**Plenary meeting to determine modalities and institutional
arrangements for an intergovernmental science-policy
platform on biodiversity and ecosystem services
Second session**
Panama City, 16–21 April 2012

Report of the workshop on the theme "Considering further the intergovernmental science-policy platform on biodiversity and ecosystem services knowledge-generation function"

Note by the secretariat

The annex to the present note contains the report of the workshop on the theme "Considering further the intergovernmental science-policy platform on biodiversity and ecosystem services knowledge-generation function", held in Annapolis, United States of America, from 31 January to 2 February 2012. The workshop was convened by the United States Geological Survey, the International Council for Science, DIVERSITAS and the National Socio-Environmental Synthesis Center. The annex is presented as received from the United States Geological Survey and has not been formally edited.

Annex

Considering further the IPBES Knowledge Generation Function
Results of a USGS/ ICSU-DIVERSITAS Workshop

Annapolis, Maryland, USA
31 January – 2 February 2012

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EXECUTIVE SUMMARY

1.   The United States Geological Survey (USGS), the International Council for Science (ICSU) and the international program dedicated to biodiversity sciences, DIVERSITAS and the National Socio-Environmental Synthesis Center (SESYNC) sponsored a work shop in Annapolis, Maryland, USA from 31 January to 2 February 2012 with the purpose of exploring the program of work of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), with a particular focus on the generation of knowledge function. This paper is intended to inform negotiations that will occur during the second session of the IPBES plenary, 16-21 April 2012, Panama City, Panama.

2.   The generating knowledge section of the program of work, as agreed in the Busan outcome, addresses uncertainty due to either (a) insufficient understanding of the processes or mechanisms involved in anthropogenic biodiversity changes, or (b) inadequate or missing data, through a series of activities, which are outlined in the document UNEP/IPBES.MI/2/2. Workshop participants from all regions of the world provided comments and recommendations on how potential activities 6, 7, 8 and 9, in particular, could be improved in Document "Possible Elements of the Work Program of the Platform" (**UNEP IPBES.MI/2/2, pages 16-17**).

3.   The purpose of Potential activity 6, *Identifying and prioritizing gaps in knowledge*, is to gain an understanding of IPBES research needs. The activity was designed to produce, maintain, and prioritize a list of needs that can be disseminated to science and funder communities as post activities. However, we observed that the proposed activity in the current document (dated 26 January 2012) is about "compiling and prioritizing" the list of needs, rather than "identifying and prioritizing" the needs, as the title says, because the activity only describes collecting needs identified by other activities. Consequently, we recommend that the scoping process be established as a stand-alone activity, prior to completing assessments, to ensure the process can be used to identify science needs for this activity. Second, we recommend that transparent and repeatable criteria regarding the relevance, value, and feasibility of knowledge be developed to ensure that gaps pertaining to the mission of IPBES are addressed in a strategic way.

Recommendation 1: We recommend establishment of a scoping process, as a stand-alone activity prior to completing assessments, to make sure that scoping is used to identify science needs and gaps in knowledge;

Recommendation 2: We recommend establishing criteria to prioritize science needs.

4.   Potential activity 7, *Engaging Key Stakeholders in addressing prioritized knowledge needs*, provides a mechanism to engage and encourage researchers and research funding fora

(assembly of key partners) to produce knowledge that falls within the interests of IPBES. However, the fora, or other possible opportunities to engage the research funding community, need to be identified. We recommend several examples of fora that can review and potentially fund science needs produced by IPBES, including ICSU, the Global Marine Assessment initiative, and the Belmont Forum. If it is not possible to address the knowledge needs through existing fora, then IPBES could establish new fora based on appropriate focus and scales. Additionally, it is important that IPBES identify how scientists are represented in IPBES. We recommend that IPBES create a mechanism to ensure the entire science community with interests in IPBES is represented.

Recommendation 3: We recommend identification of representatives of scientific and funding organizations to regularly review knowledge generation needs produced by IPBES and fund the science that addresses the knowledge needs.

5.   Potential Activity 8, *Partnering with long-term observation and monitoring programs*, was developed to ensure that IPBES establish a strategic partnership with key observation and monitoring initiatives to facilitate the delivery of data and information. IPBES should establish criteria on how to identify and create successful partnerships and identify possible data standards. For example, partners could be classified based on the accuracy and reliability of the data or the scale of data that they provide. Additionally, consistency on what metrics are used and how they are established will need to be considered (e.g., essential biodiversity variables provided by GEO-BON). It will also be important to have criteria regarding data, metadata, and interoperability of data, as well as repositories for models, scenarios, and other derivatives of observations. We also recommend integration of long-term monitoring and observations of biodiversity and ecosystem service production with monitoring and observations of human well-being and of benefits of ecosystem services for well-being. Finally, steps need to be established to ensure that essential information, that is not available, be added as a need and warrants future exploration.

Recommendation 4: IPBES needs to develop criteria for partnerships with key observation and monitoring programs.

Recommendation 5: IPBES should encourage data interoperability and information technology standards to facilitate data sharing.

Recommendation 6: IPBES should emphasize the needs to link monitoring and observations with some measure of human well-being.

Recommendation 7: IPBES should develop a strategy to ensure that the necessary information, that is currently unavailable, is added as science needs emerge.

6.   Potential activity 9, *Making effective use of modeling and scenarios*, will be essential for IPBES because of the ability to synthesize and interpret data from a wide range of sources, evaluate the robustness of biodiversity indicators, and alert decision makers on the future impacts that global change may have on biodiversity and ecosystem services. IPBES should clarify the types of scenarios IPBES plans to implement to ensure success. Although scenarios and models are important for knowledge generation, we also believe they are important for assessments, policy tools, and capacity building and should be integrated across all IPBES functions. Additionally, we recommend that scenarios and models be used iteratively so that they can be updated as knowledge progresses. Finally, it is critical that standards are developed so that scenarios and models are scalable from regional to global and between regions. Development of standards could be accomplished by partnering with modeling and policy communities.

Recommendation 8: Scenarios and models have a key role in all functions of IPBES, and should be integrated throughout IPBES.

Recommendation 9: Scenarios and models must be developed and used iteratively to allow us to learn and update models as knowledge progresses.

Recommendation 10: To ensure scenarios and models are scalable from regional to global and between regions, it will be critical to develop standards for models and scenarios, through engagement with the modeling and policy communities.

7.   Participants also reviewed Document **UNEP IPBES.MI/2/3** on "Functions and Structures of bodies that might be established under an IPBES and recommended:

8.   **On Working Groups (relevance of science):** Each working group should integrate each of the 4 functions as opposed to separating the groups by each function, in order to promote synergy and collaboration among the four functions; this is Option 3, Section III C).

9.   **On governance (scientific independence and credibility):** A scientifically independent approach ensuring that the scientific functions are carried out in an independent way was favored. This is Option 2 (Section III B 14). If, however, Option 1 is selected, the necessary governance, rules and procedures within the expanded bureau should be established, in order to ensure the independence and credibility of the science functions.

10.   To ensure scientific credibility, a review process of IPBES performed by an external independent review panel, should be put in place at the beginning of IPBES.

11.   Finally, participants made several suggestions for changes in the wording of some of the texts to be negotiated in Panama, to take the most important comments into account (Appendix 2).

1 PREAMBLE

12.   This information paper is the result of a workshop organized by the United States Geological Survey (USGS), the International Council for Science (ICSU) and the international program dedicated to biodiversity sciences, DIVERSITAS and the National Socio-Environmental Synthesis Center (SESYNC). The workshop was held at SESYNC in Annapolis, Maryland, USA from 31 January to 2 February 2012. The purpose of the workshop was to explore the program of work of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), with a particular focus on the generation of knowledge function. Participants used as a basis for their work, document UNEP/IPBES.MI/2/2, and focused their comments on potential activities 6, 7, 8 and 9 (pages 16-17). The workshop was made possible thanks to funding from USGS, DIVERSITAS, UNEP DEPI, and SESYNC. This paper is intended to inform negotiations that will occur during the second session of the IPBES plenary, 16-21 April 2012, Panama City, Panama.

2 WHAT IS THE OVERALL INTENT OF THE KNOWLEDGE GENERATION FUNCTION OF IPBES?

Why a generation of knowledge function?

13.   One of the innovative aspects of the Busan outcome, is the decision to include four functions in the IPBES program of work, rather than focus solely on assessment, as previous related initiatives have done. The generation of knowledge function, which is the focus of this paper, is a new function that is intended to encourage the production of the knowledge needs of IPBES. In previous assessments, areas of high uncertainty were flagged but nothing was then done as part of the assessment process, to stimulate the needed research. Uncertainty is generally due to (a) insufficient understanding of the processes or mechanisms involved in anthropogenic biodiversity changes, and (b) inadequate or missing data. The generation of knowledge function of IPBES will make it possible for both types of knowledge needs to be identified and discussed with the relevant communities of knowledge producers and funders, in order to reduce uncertainty and improve the effectiveness of IPBES assessments.

How will the information flow across the four functions?

14.   Requests are (1) prioritized by the Plenary. A scoping exercise (2), then, needs to take place (see paper) to discuss what knowledge is available and what knowledge needs to be generated. Depending on the outcome of the scoping exercise, either 3a or 3b will take place: 3a) the knowledge that is available is assessed (Assessment-Capacity Building), and, via a series of Policy Support tools, delivered to policy makers and 3b) the knowledge that is missing is further identified and prioritized by the generation of knowledge function (potential activity 6).

IPBES then convenes a series of dialogues –via Potential activities 7, 8 or 9- with the research, research funding community and the long term observation and monitoring community to encourage research in priority knowledge gap areas, and to encourage long term collection of data and information to fill identified data gaps. Potential activity 8 will encourages partnerships with the long term observation and monitoring community to assure long term availability of data and information and to fill data gaps. Since models and scenarios to projects changes in biodiversity and ecosystem services have already been identified as a key gap, a particular emphasis, through Potential activity 9, will be for IPBES to encourage the building of models and scenarios, and the collection of experimental data to parameterize these models. .

15.   Following 3b, new knowledge, data and models become available to be assessed by IPBES.

3 POTENTIAL ACTIVITY 6: IDENTIFYING AND PRIORITIZING GAPS IN KNOWLEDGE

> *Potential activity 6:* : Compile and maintain an annotated list of identified policy-relevant knowledge needs which arise from other work program activities, and put in place a process involving the research community and other knowledge holders whereby the IPBES plenary reviews and prioritizes the list of identified gaps.

What is the purpose of Potential activity 6?

16.   The purpose of activity 6 is to produce and maintain an up-to-date list of research needs in relation with the program of work of IPBES and to prioritize those needs.

How would it work?

17.   Identifying and prioritizing gaps in knowledge would involve the following steps: to 1) identify needs, as a "scoping activity" (either in this activity or as a step in another activity), 2) compile a list of identified needs, 3) a possible independent science body would assess needs against a list of prioritization criteria, approved by the plenary, using transparent methods and processes, 4) have plenary meet and agree on the list of prioritization of needs, and 5) disseminate to the science and funder communities as a post activity (e.g., potential activity 7).

Are there missing elements?

18.   The proposed activity is about "compiling and prioritizing" the list of needs, rather than "identifying and prioritizing" the needs, as its title says. The definition of compiling is: to collect from other sources. What is proposed for activity 6 is focused on collecting needs identified by other activities. Para 67 indeed explains that gap identification would take place in many different places throughout IPBES. Identification of science gaps and needs, however, is a very important process, which deserves more visibility, and should be done throughout all processes implemented by IPBES.

19. However, in the previous version of Doct IPBES/MI/2/2 (Draft for review-dated 31 Oct 2011), a "scoping process" was clearly proposed as a stand-alone activity 10 (as part of the assessment function), as a first step to identify science needs:

*"Potential activity 10: IPBES may wish to consider establishing a **scoping process** in order to help identify what scientific and other data, information and knowledge is required to carry out the assessments that it requests, or which are requested of it, and the extent to which that data, information and knowledge is already available."*

20. The current document (Doct IPBES/MI/2/2 26 January 2012) no longer identifies need identification as a separate activity. Instead, scoping is currently embedded in para 56 under activity 3 (carrying out global and regional assessments), but not listed in the box describing potential activity 3. Effective implementation of IPBES will need a scoping process for assessments that allows for identification of science needs and gaps, along with an ongoing process of identifying and prioritizing knowledge gaps.

Recommendations

Recommendation 1: We recommend establishment of the scoping process, as a stand-alone activity prior to completing assessments, to make sure that scoping is used to identify science needs and gaps in knowledge

21. Moreover, some science needs may emerge from functions, other than the assessment function. This further argues in favor of a stand-alone scoping activity.

22. We agree that it is very important to have a clear and transparent process on how to identify needs, but how that process is supposed to occur is not explicitly articulated in the reference document. There were more details included in the previous version of the reference document (dated October 2011). Specifically, a list of ways that needs could be identified was provided (section 3.2.1, paragraph 46), and it would be useful if this list could be added to the most recent document.

23. A transparent process for compiling science needs will need to be agreed upon. It might be more feasible for assessments to feed needs to a compilation focal point. Decisions regarding who would be compiling the list (e.g., secretariat, science panel) and how regularly it would be updated (e.g., ad hoc, continuously, regular periodic) still need to be made.

Recommendation 2: We recommend establishing criteria for prioritizing science needs

24. An independent science panel body should develop criteria for conducting science assessments that will be approved by the plenary. The independent science body would conduct need prioritization using the approved criteria (produced by Activity 6). The criteria used for science need prioritization will need to be transparent and repeatable, and the cost

effectiveness of the information will need to be assessed. Three main groups of prioritization criteria were identified: i) relevance to single and multiple assessments, ii) feasibility, and iii) cost.

a) Relevance: Science needs should be clearly relevant to the requests selected by the Plenary. Scale will also be an important criteria, since determining if a gap is more global or localized (scalability) and whether filling the gap at one level will have resonance or impact at a wider scale, is important (e.g., geographic/spatial/taxonomic biases/gaps).

b) Feasibility: The feasibility to fill the science needs can be described as the probability of success that knowledge will be gathered. Specific questions, such as whether existing research programs or data exist, can provide insights on feasibility. Additionally, determining whether an infrastructure (e.g., an existing research center) is already in place is important. Feasibility would also include knowledge of the timeframe required to collect data and whether there are any potential risks involved. Finally, other factors regarding feasibility include whether an enabling environment exists. For example, specific times may be more politically appropriate or donors and funders may be more willing to provide support.

c) Cost: The cost of gap filling can be described as the amount of money it would require to ensure the knowledge is generated to fill this science need relative to its importance in completing the assessment.

25.   Nature of science need: When prioritizing knowledge needs it is important to distinguish between those stemming from the state of science and monitoring, and those stemming from restrictions on access to existing information. Knowledge generation mainly covers actions to reduce uncertainty that is due to the state of science and monitoring.

26.   Weighting criteria: Determining whether one criteria (e.g., relevance) may be more important than another (e.g., feasibility) and how those different criteria could potentially be combined into a score needs to be determined to fully inform the Plenary for its prioritization.

Who would be the key players?

27.   A secretariat could carry out needs compilation. Both the policy and the scientific community would need to provide the input required for the initial prioritization review. The plenary would need to acknowledge the list of priority knowledge gaps.

4 POTENTIAL ACTIVITY 7: ENGAGING KEY STAKEHOLDERS IN ADDRESSING PRIORITIZED KNOWLEDGE NEEDS

> *Potential activity 7:* Develop and implement a communication strategy for engagement with the research community and other knowledge holders in order to encourage them to address identified knowledge needs, and for ensuring that those funding research are aware of the identified knowledge needs and the research requirements for addressing them.

What is the purpose of Potential activity 7?

28.   Many assessments have identified important areas of uncertainty, but have not involved relevant partners in organizing the strategic delivery of that knowledge. Progress in follow up assessments has, as a result, been slowed down, since assessments are limited by the amount of existing relevant knowledge. The purpose of Activity 7 is to provide a mechanism to engage researchers and research funding agencies, and to encourage them to generate knowledge to meet the knowledge needs of IPBES.

How would it work?

29.   Engaging stakeholders in addressing prioritized knowledge would involve, first, engagement with existing research and research funding organizations. These organizations would need to 1) study prioritized needs and outline what knowledge has to be produced, and 2) define who would be in charge of producing the knowledge, as well as who would be in a position to fund the efforts. Engagement with such organizations would have, as a primary goal, the communication of IPBES research priorities for their research agenda. In all cases, engagement with research funders would hopefully lead to the adoption of IPBES priorities in the research funding activities of those bodies.

Are there missing elements?

30.   The research funding organizations or other possible opportunities to engage the research funding community, who would review the prioritized science needs and fund the science necessary to address the needs have to be identified.

Recommendations

Recommendation 3: We recommend identification of representatives of scientific and funding organizations to regularly review knowledge generation needs produced by IPBES and fund the science that addresses these knowledge needs.

31.   Examples of representative global scientific organizations include ICSU, the International Council for Science, which federates science academies and professional scientific unions worldwide, via its global change research programs DIVERSITAS, IHDP, the International Human

Dimensions Program on global change research, and (in the future) Future Earth. For specific areas, existing ad hoc scientific groups could also be appropriate. The Census of Marine Life initiative, for example, involved 80 countries, and secured interoperability of existing marine databases, open access publication and capacity building. Examples of research funding groups include IGFA (International Group of Funding Agencies for global change research) or the Belmont Forum, which are consortia of national funding agencies that support international scientific research. There is also scope for engaging the Global Environment Facility.

32.   If it is not possible to address the knowledge needs through existing organizations, then IPBES could establish new groups with appropriate focus, and at appropriate scales. Knowledge needs at the global scale would require a forum operating at that same scale. Knowledge needs at the regional scale would require regional organizations, and so on. For example, the problem of zoonotic diseases emerging as a result of local land use change potentially affects people everywhere. It also involves many different sectors (medical, environmental, veterinary, conservation) each of which monitors different variables and holds different types of data. Uncertainty in this case is related to the lack of coordination and integration of research efforts across sectors. A forum to facilitate knowledge exchange between the relevant sectors would need to include a number of relevant global organizations such as WHO, WTO, OIE, CBD, Ramsar and IPCC.[1]

Who would be the key players?

33.   "Knowledge needs" include 1) insufficient knowledge about the processes or mechanisms involved in anthropogenic biodiversity change (e.g., lack of understanding about the mechanisms involved in the emergence of zoonotic disease resulting from land use change), and 2) uncertainty due to a lack of data (e.g., lack of data to calibrate models, or the lack of information on the role of particular species in the provision of particular ecosystem services. Knowledge needs may also arise, 3), from lack of access to existing proprietary data.

34.   The key players for potential activity 7 fall into 3 categories: 1) the producers of knowledge—the scientific community and other knowledge holders, at the appropriate scale, 2) the funders of research, which include national research funding agencies, sectoral funding agencies such as health, and agriculture, and private foundations, again at the appropriate scale; and 3) representatives of the users of knowledge, that is of the IPBES Plenary. Representatives of these various groups will need to be selected to interact with IPBES.

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[1] WHO – World Health Organization, WTO – World Trade Organization, OIE – World Organization for Animal Health, CBD – Convention on Biological Diversity, Ramsar – Ramsar Convention of Wetlands of International Importance , IPCC – Intergovernmental Panel on Climate Change

5 POTENTIAL ACTIVITY 8: PARTNERING WITH LONG-TERM OBSERVATION AND MONITORING PROGRAMS

Potential activity 8: Identify and develop partnerships with long-term observation and monitoring programs that provide data and information necessary for indicators and metrics, as well as those programs that help to ensure the availability of the resulting data.

What is the purpose of potential Activity 8?

35. Long-term monitoring and observation programs need to serve as a basis for assessments. The purpose of Activity 8 is to ensure that IPBES establish a strategic partnership with key observation and monitoring initiatives, so that they are aware of the data needs of IPBES, and can address these needs.

How would it work?

36. This activity is very similar to and partially overlaps with Activity 7, the difference being that Activity 7 would engage knowledge producers, while Activity 8 would engage data producers. The overlapping portion resides in the fact that knowledge producers will also produce new data. However, observations differ from data produced by research because, in general, observations are produced in a repeated manner, on a long term basis, by operational –and not research- agencies/ministries.

Are there missing elements?

37. A stronger statement at the beginning of section 8 would be useful to clarify why these partnerships are critical (i.e., that the assessments will depend critically on the availability and quality of data from long-term monitoring and observation programs). The description of the need for partnerships is lacking in direction and could be improved by explaining potential achievements of the partnerships. Additionally, a link between monitoring and observations and human well-being needs to be made. Work on interoperability and information technology standards is needed to facilitate sharing of data.

38. It is important to note that GEO BON, unlike what is inferred in para 75a, does not focus only on biodiversity. GEO BON has a Working Group on ecosystem services which is working toward a road map for observing ecosystem services (Scholes et al. 2012), and its implementation in the context of GEOSS.

Recommendations

Recommendation 4: IPBES needs to develop the criteria for partnerships with key observation and monitoring programs.

39.　　Criteria for establishing successful partnerships need to be defined. Partnership criteria should focus on a small number of priority organizations that provide important data for assessment. Additionally, development of clear data standards should be established to evaluate data quality relative to those standards. Criteria for establishing partnerships, which might include the development of classes of partners, could be dependent on the accuracy and reliability and/or the scope or scale of data that they provide (relative to agreed upon standards), as well as the quality of metadata and the potential for integration and interoperability. Other criteria for partnerships could include the type of metrics/indicators used and their relevance for IPBES, type of standard approaches used, the spatial extent/scale explored, and the electronic accessibility of the data they provide. IPBES should, as much as possible, target partners that already involve many organizations, like GEO BON, rather than establishing many partnerships with many people, in order to be more strategic and efficient.

40.　　Long-term monitoring and observations will require a number of metrics (e.g., Essential Biodiversity Variables, a suite of variables that can address the Convention of Biological Diversities strategic plan targets and can track change in biodiversity, established by GEO-BON). However, consistency on what metrics are used and how they are established will need to be considered in relation to the IPBES conceptual framework as it is developed. The Essential Biodiversity Variables established by GEO-BON, may constitute a useful set of variables to be used by IPBES and may provide a good model for the definition of criteria for metrics selection. The Essential Biodiversity Variables derive from primary observations (e.g. population abundance, land cover), which may be directly used to inform biodiversity change indicators (e.g., population of selected species) or combined among them or with other data to derive more complex information (e.g., extinct risk derived from population trends and species life history attributes).

Recommendation 5: IPBES should encourage data interoperability and information technology standards to facilitate data sharing.

41.　　It will be important to develop criteria and standards for encouraging data, metadata and interoperability. It might also be useful to encourage the development of repositories for models, scenarios, and other derivatives of observations to facilitate integration of information acquired from long-term monitoring and observations. Further, development and adoption of standards will help ongoing coordination among the institutions engaged in the monitoring activities and those engaged in the model development and scenarios. Properly done, the monitoring activities will strategically address data needs that reduce model uncertainty, and

ensure that the scales of data being measured in monitoring activities are appropriate to the models and vice versa.

Recommendation 6: IPBES should emphasize needs to link monitoring and observations with some measure of human well-being.

42. We feel that more emphasis needs to be placed on integration of long-term monitoring and observations of biodiversity and ecosystem service production with monitoring and observations of human well-being and of benefits of ecosystem services for well-being. Scholes et al (2008, 2012) provide an illustration of how biodiversity observations can link to measures that can track changes in human well-being. We support Para 76, which underlines the importance of performing and integrating observations of a range of key ecosystem services.

Recommendation 7: IPBES should develop a strategy to ensure that the necessary information, that is currently unavailable, is added as science needs emerge.

43. We recommend development of steps to take when essential data is needed but not existent or available. A strategy will need to be established to ensure that the necessary information is added as a gap and warrants future exploration.

Who would be the key players?

44. We recommend that IPBES link with long-term monitoring and observations efforts, like GEO BON, and the other observing systems across GEOSS (Global Earth Observing System of Systems) societal benefit areas, many of which are relevant to ecosystem services (e.g., water, energy, ecosystems, agriculture), as well as with other relevant partners, such as OECD, WHO, or FAO. IPBES also should encourage better coordination and integration among these activities. In this context, it is important to note that GEO BON, unlike what is inferred in para 75a, does not focus only on biodiversity. GEO BON has a Working Group on ecosystem services which is developing a road map for observing ecosystem services (Scholes et al 2012), and is working on its implementation in the context of GEOSS.

6 POTENTIAL ACTIVITY 9: MAKING EFFECTIVE USE OF MODELING AND SCENARIOS

Potential activity 9: Identify how to make effective use of modeling and scenarios in the context of IPBES.

What is the purpose of potential Activity 9?

45. We believe that scenarios and models are essential for IPBES. A major reason to undertake IPBES is to become better able to understand the impact of current decisions on the future of our biodiversity and ecosystem services. Models and scenarios are tools which make it

possible to make these projections. Scenarios are used to understand the impacts of different socio economic development pathways. Models are used to make projections of future changes in biodiversity and ecosystem services, according to these different scenarios/ socio-economic pathways.

46.   Specifically, models and scenarios will have the ability to increase efficiency and effectiveness of IPBES by helping to synthesize and interpret data from a wide range of sources, evaluate the robustness of biodiversity indicators, and understand important processes. They will have the potential to alert decision makers to future impacts global change may have on biodiversity and ecosystem services. This includes anticipating potential tipping points (i.e., rapid and irreversible changes in biodiversity and ecosystem services) and other relevant changes in biodiversity and ecosystem services. This provides the opportunity to develop policy and adaptive management strategies that are proactive and coherent, rather than reactive and uncoordinated. Finally, models and scenarios can be used to explore the effectiveness, including monetary costs and benefits, of a wide range of policy decisions and management strategies in terms of their impacts on biodiversity, ecosystem services, and human well-being (MA 2005, Leadley et al. 2010, Pereira et al. 2010; Fig. 1).
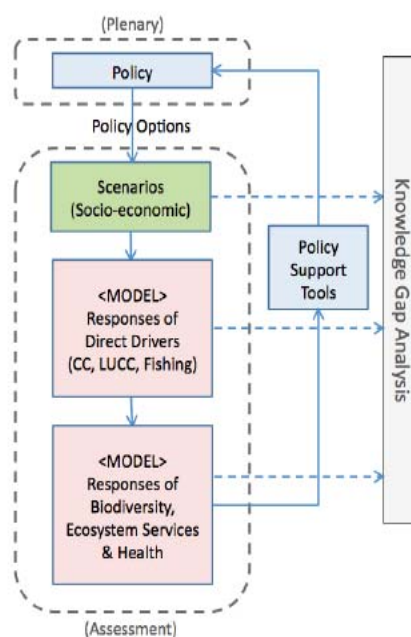
How would it work?

Fig. 1. Illustration of the relationships between policy, socio-economic scenarios, and models of direct drivers, biodiversity, ecosystem services, and human well-being. This shows how policy options identified in the IPBES process need to be accounted for when developing scenarios and

that this must feed back to policy through specifically developed policy support tools. The assessment process plays a key role in identifying gaps in scenarios and models of direct drivers, biodiversity, ecosystem services and human well-being.

Are there missing elements?

47.   Clear definition of the types of scenarios IPBES would use will be critical to insure success. These scenarios should allow contrasts and comparisons across a number of alternative futures and should have consistency across multiple scales. Development of a common approach and to scenarios themselves would allow comparison regardless of scale at which the scenarios is applied.

Recommendations

Recommendation 8: Scenarios and models have a key role in all functions of IPBES, and should be integrated throughout IPBES.

48.   Models and scenarios are important for knowledge generation, but also for the other 3 functions of IPBES. The relevance of models and scenarios for 1) assessment, 2) policy support tools and methodologies, 3) capacity development, and 4) knowledge generation functions are described below.

49.   Scenarios and models for assessment: The use of scenarios and models could allow assessments to go beyond a status review to an exploration of realistic possible futures. Such an expansion of the assessments allows decision makers to consider responsive actions to the status of biodiversity and ecosystem services and be pro-active in altering or avoiding undesired trends, tipping points or state changes. Use of multiple model comparisons to assess scenarios for biodiversity and ecosystem service outcomes will 1) provide an unbiased, comprehensive assessment of likely outcomes representing the broad spectrum of scientific approaches (as is done in the IPCC) and 2) allow quantitative estimates of the set of costs and benefits likely to arise from a given scenario.

50.   Scenarios and models for policy support tools and methodologies: Once assessment results are produced, scenarios and models can be effective tools for identifying ways to translate results to other scales for implementation. For example, a finding of an assessment may be that provisioning services (e.g. food production) are increasing globally while regulating services (e.g. water quality regulation) and biodiversity are declining. . Scenarios and models can be very useful tools in this translation step. The role of IPBES would be to explicitly include tools and methods related to scenarios and models in potential activities 11 and 12.

51.   Scenarios and models for capacity building: Scenarios and models can be very useful tools for capacity building with decision makers. Scenarios can be built to directly reflect decision options, and models can be used to communicate the consequences of a given option for a diverse set of stakeholders. Moreover, scenarios and models can help disciplinary scientists and decision makers understand linkages among components of biodiversity and between biodiversity and society in ways that enhance their ability to consider these connections in research and decision making.

Recommendation 9: Scenarios and models must be developed and used iteratively to allow scientists to learn and update models as knowledge progresses.

52.   We note that the use of scenarios and models for knowledge generation is a large job and cannot be conducted as a series of "one-off" activities (serving a singular purpose or project outcome), as proposed in para 81. Rather, they should form part of an ongoing, iterative process, where models and scenarios are updated as knowledge improves. Scenarios and models regarding knowledge generation could fulfill the following Knowledge generation roles. For the development and the iterative process to be effective, guidelines, frameworks, and standards for models and scenarios could be recommended for certain processes, including model comparison, analysis of uncertainty, standard inputs, standard outputs, and policy options.

Recommendation 10: To ensure scenarios and models are scalable from regional to global and between regions, it will be critical to develop standards for models and scenarios, through engagement with the modeling and policy communities.

53.   The activity can encourage partnerships within the modeling community to promote model inter-comparison; however no unified community currently exists, thus IPBES should also help to identify or develop a relevant scenario and modeling community. The use of scenarios and models can be used to encourage model development at regional scales. Also, scalable scenario models and metrics and conceptual framework for scaling (capacity building) could be developed. Dialog with policy-makers should be encouraged and can lead to the development of decision support models (see potential activities 10-12). Scenarios and models could be used to encourage partnerships between modelers and data providers (e.g., through international programs like GEO-BON). Finally, coupled social-ecological models should be encouraged to insure broad partnerships.

Examples on how IPBES could facilitate knowledge generation

54.   Identified data and knowledge gaps could provide guidance on the development of models and scenarios to better answer to plenary requests. This would be useful because there is 1) a lack of capacity to respond to policy relevant questions, 2) a need to link biodiversity and

ecosystem services in scenarios, 3) Social-Ecological scenarios can be difficult to relate to, and 4) a better analysis of tipping points is needed.

55.   Assessments can help identify gaps in the ability of models and scenarios to answer key questions about current trends and future projections; such gaps can be communicated to the scientific community (Fig.1).   Modeling and scenarios can help identify new gaps in understanding and data, but dialog with data groups is needed. Models and scenarios can also help to identify gaps in observation and monitoring data and inform design of monitoring activities. For example, within fisheries management, models are often combined with scenarios developed by stakeholders and scientists working together for more effective and successful management (Smith et al. 2008, Bunnefeld et al. 2011). This method, known as *management strategy evaluation*, allows both alternative management scenarios and different indicators of system state and trends to be tested.

56.   Other examples could include IPCC climate models (CMIP), which would illustrate the importance of multi-model and model-data comparisons. Additionally, an example of how an existing knowledge base is being built would be useful to show that proposed objectives are realistic.

7 RECOMMENDATIONS ON IPBES FUNCTIONS AND STRUCTURES

Document: "Functions and Structures of bodies that might be established under an IPBES" (UNEP IPBES.MI/2/3)

On working groups (relevance of science)

57.   There is a number of ways that the work of IPBES could be divided. It has been proposed to divide it according to each one of the four functions of IPBES. We think that each working group should integrate each of the 4 functions as opposed to separating the groups by each function, in order to promote synergy and collaboration among the four functions, which will greatly overlap. We therefore support Option 3 (Section III C).

On governance (scientific independence and credibility)

58.   We recommend establishment of a scientifically independent approach, that makes decisions distinct from the Bureau, in order to ensure that the scientific functions are carried out in an independent way. We therefore support Option 2 (Section III B 14). If, however, Option 1 is selected, the necessary governance, rules and procedures within the expanded bureau should be established, in order to ensure the independence and credibility of the science functions.

59.   Finally, most participants agreed that the review process for IPBES needs to be carefully structured, and performed by an external independent review panel, in order to ensure that reviews are seen as unbiased and credible. Additionally, it is important that the structures and criteria for the review process are in place at the beginning.

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APPENDIX 2: COMMENTS AND SUGGESTED CHANGES TO THE TEXT IN THE DOCUMENT "POSSIBLE ELEMENTS OF THE WORK PROGRAM OF THE PLATFORM" (UNEP IPBES.MI/2/2)

Comments and suggested changes to Potential Activity 6

Comments and suggested changes to Potential Activity 7

Suggested new title for "boxed" title of Potential Activity 7.

Develop and implement a strategy for engagement with the research community and other knowledge holders in order to a) enhance accessibility of existing knowledge; b) encourage research to address the identified knowledge gaps; c) ensure that research funding agencies are aware of the identified knowledge needs and the research requirements for addressing them to help in prioritizing and coordinating research funding; and d) identify new funding sources for research at global scale.

Comments and suggested changes to Potential Activity 8

taken up in developing research strategies and in other knowledge generation processes, and in setting funding priorities.

    (c) → Communicating information on knowledge needs to the wider scientific community, other knowledge holders, funding agencies, and capacity building community at large.

    (d) → Encouraging and collaborating with the research community in developing a coherent knowledge generation strategy to guide further research on biodiversity and ecosystem services.

    (e) → Collaborating with funding agencies and associated policy makers in the development of an enhanced funding strategy for research and long-term monitoring.

34. → It is anticipated that this would be an ongoing process, but at a relatively low level with much of the work done through communication, and partnership with appropriate organizations. However this may well be supported by mandates from a future IPBES Plenary.

- **3.2.8 Partnering with long-term observation and monitoring programmes**

> *Potential activity 8:* Identify and develop partnerships with long-term observation and monitoring programmes that provide data and information necessary for indicators and metrics, as well as those programmes that help to ensure the availability of the resulting data.

35. → An assessment of the current status of long-term observation and monitoring programmes with respect to the needs of IPBES might be a first step towards a comprehensive approach to addressing data and information needs on biodiversity and ecosystem services across scales. While a number of long-term monitoring programmes exist at both national and international levels, not all monitoring needs are covered (see for example report prepared for the CBD on the adequacy of biodiversity observation systems to support the Aichi targets[22]) and greater synergies could be achieved through the adoption of common observation and monitoring approaches.

36. → With regard to specific ongoing activities, section E.1.3 of the IPBES Gap Analysis provided a brief summary, and gave examples of existing initiatives aiming to promote long term observation and monitoring programmes, and increase access to observation data. For example, the following both have significant government involvement:

    (a) → The Group on Earth Observations Biodiversity Observation Network (GEO-BON)[38] coordinates activities relating to biodiversity of the Global Earth Observation System of Systems (GEOSS), with the aim of organizing and improving biodiversity observations globally, and making their biodiversity data, information and forecasts more readily accessible.

    (b) → While not itself an observation or monitoring programme, the Global Biodiversity Information

Comments
Comment [BD1]: Long-term obs. And monitoring are the basis for any international assessment of biod and ES (to be added in text).
Comment [BD2]: Why the emphasis on partnerships and not the needs for long-term observation and not the observation needs.
Comment [BD3]: Need to identify gaps in the long-term monitoring systems.
Comment [BD4]: As designed it is quite passive statement, but should it be more coupled with policy needs and development. Setting agenda for observation and monitoring.
Comment [BD5]: Is it only related to indicators and metrics? Information necessary to support IPBES work-program.
Comment [BD6]: e.g. essential biodiversity variables (to be added to the text).
Comment [BD7]: And integration of resulting data (to be added to the text).
Comment [BD8]: Need for long-term information systems to support long-term time-series of observations
Comment [BD9]: What is the purpose of the partnership? And what can we add on implementation?
Comment [BD10]: Need to couple with modeling and scenario's community, assessment that cuts across all communities.
Comment [BD11]: Identify potential for synergy and integration of monitoring and observation programs
Comment [BD12]: Should IPBES act as a coordinating mechanism for obs and monitoring?
Comment [BD13]: Need to know what you need before you do an assessment of availability
Comment [BD14]: Subsequent to needs – Define scoping (related to activity 3, also information under activity 5, new topics, 6, etc… and probably policy level).

Comments and suggested changes to Potential Activity 8 (continued)

    (a) → The Group on Earth Observations Biodiversity Observation Network (GEO-BON)[38] coordinates activities relating to biodiversity of the Global Earth Observation System of Systems (GEOSS), with the aim of organizing and improving biodiversity observations globally, and making their biodiversity data, information and forecasts more readily accessible.

    (b) → While not itself an observation or monitoring programme, the Global Biodiversity Information Facility (GBIF)[39] facilitates a decentralized network of databases on species occurrence data with the specific purpose of increasing access to data arising from collection, observation and monitoring programmes.

37. → A range of ecosystem service–related observation and monitoring initiatives at the global and regional level are also relevant, and the IPBES plenary might consider whether (which) partnerships are required with components of global and regional observing systems in support of IPBES' work. The IPBES conceptual framework will also be important to inform observation and monitoring activities covering the main drivers of change of ecosystems and human well-being, impacts of trends, and responses.

38. → It is anticipated that this would be an ongoing process, but at a relatively low level with much of the actual work done through partnership with appropriate organizations. However this may well be supported by mandates from a future IPBES Plenary, and both the Plenary subsidiary bodies may also identify priority data needs.

- **3.2.9 Making effective use of modeling and scenarios**

> *Potential activity 9:* Identify how to make effective use of modeling and scenarios in the context of IPBES.

Comments
Comment [BD13]: Need to know what you need before you do an assessment of availability
Comment [BD14]: Subsequent to needs – Define scoping (related to activity 3, also information under activity 5, new topics, 6, etc… and probably policy level).
Comment [BD15]: Services are an after-thought, needs to be more emphasis.
Comment [BD16]: Encourage GEO-BON to work with other sources of information like FAO, IPCC, WHO and others. Develop portal or build a portal for sharing information.
Comment [BD17]: Have to be imaginative to develop ES monitoring and linkages to things like World Bank, OECD and others.
Comment [BD18]: Do we have some examples that we can put in here, perhaps the FAO or WHO information or needs. Fisheries data, pollination, GEO-Agriculture, and other work-groups, GEO-Water, GEO-Ecosystems, Climate, MDG process
Comment [BD19]: Needs to be more inspirational, perhaps, needs to be more stimulating. Catalyzing activities across the globe.
Comment [BD20]: Is it needed where does it fit in timing of a work programme, where does it fit in the timeline, how does it interact with the process.

Comments and suggested changes to Potential Activity 8 (continued)

- 3.2.8 Partnering with long-term observation and monitoring programmes¶

Potential activity 8: Identify and ~~develop prioritize~~ ~~partnerships~~ with long-term observation and monitoring programmes that provide data and information necessary for indicators and metrics, including social and ecological. Partner with ~~as well as~~ those programmes that help to ensure the availability of the resulting data ¶

> **Comment [BD1]:** How will partnerships be developed? Need more information on conditions and who can be a partner. Criteria for inclusion for partnership. ¶

35. → An assessment of the current status of long-term observation and monitoring programmes with respect to the needs of IPBES might be a first step towards a comprehensive approach to addressing data and information needs on biodiversity and ecosystem services across scales. While a number of long-term monitoring programmes exist at both national and international levels, not all monitoring needs are covered (see for example report prepared for the CBD on the adequacy of biodiversity observation systems to support the Aichi targets[22]) and greater synergies could be achieved through the adoption of common observation and monitoring approaches ¶

> **Comment [BD2]:** Address concern about HWB part¶

> **Comment [BD3]:** Dependent on assessment group and linkages for that. Look at paragraphs 45 and 47 under assessments. ¶

> **Comment [BD4]:** Need something on reporting, why do we need this information?¶

36. → With regard to specific ongoing activities, section E.1.3 of the IPBES Gap Analysis provided a brief summary, and gave examples of existing initiatives aiming to promote long term observation and monitoring programmes, and increase access to observation data. For example, the following both have significant government involvement ¶

> **Comment [BD5]:** Close tie between monitoring gap and assessments, to answer questions that the plenary care about, the scale and frequency. Should be close tie between the plenary questions and monitoring. Also need to think about monitoring policies to measure their effectiveness. ¶

(a) → The Group on Earth Observations Biodiversity Observation Network (GEO BON)[38] coordinates activities relating to biodiversity of the Global Earth Observation System of Systems (GEOSS), with the aim of organizing and improving biodiversity observations globally, and making their biodiversity data, information and forecasts more readily accessible ¶

> **Comment [BD6]:** Need to mention activites from UNEP-WCMC, UNESCO and FAO, provide activities related to marine environments. Can more examples of potential partners. ¶

(b) → While not itself an observation or monitoring programme, the Global Biodiversity Information Facility (GBIF)[39] facilitates a decentralized network of databases on species occurence data with the specific purpose of increasing access to data arising from collection, observation and monitoring programmes.¶

> **Comment [BD7]:** Not clear why these are picked, for what purpose would we do use these programs. ¶

37. → A range of ecosystem service-related observation and monitoring initiatives at the global and regional level are also relevant, and the IPBES plenary might consider whether partnerships are required with components of global and regional observing systems in support of IPBES' work. The IPBES conceptual framework will also be important to inform observation and monitoring activities covering the main drivers of change of ecosystems and human well-being, impacts of trends, and responses.¶

> **Comment [BD8]:** How would you report, what the relevance of the monitoring program is in a wider context, needs to be set out to support long-term decisions. What are criteria for inclusion of other programs. ¶

38. → It is anticipated that this would be an ongoing process, but at a relatively low level with much of the actual work done through partnership with appropriate organizations. However this may well be supported by mandates from a future IPBES Plenary, and ~~both~~ the Plenary subsidiary bodies may also identify priority data needs¶

> **Comment [BD9]:** Final sentence, what do they do once the priority is identified, where does it go? How is it connected. And communicate partners?¶

Comments and suggested changes to Potential Activity 9

There are several issues with the text of Potential Activity 9 as it is currently written. We feel the text should be rewritten to:

- Indicate that knowledge generation role IPBES is much broader than title and text suggests. It covers several functions including: review, guidelines, continuous improvement based on partnerships, and dialog (e.g., with monitoring)

- Consider that knowledge generation is an iterative process. Only certain aspects can be considered as "one-off" activities (re: para 78)

- Highlight the vital roles of scenarios and modeling for IPBES, especially to make this clearer for non-specialists

We have focused our attention on the "boxed" title and para 78 where changes are of the very highest priority

Suggested new title for "boxed" title of Potential Activity 9

Encourage the development and effective use of models and scenarios to support the four functions of IPBES.

Current version under consideration:

Potential activity 9*:* ~~Identify how to make effective use of modeling and scenarios in the context of IPBES.~~ <u>Encourage the development and effective use of models and scenarios to support the four functions of IPBES.</u>

Annotation for boxed title of Potential Activity 9

We feel that the current title, by focusing on "identifying effective use of models and scenarios", misses out on the many of the important, iterative and interactive processes that are essential for knowledge generation. IPBES can play a strong role in encouraging and facilitating review of existing models and scenarios, development of guidelines, continuous improvement of models and scenarios based on partnerships, and enhanced dialog (e.g., with monitoring community).

Essential Changes to Text for Para 78

78. It is anticipated that this potential activity would <u>be an ongoing process</u> ~~actually comprise a number of one-off activities carried out~~<u>initiated</u> relatively early in the life of the IPBES, with periodic review and update ~~as thought necessary~~ to take account of new developments and lessons learnt. Much of this ~~might~~<u>would</u> be carried out through appropriate partnerships.

"Ideal" Changes to Text for Para 78

78. It is anticipated that this potential activity would <u>be an ongoing process</u> ~~actually comprise a number of one-off activities carried out~~<u>initiated</u> relatively early in the life of the IPBES, with periodic review and update ~~as thought necessary~~ to take account of new developments and lessons learnt. Much of this ~~might~~ <u>would</u> be carried out through appropriate partnerships <u>that would encourage the formation of a platform which supports multi-model comparison and scenarios.</u>~~.~~

Comments and Suggested changes for Text Outside of Potential Activities 6, 7, 8, and 9

There is a need to identify the contribution of modeling and scenarios in the work plan outside of Potential Activity 9, because the vital role of modeling and scenarios is not sufficiently clear in the work program text as it stands. We have made suggestions for a very limited number of small modifications of text that are important to clearly signal the importance of scenarios and

models. We have provided both comments on the text to explain why modifications are needed, suggestions for text changes as well as more lengthy justifications in the information document.

Annotated versions of points 28, 35 and 52

28. This element of the work programme is integral to all of the other three functions. Assessments are based on available data, information and knowledge, and as a result of assessments there is improved understanding of gaps in such knowledge, and of knowledge generation needs in the future. Capacity building has formed an important part of nearly every international assessment process undertaken in the recent past, either directly (e.g. through fellowships and dedicated workshops) or indirectly (e.g. by taking part or engaging in the assessment process). Finally, assessments are themselves tools for supporting policy formulation and implementation, and can be a useful means for identifying and assessing policy options and policy-relevant tools and methodologies.¶

> **Comment [bw1]:** Scenarios and models are also a vital element of assessments. This should be spelled out as it is not clear that "data, information and knowledge" include scenarios and models.¶

35. As has been illustrated in each of the four preceding subsections, there are close relationships between each of the four proposed programme functions, and many programme activities are likely to contribute directly to more than one of them¶

> **Comment [PL2]:** Scenarios and models will play a particularly powerful role of synthesizing data, information and knowledge across all four functions and this should be highlighted¶

52. Regional and global assessments might include assessments of the: status and trends of biodiversity and ecosystem services and their interlinkages; drivers of changes affecting biodiversity and ecosystem services and their interlinkages; consequesnces of changes in biodiversity and ecosystem services and their interlinkages for long-term human well-being and sustainable development; and the effectiveness of response options available to governments and their stakeholders in relation to the drivers of changes and trends in biodiversity and ecosystem services and their interlinkages.¶

> **Comment [bw3]:** It is important to acknowledge the key roles of analyzing both "recent trends" and "future scenarios of change" in biodiversity (see Information document for justification). The text as is currently stands does not encompass the forward looking aspects that scenarios and models provide.¶

Change-tracked versions of points 28, 35 and 52 that encapsulate the intent of the annotations above

28. This element of the work program is integral to all of the other three functions. Assessments are based on available data, information, ~~and~~ knowledge, scenarios and models, and as a result of assessments there is improved understanding of gaps in ~~such~~ knowledge, and of knowledge generation needs in the future. Capacity building has formed an important part of nearly every international assessment process undertaken in the recent past, either directly (e.g. through fellowships and dedicated workshops) or indirectly (e.g. by taking part or engaging in the assessment process). Finally, assessments are themselves tools for supporting policy formulation and implementation, and can be a useful means for identifying and assessing policy options ~~and policy-relevant tools and methodologies~~.

35. As has been illustrated in each of the four preceding subsections, there are close relationships between each of the four proposed program functions, and many program activities are likely to contribute directly to more than one of them. Models and scenarios should play a key role in synthesizing and integrating data, knowledge and information across, as well as within, the four functions.

52. Regional and global assessments might include assessments of the: status, recent and trends and future scenarios of change in of biodiversity and ecosystem services and their interlinkages; drivers of changes affecting biodiversity and ecosystem services and their interlinkages; consequences of changes in biodiversity and ecosystem services and their interlinkages for long-term human well-being and sustainable development; and the effectiveness of response options available to governments and their stakeholders in relation to the drivers of changes and trends in biodiversity and ecosystem services and their interlinkages.