables.</p> <p>Assessment co-chairs are expected to contribute 25% of their time to the coordination of their dedicated assessment. They are expected to participate in each author meeting.</p>	
Coordinating Lead Author (CLA)	<p>A coordinating lead author's role within an IPBES assessment is to assume overall responsibility for coordinating a chapter of the assessment report.</p> <p>Coordinating lead authors are lead authors who, in addition to their responsibilities as a lead author, have the responsibility of ensuring that the chapters of a report are completed to a high standard and are collated and delivered to the report co-chairs in a timely manner and conform to any overall standards of style set for the document. They are thus to coordinate the work of the lead authors, fellows and contributing authors involved in their chapter to ensure the quality of the chapter as a whole.</p> <p>Coordinating lead authors also play a leading role in ensuring that any cross-cutting scientific, technical or socio-economic issues of significance to more than one section of a report are addressed in a complete and coherent manner and reflect the latest information available.</p> <p>CLAs coordinate the pulling out of key messages of their chapter and the writing of the executive summary of the chapter. They contribute to the writing of the SPM.</p> <p>CLAs are expected to contribute 20% of their time to the coordination of their chapter. They are expected to participate in the author meetings and to coordinate the work of their chapter at the meeting.</p>	

Role in assessment	Function	Advice for playing this role
Lead Author (LA)	<p>The role of a lead author is to assume the responsibility of producing designated sections or parts of chapters that respond to the work programme of the Platform on the basis of the best scientific, technical and socio-economic information available.</p> <p>Lead authors typically work in small groups that together are responsible for ensuring that the various components of their sections are put together on time, are of a uniformly high quality and conform to any overall standards of style set for the document.</p> <p>The essence of the lead authors' role is to synthesize material drawn from the available literature, fully-justified unpublished sources, contributing author's stakeholders and experts where appropriate.</p> <p>Lead authors can identify contributing authors who can provide additional technical information or graphics on specific subjects covered in the chapter.</p> <p>LAs are expected to contribute 15% of their time to producing relevant sections and parts to their dedicated chapters. They are also expected to participate actively in the author meetings.</p>	
Fellow	<p>The IPBES fellowship programme allows early career researchers and other professionals to engage with the Platform's activities, working alongside more experienced colleagues. Fellows are experts that are in the early stages of their careers, indicatively not older than 35 years of age and 5-10 years of experience after obtaining their academic degree. They should be working in the area of social, economic and biological sciences, policy development and/or indigenous and local knowledge systems.</p> <p>Fellows are an integral part of the IPBES assessment chapters and they collaborate with the CLAs and LAs in developing sections or parts of the chapters. They receive training to gain an in-depth understanding of the IPBES assessment processes. Fellows will also be paired up with a mentor for the assessment period.</p> <p>Fellows are expected to participate in the author meetings.</p>	
Review editor (RE)	<p>Review Editors are seniors in their field, and may represent a range of scientific, technical and socioeconomic views, and therefore have expertise in one or more natural and social scientific disciplines, and represent or have expertise in indigenous and local knowledge. The review editors get involved as of the review phase of the first order draft and help the author teams to address review comments during the second and third author meeting, and help to ensure that confidence terms are used consistently throughout the executive summary of the related chapter.</p> <p>In general, there will be two review editors per chapter, including its executive summary. It is also possible that an assessment has one or more overall review editors that review the entire report. Review editors are not actively engaged in drafting reports and may not serve as reviewers for text that they have been involved in writing.</p> <p>The review editors' main tasks are: (i) to assist the Multidisciplinary Expert Panel in identifying reviewers for the expert review process, (ii) ensure that all substantive expert and government review comments are afforded appropriate consideration, (iii) advise lead authors on how to handle contentious or controversial issues and (iv) ensure that genuine controversies are adequately reflected in the text of the report concerned.</p> <p>Responsibility for the final text of the report remains with the relevant CLAs and LAs.</p> <p>Review editors must submit a written report to the Multidisciplinary Expert Panel and, where appropriate, will be requested to attend a meeting convened by the Multidisciplinary Expert Panel to communicate their findings from the review process and to assist in finalizing summaries for policymakers and, as necessary, synthesis</p>	

Role in assessment	Function	Advice for playing this role
	<p>reports. The names of all review editors will be acknowledged in the reports.</p> <p>Review editors participate in the second and third author meetings.</p>	
Expert reviewer	<p>Expert reviewers carry out the external review of the first and second order drafts of the assessment report and the summary for policy makers. They have to register as an expert reviewer in order to be able to comment on the accuracy and completeness of the scientific/technical/socio-economic content and the overall scientific/technical/socio-economic balance of the drafts. An expert reviewer evaluates the quality, validity and relevance of the assessment. The aim of a peer review is to provide authors with constructive feedback that will help in preparing the assessment of the highest quality.</p> <p>Experts who are nominated by governments and observer organizations but not selected are encouraged to contribute to the report as Expert Reviewers.</p> <p>Expert reviewers are independent experts (i.e. experts not involved in the preparation of that particular chapter). They will be mentioned as expert reviewers in the final report.</p>	
Contributing Author (CA)	<p>A contributing author's role is to prepare technical information in the form of text, graphs or data for inclusion by the lead authors in the relevant section or part of a chapter.</p> <p>Input from a wide range of contributors is key to the success of Platform assessments. Contributions are sometimes solicited by lead authors but spontaneous contributions also encouraged. Contributions should be supported, as far as possible, with references from the peer reviewed and internationally available literature.</p> <p>Contributing authors are responsible only for contributing to a specific part of the chapter and do not work on the chapter as a whole. They will be listed only as contributing author if their input is included in the final report. Contributing authors are not formally nominated and also do not normally fill in the conflict of interest forms. They are not privy of all communication in the chapter team but work directly with the LA or CLA who is coordinating the CA's technical input into the chapter.</p>	
Management Committee	<p>The management committee of the assessments consists of the co-chairs of the assessment, appointed members of MEP and bureau and representatives of the responsible technical support unit and secretariat. The management committee is chaired by the co-chairs of the relevant assessment and responsible for supporting the co-chairs of the relevant assessment in the day-to-day operations required for the implementation of the respective deliverable, where the substance of the matter to be addressed does not warrant alerting the MEP, Bureau or other entity responsible according to the IPBES procedures.</p> <p>The management committee stays up to date with all developments of the assessment process and also ensures that the processes adhere to the IPBES rules of procedure. Where the management committee cannot agree on an issue, or the scope of the matter to be addressed warrants a decision by the responsible body, the matter will be referred by the management committee to the responsible body.</p> <p>Examples for responsibilities of the management committees include:</p> <ul style="list-style-type: none"> • Identifying and suggesting names of experts (CLAs, LAs and REs) to fill gaps in expertise, for MEP approval • Ensuring that the global, regional and thematic assessments are consistent in including/using: <ul style="list-style-type: none"> ✓ The conceptual framework ✓ The values Guide ✓ The scenarios and modelling assessment 	

Role in assessment	Function	Advice for playing this role
	<ul style="list-style-type: none"> ✓ Indicators ✓ ILK ✓ Ecosystem services classification • Ensuring the approaches and findings of the assessments are consistent • Assisting in the preparation of SPMs and presentation at Plenary • Hold meetings by teleconference or other appropriate means at least once every two months 	
Technical Support Unit (TSU)	<p>The IPBES secretariat is mandated to provide technical support to the expert working groups. Technical support needed for the development of the deliverables including the assessments will in principle be provided by the secretariat. In many instances however, the technical support needed exceeds the capacity of the secretariat in its planned composition and it is more cost effective when additional technical support to expert groups is provided through the establishment of technical support units</p> <p>Each assessment has one dedicated technical support unit, normally hosted by a partner institution and consisting of a couple of technical and administrative staff members. Technical support units represent one avenue for involving regional hubs and regional or thematic centres of excellence in the work of the Platform. It can also happen that the technical support unit is hosted within the IPBES secretariat. In any case, the TSU works under the oversight of the secretariat to coordinate and administer the activities for the assessment expert group.</p> <p>Some of these main activities include:</p> <ul style="list-style-type: none"> • Provide guidance to the expert group to ensure that activities are delivered in accordance with the guidance of the MEP, related IPBES decisions, and with the rules of procedure of the Platform. • Provision of logistical, technical and thematic support (through documents, communications, contacts, etc.) to the experts to facilitate their participation in the assessment • Support the formatting and editing of the regional assessment report and the identification of plagiarism risks. • Support the organization and storage of reference materials and data used in the assessment report. • Support the expert group in convening teleconferences, also by putting in place the necessary teleconference services to facilitate calls. 	

Table 2.3

What should happen at each stage of an IPBES Assessment and who should be involved?

Stage	Who should be involved	What happens?
First Author Meeting	Co-Chairs, CLAs, LAs and fellows Assessment management team	<ul style="list-style-type: none"> • Development of an annotated outline (MOD) • Identification of CAs • Identification of data & knowledge needs • Identification of case studies • Understanding of roles, responsibilities and timelines • Engagement of expert groups and task forces as appropriate
Development of the Zero Order Draft (ZOD)	Co-Chairs, CLAs, LAs, CAs and fellows	<ul style="list-style-type: none"> • The ZOD has around 70% completed text • Some paragraphs will consist of bullet points to indicate content. • Graphics, Tables and Case Studies are not all agreed but text may include indication of a graphic that might be included.
Peer review within the assessment	Co-Chairs and CLAs Assessment management team MEP	This review stage is internal to the assessment. It provides an opportunity to understand where the overlaps are between chapters, gaps in text and expertise
Development of the First Order Draft (FOD)	Co-Chairs, CLAs, LAs, CAs and fellows REs	The FOD is a complete draft of the technically and scientifically balanced assessment including the glossary. Each chapter should include an executive summary. Authors should have thought about graphics and either have identified existing graphics for inclusion or have identified where graphics will be developed. Assessment authors should be mindful of the language used in the preparation of the first draft and the range of scientific, technical and socio-economic evidence should be presented clearly and concisely (Box 2.1). The REs identify a list of potential external expert reviewers and contacts them before the external review goes live
Expert Peer Review	Expert reviewers Assessment management team	<p>The first external review process is directed at expert review. These reviewers will come from a variety of institutions but will have a technical background in the content of the assessment.</p> <p>The secretariat sends out a notification to national focal points and observers announcing the availability of the FOD for review. Experts register through the IPBES website and the FOD is made available. Comments are returned to the Secretariat or respective TSU, in an agreed format (see 2.3.3). Comments are collated and sent to authors of the assessment.</p> <p>The management team for each assessment also works with authors to identify expert reviewers who are also invited by the secretariat to provide review comments</p> <p>On request, the secretariat will also make available any material that is referenced in the document being reviewed that is not available in the international published literature. Therefore, authors should have this material available in case a request is made</p> <p>The review of the FOD runs for 6-8 weeks.</p> <p>Review comments and responses are posted on line</p>
Second Author Meeting	Co-Chairs, CLAs, and REs Assessment management team LAs and Fellows may be included but this will differ between assessments	<p>The main objectives of second author meetings are:</p> <ul style="list-style-type: none"> • Develop content in each chapter, identify gaps and challenges • Address comments received from the expert review of the First Order Draft • Work on the executive summary and draw out draft key messages • Plan next steps for producing the Second Order Draft, including the summary for policy makers • Standardize the quality of scientific evidence across chapters and across assessments • Address and discuss the integration of indigenous and local knowledge (ILK) into assessments

Stage	Who should be involved	What happens?
		The second author meeting also provides an opportunity for authors to work with REs
Development of the Second Order Draft (SOD) & and Summary for Policy Makers (SPM)	Co-Chairs, CLAs, LAs, CAs, REs and fellows	The SOD is a complete draft of the assessment including the glossary and executive summary for each chapter and graphics. The SOD will take into consideration comments from the Expert Peer Review. A full draft of the SPM including key messages and graphics is also developed during this period
Review by Members and Observers	Member governments, Observers and Experts	<p>The SOD and first draft of the SPM are reviewed concurrently.</p> <p>Once the SOD and draft SPM is drafted, the secretariat will notify members and observers of the start of the review period.</p> <p>Reviewers can then register through the IPBES website and then be granted access to the relevant documents.</p> <p>Comments need to be returned to the IPBES secretariat in a standard format. Governments should send one integrated set of comments for each report to the secretariat through their designated national focal points. Experts should send their comments to the secretariat.</p> <p>Comments are then collated and sent to the relevant assessment management team</p> <p>This review period runs for 8 weeks.</p>
Third Author Meeting	Co-Chairs, CLAs, LAs, REs and fellows Assessment management team	The third author meeting provides a final opportunity for authors to work face-to-face with REs and as a group of authors. The third author meeting aims to address comments received from the external review of the Second Order Draft and to plan for the finalization of the report as well as its SPM and its presentation at plenary.
Finalisation of Draft assessment report and SPM for Plenary	Co-Chairs, CLAs, LAs, REs and fellows	<p>A final draft of the assessment report and SPM should be completed and submitted to the secretariat 12 weeks before the Plenary in which the SPM is agreed at. To allow for editing and translation. The SPM is translated into the six official languages of the United Nations and prior to distribution is checked for accuracy by the experts involved in the assessments.</p> <p>The final draft should reflect comments made by Governments and experts. If necessary, the MEP working with authors, review editors and reviewers can try to resolve areas of major differences of opinion.</p> <p>Reports should describe different, possibly controversial, scientific, technical and socio-economic views on a given subject, particularly if they are relevant to the policy debate. The final draft of a report should credit all report co-chairs, coordinating lead authors, lead authors, contributing authors, reviewers and review editors and other contributors, as appropriate, by name and affiliation, at the end of the report.</p>
Members submit written comments on SPM	Member governments	<p>Members of IPBES are invited to submit comments to the secretariat up to 2 weeks before Plenary of the final drafts of the assessment report and SPM. Comments should be submitted in the common format (see section 2.3.3).</p> <p>Comments are collated by the secretariat and sent to the relevant assessment team</p> <p>Upon receiving the comments and Plenary, Authors might like to prepare alternative text or responses to address the comments should they be discussed at the Plenary. Authors should not make direct changes to the text of the documents at this point.</p>
Plenary discussion on SPM	The Plenary, Co-Chairs, CLAs (and TSU)	<p>At the Plenary the SPM is agreed line by line. Members must also make interventions on comments provided to the secretariat in advance or amendments to the text cannot happen.</p> <p>The Co-Chairs and CLAs are present during the Plenary discussions to provide responses and/or alternative wording.</p>

Table 2.4
Sources of low confidence

Source of low confidence	Definition & examples	Qualities	Means of dealing with low confidence
Imprecise meanings of words (Linguistic uncertainty)	Vagueness and ambiguity of terms EXAMPLE: When terms such as human welfare, risks, plant reproductive success, pollination deficits are central to the finding.	Reducible Not quantifiable	<ul style="list-style-type: none"> • Clear, common definition of terms (IPBES Common Glossary). • Protocols as used in agent based modelling to deal with context dependence
Inherently unpredictable systems (Stochastic uncertainty)	Low confidence due to the chaotic nature of complex natural, social or economic systems (sometimes known as ‘aleatory’ uncertainty). Findings that depend on weather or climate variables, or market prices, will be subject to this low confidence. EXAMPLE: Pollination deficits and values measured at local scales.	Not reducible Quantifiable	<ul style="list-style-type: none"> • Clear communication. • Using probabilistic approaches. • Support large scale, long term multi-site studies to quantify the variation over space and time to characterise the low confidence. • Evidence synthesis. • Capacity building for researchers and decision makers
Limits of methods and data (Scientific uncertainty)	Where there is insufficient data to fully answer the question, due to unsatisfactory methods, statistical tools, experimental design or data quality (also referred to as epistemic uncertainty). EXAMPLE: Impacts of pesticides on pollinator populations in the field, trends in pollinator abundance, estimations of ecosystem service delivery.	Reducible Quantifiable	<ul style="list-style-type: none"> • Acknowledge differences in conceptual frameworks (within and between knowledge systems). • Improve experimental design • Expand data collection. • Support detailed, methodological research. • Knowledge quality assessment. • Evidence synthesis. • Capacity building for scientists.
Differences in understanding of the world (Decision uncertainty)	Low confidence that is caused by variation in subjective human judgments, beliefs, world views and conceptual frameworks (sometimes called epistemic uncertainty). In terms of policy decisions, low confidence is due to preferences and attitudes that may vary with social and political contexts. This can mean a finding looks different in different knowledge systems that cannot easily be aligned. EXAMPLES: Effects of organic farming look different if you take the view that wild nature beyond farmland has a higher value than farmland biodiversity, and overall food production at a large scale is more important than local impacts. There are divergent interpretations/perceptions of well-being.	Sometimes reducible Not quantifiable	<ul style="list-style-type: none"> • Acknowledge differences in conceptual frameworks (within and between knowledge systems). • Document, map and integrate where possible. • Acknowledge existence of biases. • Multi-criteria analysis, decision support tools. • Capacity building for decision makers.

Box 1.1: IPBES at a Glance

Objective: To strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development.

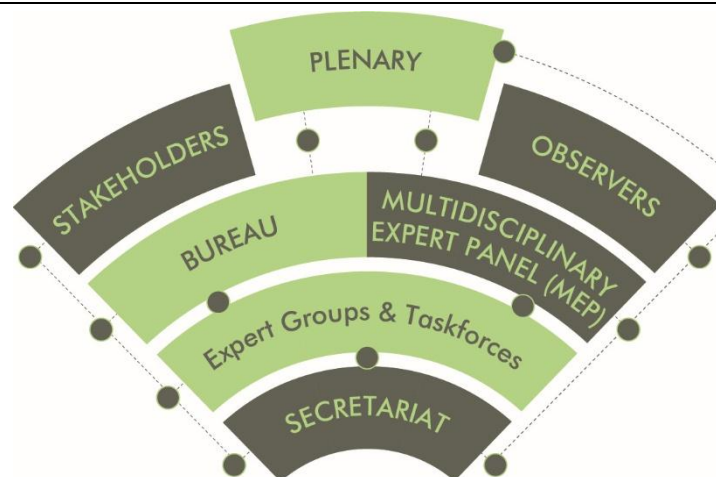
Operating Principles: IPBES addresses terrestrial, marine and inland water biodiversity and ecosystem services and their interactions, ensuring the Platform’s credibility, relevance and legitimacy, and promoting its independence. The Principles further include: facilitating an interdisciplinary and multidisciplinary approach; engaging with different knowledge systems, including indigenous and local knowledge; recognizing the need for gender equity in its work; ensuring full and effective participation of developing countries; ensuring the full use of national, subregional and regional knowledge; integrating capacity-building into all relevant aspects of its work; and promoting a collaborative approach which builds on existing initiatives and experience.

Functions

Catalyses the <i>generation of new knowledge</i> to address gaps in knowledge identified in IPBES assessments	Deliver global, regional, sub-regional and thematic <i>assessments</i> , and at the same time promote and facilitate assessments at the national level	Promote development and use of <i>policy support tools</i> and methodologies so that assessment results can be more effectively applied	Identify and prioritize <i>capacity building</i> needs for improving the science-policy interface at appropriate levels, and provide, call for and facilitate access to the necessary resources for addressing the highest priority needs directly relating to its activities
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Institutional Arrangements

Procedures, programmes and other resources



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- Rules of Procedure for the Plenary
- Financial Procedures
- Procedure for receiving and prioritizing requests put to the Platform
- The Work Programme 2014-2018
- Conceptual Framework
- Procedures for the preparation of Platform deliverables
- Guidelines on how to carry out work in the context of IPBES (assessments, scenarios, valuation)
- Catalogues (of assessments and policy support tools)
- Information and Data Management Plan
- Strategic partnerships
- Stakeholder engagement and outreach

Box 1.2 Other Key IPBES Resources

- ✓ **IPBES Catalogue of Assessments:** brings together information on and experiences gained from undertaking assessments of biodiversity and ecosystem services from the global to the sub-national scale
- ✓ **IPBES e-learning modules:** These cover different aspects of assessments and support the development of capacity. These can be accessed the IPBES website.
- ✓ **IPBES webinar series:** This webinar series covers different aspects of the assessment process, as well as, the assessments themselves. Webinars can be downloaded from the IPBES website.
- ✓ **IPBES Guide for Conceptualising Values:** This Guide contains further information on the identification and conceptualisation of different values and complements the sub-module of the Assessment Guide. It can be accessed at: www.ipbes.net/guidance-and-conceptual-framework
- ✓ **IPBES Catalogue for Policy Support Tools and Methodologies:** will contain information regarding different policy support tools and methodologies.

Box 2.1: Some useful writing suggestions for assessment reports

These suggestions are based on comments received during the Millennium Ecosystem Assessment peer review process.

- ✓ Discuss the problems and actions first. Any necessary background can come later, in an appendix or in references to other sources.
- ✓ Focus on definable measures and actions and avoid the passive voice. For example, policy professionals are likely to ignore statements like “there are reasons to believe some trends can be slowed or even reversed”. If there are some opportunities for reversal, state precisely what we believe they are, as best we know.
- ✓ Statements like “...might have enormous ramifications for health and productivity...,” while they seem to the scientist to be strong because of the word “enormous” are actually politically impotent because of the word “might.” If data were used in the assessment, what do they say about what “is” happening? What can we recommend, based on best knowledge, about what actions would be effective?
- ✓ Statements like “There is a long history of concern over the environmental effects of fishing in coastal habitats, but the vast scope of ecological degradation is only recently becoming apparent (citation)” is a case where something strong could be said, but it is weakened by putting the emphasis on the late arrival of this information and knowledge “becoming apparent.” It does not matter so much when the degradation was discovered, what matters is that it was. Cite the source and say “fishing practices are causing wide-spread destruction.”
- ✓ Do not use value-laden, flowery, or colloquial language (e.g. “sleeping dragon,” “elephant in the room,” etc.).
- ✓ Statements like “we do not yet have clear guidelines for achieving responsible, effective management of natural resources” could result in a legitimate policy response of “OK, so we’ll wait until we do.” Instead, the statement could be changed to recommend what needs to be done, such as “if clear guidelines were developed, then...”
- ✓ Diverse formats and modes of communication, for example participatory maps, artwork and visual imagery, will be important for working with indigenous and local knowledge.

Source: Ash et al., 2010

Box 2.2 Example (extract of) key findings from Chapter 3: The status and trends in pollinators and pollination of the IPBES Pollination Assessment

Wild pollinators are declining in abundance, species occurrence, and diversity at local and regional scales, as it has been recorded in North West Europe and North America (*established but incomplete*). Loss of pollinators has negative impacts on the reproduction of wild plants (*established but incomplete*). The local abundance, richness and diversity of wild bees have been found to decline strongly in isolated and small habitat fragments, and within a few hundred meters from crop field margins (*well established*). At larger spatial scales, declines in bee diversity and shrinkage of geographical ranges, e.g. of bumble bees, have been recorded in highly industrialized regions of the world, particularly Europe and North America, over the last century (*well established*). Beyond records of species-specific population declines, e.g. Franklin's bumble bee (*Bombus franklini*) in Western USA and the giant bumble bee (*Bombus dahlbomii*) in Southern South America, trends are mainly unknown for other regions and continents because of a lack of baseline datasets and monitoring schemes. Declines have been also recorded in other insect pollinator groups, such as butterflies and moths, and among some vertebrate pollinators, particularly hummingbirds and bats (*established but incomplete*). Local declines in pollinator abundance and diversity have been linked decreasing trends in wild plant pollination and seed production in habitat fragments (*well established*), and to declines in the diversity of pollinator-dependent wild plant species at regional scales (*established but incomplete*).

Global IUCN Red List assessments of insect pollinators are incomplete, however, regional and national assessments indicate high levels of threat, particularly for bees and butterflies. IUCN assessments indicate that 16.5% of vertebrate pollinators are threatened with global extinction (increasing to 30% for island species), trending towards more extinctions. In Europe, 9% of bees and 9% of butterflies are threatened and populations are declining for 37% of bees and 31% of butterflies (excluding data deficient species, i.e. 50% of species of bees). However, data are insufficient to make IUCN assessments for most European bees. At a national level up to 50% of bee species may be threatened, percentages that are higher than at regional levels.

Large and well-connected plant-pollinator networks, i.e., those with many links between the plants and pollinators, are needed to guarantee satisfactory levels of pollination for wild plants and crops, as well as sufficient availability of food for pollinators (*established but incomplete*). Wild and domestic pollinators involved in crop pollination also require floral resources provided by wild plants (*well established*). Therefore, large, and well-connected plant-pollinator networks are associated with viable populations and diverse communities of pollinators (*established but incomplete*). Habitat disturbance tends to lead to loss of interaction links and species from plant pollinator networks (*established but incomplete*).

There is a loss of indigenous and local knowledge and sustainable bee management practices within local communities (*established but incomplete*). Shifts in social systems, cultural values, and accelerated loss of natural habitats have been associated with a decrease in the transfer of knowledge within and between generations. This has led to a decline in stingless bee husbandry in the Americas and Africa and changes in habitat management for wild honey bee species in Asia by local and indigenous communities (*established but incomplete*). Whether this has led to loss of pollination to crop and wild plants remains unknown.

The number of managed honey bee hives is increasing at the global scale, although undergoing declines in some European countries and North America (*well established*). FAO data show that the number of honey bee hives has increased globally by about 50% during the last five decades, despite a temporary drop during the 1990s after the dissolution of the Soviet Union and Eastern-European Soviet Bloc (*well established*). It is unknown whether this decline is an artefact of how data were collected and reported, or the result of a true decrease in honey bee hives that resulted from the political and economic disruption caused by the Soviet collapse (*unresolved*). FAO data also show that national trends vary widely among countries, with contrasting trends (increases, decreases, no change) found among countries within continents (*well established*). On the other hand, the status of shifts in abundance and distribution of wild honey bees (*Apis mellifera* and other *Apis* species) is largely unknown, with the exception of some records on the spread of the Africanized honey bee in the Americas (*established but incomplete*).

Trade in and movement of the managed western honey bee, *Apis mellifera*, has led not only to it being a global presence (Antarctica excluded), but also to spillover of pathogens and parasites. Particularly, the shift of the varroa mite (*Varroa destructor*), originally a parasite of the Asian honey bee *Apis cerana*, to the Western honey bee has led to severe loss of beehives and makes beekeeping more difficult and costly in many regions (*established but incomplete*). The varroa mite is associated with viruses, such as the deformed wing virus, which is now spreading to bumble bees and wild bees with yet unknown

consequences (*unresolved*). The impact of the invasion of honey bees, such as the Africanized honey bee in the Americas, on native bee communities and animal-pollinated plants remains largely unclear (*unresolved*).

Commercial management, transport and trade in other pollinators (primarily bumble bees) outside their original ranges have also resulted in new invasions, transmission of pathogens and parasites and regional extinctions of native pollinator species (*well established*). Recently developed commercial rearing of bumble bee species for greenhouse- and field-crop pollination and their introduction in other continents have resulted in numerous cases of biological invasion, pathogen transmission, and decline of congeneric species. A well-documented case is the severe decline and local extirpation of the giant bumble bee *Bombus dahlbomii* since the introduction and spread of the European species *B. ruderatus* and *B. terrestris* in southern South America (*well established*).

Box 2.3 Structure and Example of Key Messages of the SPM of the pollination assessment

Structure

Key Messages

Background to pollinators, pollination and food production

- A. Values of pollinators and pollination
- B. Status and trends in pollinators, pollination and pollinator-dependent crops and wild plants
- C. Drivers of change, risks and opportunities and policy and management options

Appendix 1 Terms that are central to understanding the summary for policymakers

Appendix 2 Communication of the degree of confidence

Example Key messages

6. The vast majority of pollinator species are wild, including more than 20,000 species of bees, some species of flies, butterflies, moths, wasps, beetles, thrips, birds, bats and other vertebrates. A few species of bees are widely managed, including the western honey bee (*Apis mellifera*), the eastern honey bee (*Apis cerana*), some bumble bees, some stingless bees and a few solitary bees. Beekeeping provides an important source of income for many rural livelihoods. The western honey bee is the most widespread managed pollinator in the world, and globally there are about 81 million hives producing an estimated 1.6 million tonnes of honey annually

11. The number of managed western honey bee hives has increased globally over the last five decades, even though declines have been recorded in some European countries and North America over the same period. Seasonal colony loss of western honey bees has in recent years been high at least in some parts of the temperate Northern Hemisphere and in South Africa. Beekeepers can under some conditions, with associated economic costs, make up such losses through the splitting of managed colonies

14. The abundance, diversity and health of pollinators and the provision of pollination are threatened by direct drivers that generate risks to societies and ecosystems. Threats include landuse change, intensive agricultural management and pesticide use, environmental pollution, invasive alien species, pathogens and climate change. Explicitly linking pollinator declines to individual or combinations of direct drivers is limited by data availability or complexity, yet a wealth of individual case studies worldwide suggests that these direct drivers often affect pollinators negatively.

20. Most agricultural genetically modified organisms (GMOs) carry traits for herbicide tolerance (HT) or insect resistance (IR). Reduced weed populations are likely to accompany most herbicide-tolerant (HT) crops, diminishing food resources for pollinators. The actual consequences for the abundance and diversity of pollinators foraging in herbicide-tolerant (HT)-crop fields is unknown. Insect-resistant (IR) crops can result in the reduction of insecticide use, which varies regionally according to the prevalence of pests, the emergence of secondary outbreaks of non-target pests or primary pest resistance. If sustained, the reduction in insecticide use could reduce pressure on nontarget insects. How insect-resistant (IR) crop use and reduced pesticide use affect pollinator abundance and diversity is unknown. Risk assessments required for the approval of genetically-modified organism (GMO) crops in most countries do not adequately address the direct sublethal effects of insect-resistant (IR) crops or the indirect effects of herbicide-tolerant (HT) and insect-resistant (IR) crops, partly because of a lack of data.

Box 2.4 Addressing possible errors and complaints

The IPBES review processes should ensure that errors are eliminated well before the publication of Platform reports and technical papers. However, if a reader of an agreed Platform report, accepted summary for policymakers or finalized technical paper finds a possible error (e.g., a miscalculation or the omission of critically important information) or has a complaint relating to a report or technical paper (e.g., a claim to authorship, an issue of possible plagiarism or of falsification of data) the issue should be brought to the attention of the secretariat, which will implement the process for error correction or complaint resolution as set out in decision IPBES 2/3.

Appendix III

IPBES Units of Analysis

The below table shows the IPBES Units of Analysis. The table is work in progress and expected to be finalized in 2017. While the units are finalised, the definition are still in progress and thus not yet reflected in the table below.

IPBES terrestrial and aquatic units of analysis		
IPBES no.	Unit (Terrestrial or Aquatic)	Definition (still under development)
1	Tropical and subtropical dry and humid forests	
2	Temperate and boreal forests and woodlands	
3	Mediterranean forests, woodlands and scrub	
4	Tundra and High Mountain habitats	
5	Tropical and subtropical savannas and grasslands	
6	Temperate Grasslands	
7	Drylands and Deserts	
8	Wetlands – peatlands, mires, bogs	
9	Urban/Semi-urban	
10	Cultivated areas (incl. cropping, intensive livestock farming etc.)	
11	Cryosphere	

12	Aquaculture areas	
13	Inland surface waters and water bodies/freshwater	
14	Shelf ecosystems (neritic and intertidal/littoral zone)	
15	Open ocean pelagic systems	
16	Deep-Sea	
17	Coastal areas intensively and multiply used by human	

Appendix IV

Nature's Contributions to People System

The table below shows the 18 reporting categories of the IPBES Nature's Contributions to People System. Additional background will be included in the dedicated module.

	Reporting categories of nature's contributions to people	Brief explanation and some examples
1	Habitat creation and maintenance	<ul style="list-style-type: none"> Formation and continued production, by ecosystems or organisms within them, of ecological conditions necessary or favourable for organisms important to humans, e.g. nesting, feeding, and mating sites for birds and mammals, resting and overwintering areas for migratory mammals, birds and butterflies, nurseries for juvenile stages of fish
2	Pollination and dispersal of seeds and other propagules	<ul style="list-style-type: none"> Facilitation by animals of movement of pollen among flowers, and dispersal of seeds, larvae or spores of organisms important to humans
3	Regulation of air quality	<ul style="list-style-type: none"> Regulation (by impediment or facilitation) by ecosystems, of CO₂/O₂ balance, O₃ for UV-B absorption, levels of sulphur oxide, nitrogen oxides (NO_x), volatile organic compounds (VOC), particulates, aerosols Filtration, fixation, degradation or storage of pollutants that directly affect human health or infrastructure
4	Regulation of climate	<p>Climate regulation by ecosystems (including regulation of global warming) through:</p> <ul style="list-style-type: none"> Positive or negative effects on emissions of greenhouse gases (e.g. biological carbon storage and sequestration; methane emissions from wetlands) Positive or negative effects on biophysical feedbacks from vegetation cover to atmosphere, such as those involving albedo, surface roughness, long-wave radiation, evapotranspiration (including moisture-recycling) Direct and indirect processes involving biogenic volatile organic compounds (BVOC) Regulation of aerosols and aerosol precursors
5	Regulation of ocean acidification	<ul style="list-style-type: none"> Regulation, by photosynthetic organisms (on land or in water), of atmospheric CO₂ concentrations and seawater pH, which affect associated calcification processes by many marine organisms important to humans (such as corals)
6	Regulation of freshwater quantity, location and timing ^{††}	<ul style="list-style-type: none"> Regulation, by ecosystems, of the quantity, location and timing of the flow of surface and groundwater used for drinking, irrigation, transport, hydropower, and as the support of non-material contributions (NCP 15, 16, 17) Regulation of flow to water-dependent natural habitats that in turn positively or negatively affect people downstream, including via flooding (wetlands including ponds, rivers, lakes, swamps) Modification of groundwater levels, which can ameliorate dryland salinization in unirrigated landscapes

^{††} Hydrological NCP are fundamentally conceived as regulating NCP, because the primary impact of ecosystems on water is the modification of its flows, not the creation or breakdown of water molecules.

7	Regulation of freshwater and coastal water quality	<ul style="list-style-type: none"> Regulation – through filtration of particles, pathogens, excess nutrients, and other chemicals – by ecosystems or particular organisms, of the quality of water used directly (e.g. drinking) or indirectly (e.g. aquatic foods, irrigated food and fibre crops, freshwater and coastal habitats of heritage value)
8	Formation, protection and decontamination of soils and sediments	<ul style="list-style-type: none"> Sediment retention and erosion control, soil formation and maintenance of soil structure and processes (such as decomposition and nutrient cycling) that underlie the continued fertility of soils important to humans. Filtration, fixation, degradation or storage of chemical and biological pollutants (pathogens, toxics, excess nutrients) in soils and sediments that are important to humans
9	Regulation of hazards and extreme events	<ul style="list-style-type: none"> Amelioration, by ecosystems, of the impacts on humans or their infrastructure caused by e.g. floods, wind, storms, hurricanes, seawater intrusion, tidal waves, heat waves, tsunamis, high noise levels Reduction, by ecosystems, of hazards like landslides, avalanches
10	Regulation of organisms detrimental to humans	<p>Regulation, by ecosystems or organisms, of pests, pathogens, predators, competitors, etc. that affect humans, plants and animals, including e.g.:</p> <ul style="list-style-type: none"> Regulation by predators or parasites of the population size of non-harmful important animals (e.g. large herbivore populations by wolves or lions) Regulation (by impediment or facilitation) of the abundance or distribution of potentially harmful organisms (e.g. venomous, toxic, allergenic, predators, parasites, competitors, disease vectors and reservoirs) over the landscape or seascape Removal of animal carcasses and human corpses by scavengers (e.g. vultures in Zoroastrian and some Tibetan Buddhist traditions) Regulation (by impediment or facilitation) of biological impairment and degradation of infrastructure (e.g. damage by pigeons, bats, termites, strangling figs to buildings)
11	Energy	<ul style="list-style-type: none"> Production of biomass-based fuels, such as biofuel crops, animal waste, fuelwood, agricultural residue pellets
12	Food and feed	<ul style="list-style-type: none"> Production of food from wild, managed, or domesticated organisms, such as fish, beef, poultry, game, dairy products, edible crops, mushrooms, bushmeat and edible invertebrates, honey, edible wild fruits and tubers Production of feed for domesticated animals (e.g. livestock, work and support animals, pets) or for aquaculture, from the same sources
13	Materials and assistance	<ul style="list-style-type: none"> Production of materials derived from organisms in crops or wild ecosystems, for construction, clothing, printing, ornamental purposes (e.g. wood, fibres, waxes, paper, resins, dyes, pearls, shells, coral branches). Direct use of living organisms for decoration (i.e. ornamental plants in parks and households, ornamental fish), company (i.e. pets), transport, and labor (including herding, searching, guidance, guarding)
14	Medicinal, biochemical and genetic resources	<ul style="list-style-type: none"> Production of materials derived from organisms (plants, animals, fungi, microbes) used for medicinal and veterinary purposes Production of genes and genetic information used for plant and animal breeding and biotechnology

15	Learning and inspiration	<ul style="list-style-type: none"> • Provision, by landscapes, seascapes, habitats or organisms, of opportunities for the development of the capabilities that allow humans to prosper through education, acquisition of knowledge and development of skills for well-being, scientific information, and inspiration for art and technological design (e.g. biomimicry)
16	Physical and psychological experiences	<ul style="list-style-type: none"> • Provision, by landscapes, seascapes, habitats or organisms, of opportunities for physically and psychologically beneficial activities, healing, relaxation, recreation, leisure, tourism and aesthetic enjoyment based on the close contact with nature. E.g. hiking, recreational hunting and fishing, birdwatching, snorkeling, gardening
17	Supporting identities	<ul style="list-style-type: none"> • Landscapes, seascapes, habitats or organisms being the basis for religious, spiritual, and social-cohesion experiences • Provisioning of opportunities by nature for people to develop a sense of place, purpose, belonging, rootedness or connectedness, associated with different entities of the living world (e. g. cultural and heritage landscapes, sounds, scents and sights associated with childhood experiences, iconic animals, trees or flowers) • Basis for narratives and myths, rituals and celebrations provided by landscapes, seascapes, habitats, species or organisms (e.g. sacred groves, sacred trees, totem animals) • Source of satisfaction derived from knowing that a particular landscape, seascape, habitat or species exist in the present
18	Maintenance of options	<p>Capacity of ecosystems, habitats, species or genotypes to keep human options open in order to support a later good quality of life.</p> <p>Examples include:</p> <ul style="list-style-type: none"> • Benefits (including those of future generations) associated with the continued existence of a wide variety of species, populations and genotypes • Future benefits (or threats) derived from keeping options open for yet unknown discoveries and unanticipated uses of particular organisms or ecosystems that already exist (e.g. new medicines or materials) • Future benefits (or threats) that may be anticipated from on-going biological evolution (e.g. adaptation to a warmer climate, to emergent diseases, development of resistance to antibiotics and other control agents by pathogens and weeds)