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Second session
Panama City, 16–21 April 2012

Informal international expert workshop on the theme "Policy support through relevant tools and methodologies in the intergovernmental science-policy platform on biodiversity and ecosystem services"

Summary by the Chair

Note by the secretariat

The annex to the present note contains a summary of the informal international expert workshop on the theme "Policy support through relevant tools and methodologies in the intergovernmental science-policy platform on biodiversity and ecosystem services". The workshop was convened in Bonn, from 7 to 9 December 2011, by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the Federal Ministry of Education and Research of Germany. The summary was prepared by the Chair of the workshop and is presented as received from the Helmholtz Centre for Environmental Research, without formal editing.

Annex

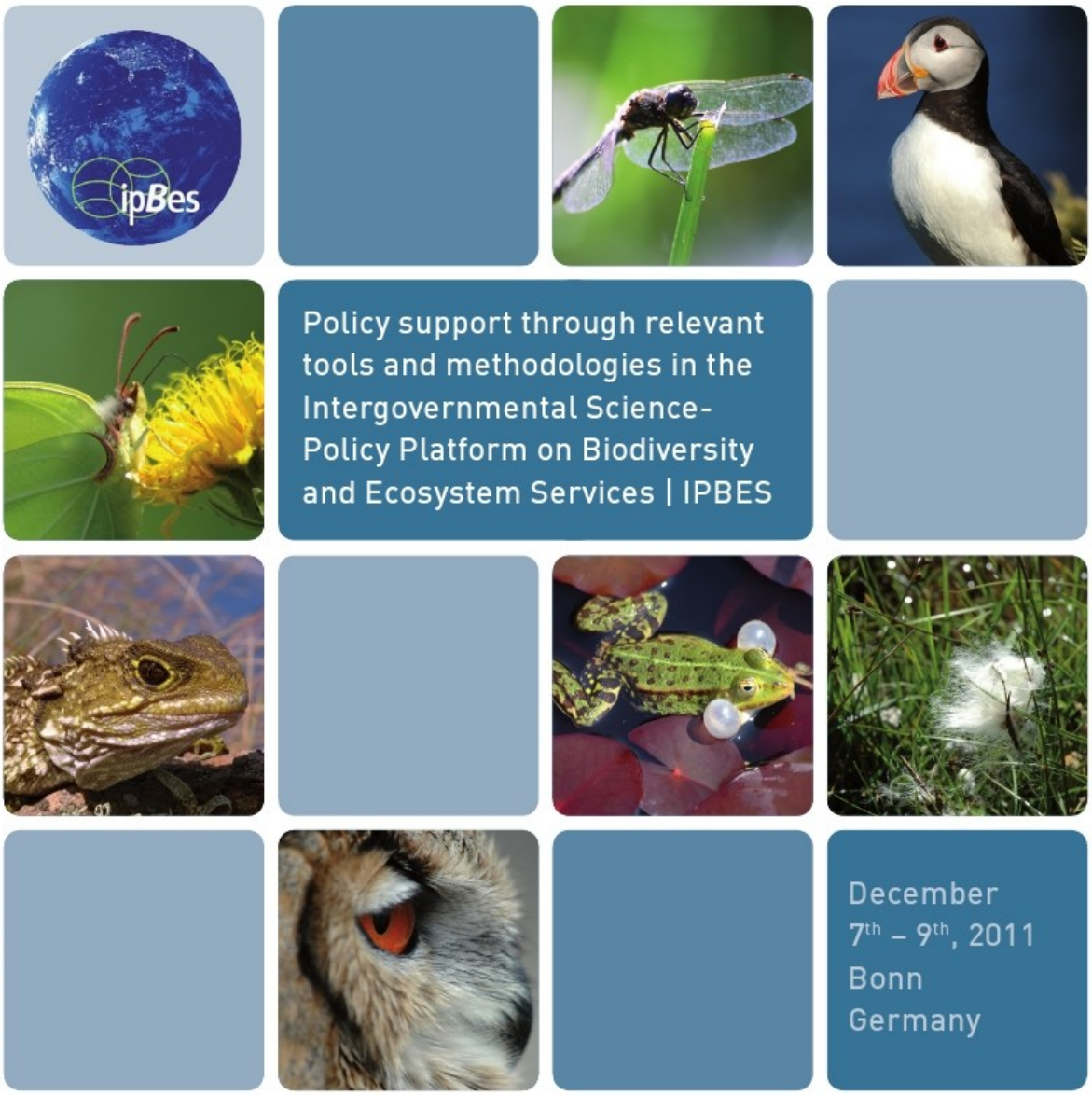
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Federal Ministry of Education and Research

Chairs Summary

Informal International Expert Workshop, December 7th – 9th, 2011, Bonn, Germany

Bonn 1st of March, 2012



1. Introduction

At the first session of the plenary meeting in Nairobi in October 2011 the process to establish an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has reached an important stage. To support the further process and discussions, the Federal Ministry for the Environment, Nature conservation and Nuclear Safety (BMU) and the Federal Ministry of Education and Research (BMBF) in Germany organised an informal international expert workshop, focussing on the policy support function of IPBES.

At the workshop 81 participants from 41 countries discussed several topics related to the IPBES function of policy support, including

- policy support as challenge for science-policy interfaces in general,
- opportunities and challenges for IPBES (e.g. best practices, biggest failures and needs / wishes at the local, national and global scale),
- potential support for the different levels of the policy cycle (e.g. awareness raising, strategic policy development, policy implementation, evaluation and monitoring, improving access),
- range and spectrum of policy tools and methods (including models and scenarios, risk analysis and valuation methods, indicators, assessments and decision support systems),
- enabling conditions for a successful policy support function (including the interplay of the four work areas of IPBES).

The workshop participants in general supported the idea of a strong policy support function as one of the four main functions of IPBES agreed in the Busan Outcome. Discussions in plenary and the break-out groups on (a) the scope of the policy support function, (b) potential tools and methods to address them and (c) the processes how IPBES may tackle different kinds of topics also showed a high diversity and potential of elements and options to develop the function. The following considerations have been drawn from the overall picture of opinions from the workshop. Further details can be found in the complete documentation.[1]

2. Considerations for IPBES in general

Discussions showed that there are several general issues concerning the overall procedures and structure of IPBES, in particular the work programme, which need further consideration if the policy support function should be addressed properly. The main topics are:

- **The general principle of being *policy relevant without being policy prescriptive* was acknowledged** but it was emphasized that this principle needs further elaboration.
- **The role of IPBES in "making the case for biodiversity":** It was discussed how far advocacy ("making the case for biodiversity") is desired and how far IPBES should and can remain neutral: The issues tackled within IPBES like biodiversity conservation and use of ecosystem services will always be subject to different values depending on the stakeholders involved. Thus it will be important for IPBES, when outlining and analysing policy options, to include the underlying values and other assumptions as far as possible into its work and make them, as an honest broker of the policy options, transparent and explicit.
- **Focussing on usefulness:** Knowledge provided by IPBES should not just be "relevant" but also "useful". To ensure this, engagement of stakeholders throughout the process and capacity building improving the ability for all participants to engage is crucial.
- **Linking all four functions of IPBES is essential:** It was discussed, whether the four functions of IPBES should be tackled as separated entities or rather be addressed in an integrated manner and how. Establishing separated IPBES working groups for the different functions might not be the best option. This was illustrated by break-out groups scoping the process on how IPBES could tackle different potential topics like global pollinator loss, the link between cultural and biological diversity or eco-tourism. In order to address most of these topics properly, needs for actions in at least two or three different functions of IPBES where identified.

1 Available at: http://biodiversity.de/index.php/de/biodiversitaet/biodiversitaet-international/ipbes/ipbes-workshop-december-2011-in-bonn

- **Set priorities for the starting phase:** The operationalization of the work programme and some other options need further discussions:
    - Which decision makers should IPBES address and how?
    - Should IPBES engage in policy implementation and evaluation?
    - If so, in which policies at which levels? How are results to be presented?
    - Regional structures or a diversity of structures (permanent and/or ad hoc working groups, thematic hubs) may be important but it is not clear yet how.
- **Self-evaluation in IPBES is crucial:** The self-evaluation process of IPBES is an important element of IPBES, especially with the view on its multiple functions. Criteria for this self-evaluation should be discussed and decided early in the coming negotiations. These criteria should include and enable the processes in IPBES to be kept flexible and enable a learning environment for improvement of processes, especially in the interactions between the different functions.
- **Integrating different forms of knowledge and working across scales:** For all IPBES functions, support of and from different knowledge forms at different scales is important. Use and integration of different forms of knowledge should be based on lessons learned, e.g. from the MA and the IAASTD - these experiences should be revisited and analysed for the next plenary meeting.

3. Considerations for the policy support function of IPBES

The function could address several aspects of the policy cycle such as awareness raising, strategic policy development, policy implementation, evaluation and monitoring, and improving access.[2] Some of them may be undertaken **actively by IPBES itself,** whereas for others a **facilitation, stimulation or catalyst role of IPBES** was identified as more appropriate.

3.1 Elements for an active role of IPBES for policy support

Analysis, evaluation and selection of existing tools and methods: It was emphasized that a wide variety of policy tools and methodologies already exist to support decision-making and management, from models, scenarios and other forecasting techniques to risk analyses, cost benefit analyses and valuation methods (many examples are described in the scoping paper of the workshop). Not all of the existing tools are relevant, easily applicable or adjustable to the complexity of biodiversity related questions with regard to context and scale: strength and weaknesses of certain tools differ depending on specific local or national conditions (in biophysical terms as well as societal terms) and goals of decision making and the specific function of policy support (e.g. awareness raising, policy implementation). Analysis and evaluation of tools and methods, thus, should focus on more specific questions, and involve the explicit view of users and the usability of knowledge in a variety of contexts, thus providing policy options for these contexts, rather than concentrate on generalised approaches. One way could be to analyse best (and worst) practices based on different forms of knowledge and within different contexts, and make them available via a knowledge platform.

Developing new forms of user-friendly products: There is a request for targeted products / analyses of different tools. Decision support systems may play a specific role in this context, but also the further development of indicators, as well as appropriate models and, in the context of assessments, scenarios have an important role for strategic policy support.

Identification of criteria for the selection of topics to be addressed by IPBES:
To ensure that IPBES addresses relevant questions for the policy process and produces useful results and tools, the identification of criteria for the selection of potential topics should be of priority in the next steps of the IPBES process (for IPBES in general as well as for the policy support function). Elements of such criteria could for example include (indicative list):

2 See also scoping report to the meeting, available in the Annex to this document, or at http://biodiversity.de/images/stories/IPBES/WS_Dezember_2011/00%20Scoping%20Report%20for%20the%20workshop%20Bonn%202011_online.pdf

- focus of topics towards forthcoming policy decisions and milestones in international policy processes
- most far reaching problems,
- issues least covered by other processes,
- added value and linkages between different topics
- topics related to urgent problems or tipping points

3.2 Elements for a facilitation or catalyst role of IPBES for policy support

Catalysing the development of tools at smaller scales: As outlined above, the *relevance* of tools might not be sufficient, but the *usefulness* needs to be considered as well. The context-dependency is a major attribute for this. With regard to many assessments, national and even local scale will be most relevant, while a global mechanism like IPBES will rather provide global, sub-regional and regional perspectives and thus can only have a facilitative role or a catalysing function of making tools widely available at smaller scales (with their pros and cons). IPBES could e.g. empower decision makers at these levels to better access them (capacity building).

Links to other processes: The facilitative role may include, depending on the topic addressed, a direct link to ongoing assessments (within IPBES and beyond), and a regular exchange with regional and national networks.

Further development of tools and methods: The further development of policy tools and methods should be left to those responsible for these tools, IPBES should have the authority to catalyse and encourage this work by pointing to the relevant tools and the necessity for their further development or the need for their adaptation.

Improve the access to information: Different approaches can be chosen to improve access to available tools and methods, taking into account different information needs:

- Local decision makers may wish to have accessible best practices collections with context-specific information.
- National policy makers may look for policy options identification and critical appraisal, including scenario-based approaches.
- Global needs (e.g. from international conventions) will seek more strategic support in terms of large scale and integrative tools like scenarios, models and indicators to support the development and evaluation of their target systems.

Access could be facilitated via the link to other IPBES activities, e.g. in terms of assessments and capacity building, but also by specific regular exchange processes on the ground, e.g. in the context of large international conferences and the meetings of international conventions. The development of a knowledge sharing platform within IPBES, serving and integrating all four IPBES functions, was also considered as a helpful tool.

4. Implications for other relevant discussions in IPBES

Structure and governance of IPBES: After the first session of the IPBES plenary meeting in Nairobi, three options of the IPBES working group structure are under discussion. Those options must be substantiated and probably complemented, e.g. a combination of strictly global and regional aspects must be considered.

Taking a regional perspective is critical: the discussions during the workshop showed, that the way the work of IPBES will be organised between different scales – from the local, national and regional to the global – is maybe the most critical point in making it successful. Commitment at all scales and a strong interactive component will be needed, designing a network of networks across these scales, with a potential hub role at the regional level. Regional conditions across the globe to support such an approach of regional hubs differ (either within or outside IPBES). While for example in Europe, several processes are going on to form such networks, other regions may need support to set them up via IPBES or related programmes.

Identify pilot topics, but keep the process flexible: In general, it was felt that although clear rules and procedures are essential, IPBES should maintain some degree of flexibility in its processes, especially in covering its different functions and linking them according to the needs of each topic addressed for this, it could be feasible to identify 3-4 pilot topics of high relevance to be addressed by IPBES in its first phase of operation, which would serve to learn lessons on how to operate and further improve IPBES processes, including the preparation of a broad global assessment on biodiversity and ecosystem services.

ANNEX to chairs summary of the workshop

Scoping Report for the workshop

Policy support through relevant tools and methodologies in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

December 7th – 9th, 2011, Bonn, Germany

Report produced on behalf of the organizers by:
Network-Forum for Biodiversity Research Germany
&
UFZ Science-Policy Expert Group

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Version 2, revised after the workshop, 20th of December 2011

Executive Summary

1. Aim and scope of the present report

After three years of consultations and negotiations, participants of the third intergovernmental and multi-stakeholder meeting on IPBES, held in Busan, South Korea in June 2010, agreed in the "Busan Outcome" to create a new international mechanism for scientific advice on biological diversity, the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES). The "Busan Outcome" provides the foundations for the establishment of IPBES and the respective decisions to be taken on structure, modalities and procedural arrangements of the mechanism. *Policy support through relevant tools and methodologies* is identified as one of the four work areas of IPBES. Together with the work areas on assessment, capacity building and knowledge generation, these four work areas constitute the main IPBES functions. However, how exactly IPBES will address these issues has yet to be identified, a detailed work programme of IPBES has to be developed. Up to now, the policy support function has not been the subject of in-depth consideration at international workshops.

The present report aims to provide input into the discussions on IPBES policy support during the expert workshop, held in Bonn, Germany, in December 2011, and beyond. It summarizes previous and ongoing discussions on the policy support function of IPBES and addresses the following key elements:

- The state of the international discussion,
- Needs identified for the work area of policy support,
- Options for making science policy relevant,
- Functions of policy support tools and methodologies,
- Scoping the range of policy support tools and methodologies to perform these functions, and
- Links with other work areas of IPBES.

2. The state of the international discussion

In the Busan Outcome, policy support was defined as a major work area of IPBES. However, neither this work area nor the work program of IPBES as a whole has been discussed in detail yet at intergovernmental meetings. The first session of the IPBES plenary meeting in Nairobi in October 2011, started to address the modalities, procedures and institutional arrangements of IPBES. It came up with several conclusions concerning the structure and rules of procedure of the new platform. Options and ways to implement the different IPBES work areas, however, were discussed in only preliminary manner in Nairobi. It is envisaged that decisions on the work programme of IPBES as well as other remaining issues will be taken at the second part of the plenary meeting, scheduled for April 2012.

In advance of this second session, the plenary in Nairobi agreed on an intersessional process and respective deadlines. Accordingly the UNEP secretariat developed a revised document on the work programme based on the comments received during the first session and circulated it. Interested parties as well as other stakeholders are invited to provide comments on this work programme document until 15 December.

It is intended that the expert workshop in Bonn will provide input to the intersessional process. The outcome document – a chair's report to be compiled based on the discussions in plenary and breakout groups – will be sent to UNEP and may then also serve as an Information document for the preparation of the second session of the plenary.

3. Needs identified for the work area of policy support

The needs for the IPBES were analyzed in the IPBES gap analysis presented to the second ad hoc intergovernmental and multi-stakeholder meeting on IPBES in October 2009. This gap analysis stated that political decisions "on the ground" are not informed by the best available knowledge. The main shortcomings are:

- Form of presentation of knowledge/findings,
- Scale (national – regional – local),
- Underdeveloped tools, and
- Regularity of assessments.

For the function of policy support, several challenges exist which are generic for this function. Looking at the gap analysis, however, reveals that some of them are particularly pressing for the area of biodiversity and ecosystem services, such as the scale sensitivity of knowledge provision. These challenges need to be addressed within the policy support function of IPBES, but with regard to the other IPBES work areas, thus again highlighting the importance of an integrated approach for all work areas.

Moreover, in order to serve the needs, IPBES will not be able to act on its own, but needs to build upon and collaborate with existing institutions and networks that already address the policy support challenge. The sciences – especially social sciences – are of crucial importance for improving the relevance of knowledge for decision making, but for an effective policy support function, the work area will also need cooperation across different societal sectors and across several spatial scales.

4. Options for making science policy relevant

The policy relevance of IPBES is a major focus of ongoing efforts to strengthen the science-policy interface for biodiversity and ecosystem services. Thus, the work area on policy support is of pivotal importance concerning this goal – but it must be linked appropriately to the other work areas of IPBES.

One of the principles guiding the IPBES processes is to provide *policy-relevant knowledge without being policy prescriptive*. This means that the platform has to provide options for policy making while also taking care that its advice does not narrow down the available response options but rather informs policy makers neutrally about the implications of different options/decisions. Its conclusions must be evidence-based rather than value-laden, i.e. they must be devoid of ideological concepts and value systems. Moreover, IPBES needs to give decision makers at hand policy-relevant tools and methodologies which ensure that the available information supports their daily work.

There are many different options available for addressing the challenge of policy relevance.

First of all, policy relevance (e.g. the uptake of assessment findings within decision-making processes) can best be ensured if IPBES findings directly respond to policy needs and requests. Moreover, a major challenge consists in establishing an effective institutional arrangement for systematically assessing scientific knowledge and communicating its significance to policy makers. This includes ensuring broad stakeholder involvement in the relevant processes in terms of both the knowledge they can contribute and the knowledge needs they may have. New forms of products and outputs might be needed for this. Addressing policy alternatives for the future might be an important way to improve the relevance of the work.

In the IPBES discussions, it was also highlighted that policy support tools and methodologies have to be "*user friendly*", *convenient* and *feasible to use" (*e.g. clear, concise and simplified language, easily applicable models/scenarios). They have to be *context-sensitive* in terms of the situation and the regional context as well as the appropriate *scale*. To tackle this challenge, there are different options for making scientific knowledge (more) policy relevant, including:

- Address the concerns and information needs of decision makers,
- Broad involvement of relevant stakeholders,
- Identify and address policy options,
- Address policy-relevant implications of scientific findings, and
- Present information in an accessible and usable format.

5. Functions of policy support tools and methodologies

Policy support tools and methodologies in general are used to pursue a number of goals/ expectations:

- Awareness raising,
- Strategic policy support,
- Policy implementation support,
- Policy evaluation, and
- Access provision.

There is a need to discuss what goals the policy support function of IPBES is thought to achieve. The range of options extends from awareness raising only (the narrow version) through to the option of policy evaluation (broad version). There are two lessons learned from previous assessments however, on which IPBES might want to focus greater attention:

- In order to make a difference, it may be important to support policy implementation and policy evaluation.
- Stakeholder involvement at lower governance levels should be supported (in addition to the international level of multilateral environmental agreements), as the issues of biodiversity and ecosystem services management are mainly addressed at these levels.

It is necessary to ensure that efforts of issue identification, policy formulation, implementation and evaluation are well orchestrated within an integrative process that reaches across all relevant scales and sectors. Ensuring proper access to relevant information and knowledge produced by the platform will therefore be highly relevant.

6. Scoping the range of policy support tools and methodologies to perform these functions

A wide range of tools and methodologies exists, from assessments, models, scenarios and other forecasting techniques to risk analyses, cost benefit analyses and valuation and accounting methods. Indicators can also provide an important framework of reference for evaluating environmental performance and policy outcomes. Another important field for policy support tools and methodologies is the communication of knowledge through information sharing, networking, mapping and knowledge platforms. A hybrid form that combines these categories are "decision support systems". Most international environmental assessments cover response measures in their scoping, including assessment of policy-relevant tools and methodologies. In addition, resources such as guidebooks, manuals, training courses and best practice kits have been developed to promote specific tools and methodologies. Increasingly, such resources are available on web-based platforms.
The scoping report discusses several tools in more detail, including:

- Assessments,
- Models and scenarios and other forecasting techniques,
- Risk analysis, cost benefit analysis, and valuation and accounting methods,
- Indicators,
- Information sharing, networking, mapping and knowledge platforms, and
- Decision support systems.

Given the wide array of evolving policy-relevant tools and methodologies, different scales of application, and the broad spectrum of entities involved in their development, consideration will be needed of how to deal with this complexity. Several options exist, which are not mutually exclusive and could be carried out in a stepwise approach:

a) It could be discussed whether IPBES' focus should be broad, or whether its focus should be narrowed down – and how this could happen;
b) It could be discussed to undertake an assessment of available tools and methodologies and the lessons learned from their application.

7. Links with other work areas of IPBES

Given the multiple challenges and the scope of issues related to the policy support function, the task of determining the appropriate structure and work program of IPBES becomes even more pressing. Further consideration is needed of how IPBES might best perform its functions, including the implementation of the policy support function and the interplay of all four work areas, and thus how its structure might support this function most efficiently and effectively. To fully operationalize IPBES, including the roles and responsibilities of its bodies, e.g. the IPBES plenary, its subsidiaries, the potential working group structure and its external partners, it is thus necessary to consider the specific functions and the interplay of all the work areas at all spatial scales.
Further relationships that the IPBES plenary may wish to consider include cooperation with leading tool developers or initiatives, such as the Global Partnership for Wealth Accounting and the Valuation of Ecosystem Services (WAVES), the TEEB network, and the network of Sub-Global Assessments. IPBES may also want to work together with IPCC, GEO and other international assessments in performing its policy support function. The working relationships with tool developers or practitioners could be through formal agreements or, alternatively, IPBES may invite existing initiatives to undertake work and report back to the plenary on progress made.

Content

Background, aims and scope of the paper

After three years of consultations and negotiations, participants of the third intergovernmental and multi-stakeholder meeting on IPBES, held in Busan, South Korea in June 2010, agreed in the "Busan Outcome" to create a new international mechanism for scientific advice on biodiversity, the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES). The "Busan Outcome", provides the foundation for the establishment and operationalisation of IPBES and the respective decisions to be taken on the structure, modalities and procedural arrangements of the mechanism and identifies four work areas for the work program of IPBES:

- assessments,
- capacity building,
- knowledge generation, and
- policy support.

In preparation for the first plenary session in Nairobi (October 2011), informal expert workshops were organized by individual governments and organisations on three work areas: assessments (Japan, South Africa), capacity building (Norway/Brasil) and knowledge generation (ICSU, DIVERSITAS and UNESCO)[3]. Up to now, however, no detailed consideration has been given to the fourth work area on policy support. This very fact indicates the need to pay more attention to the options available for establishing the work area 'policy support' as part of the overall work program of IPBES.

As an informal contribution to this discussion, Germany, namely the Federal Ministries for the Environment (BMU) and for Education and Research (BMBF) in consultation with the Government of India has invited government representatives, representatives of non-governmental organizations (including scientific and other networks) and experts in this field to an international expert workshop in Bonn (December 7th to 9th, 2011).

Germany commissioned this scoping report in order to provide input for the workshop discussions and to summarize previous and ongoing discussions on the policy support function of the IPBES. The report is based on documents prepared by UNEP during the IPBES consultation process, and provides further information for possible consideration during the workshop. This background paper thus has the status of an information document to facilitate and improve the exchange of ideas at the workshop.

The aim of the report is to outline the scope and context of the policy support function of IPBES by explaining the context of international discussions (Chapter 2). It analyzes policy support needs and explores ways of addressing policy support functions in the context of biodiversity and ecosystem services (Chapter 3 and 4), while also summarizing the range of potential support tools and methodologies, based on experiences from earlier work done in this context (Chapter 5 and 6). Chapter 7 places the analysis of chapters 2-6 in the context of potential activities within the work areas of IPBES currently under discussion, and explores the potential implications for the structure of the platform. Chapter 8 provides a short outlook.

The state of the international discussion on IPBES

In the "Busan Outcome" (UNEP, 2010a, Annex), representatives of the Governments concluded that IPBES should be established 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*" (UNEP, 2010a, 6).

Concerning the work area under consideration, the "Busan Outcome" states that the novel platform *"should support policy formulation and implementation by identifying policy-relevant tools and methodologies, such as those arising from assessments, to enable decision makers to gain access to those tools and methodologies, and, where necessary, to promote and catalyse their further development"* (UNEP, 2010a, 6d).

This wording indicates that this work area has a broad scope, ranging from support for "*policy formulation*" to support for "*policy implementation*", from the identification of "*relevant tools and methodologies*" to the "*enabling of access*" to these tools and methodologies and their "*further development*". However, policy support as a major work area of IPBES, has not yet been discussed in detail how to address these different requirements. The first session of the plenary meeting, in Nairobi in October 2011 and started to address the

3 "International Science Workshop on Assessments for IPBES"; United Nations University, Tokyo, Japan; 25-29 July 2011.

"International expert meeting on the IPBES and capacity building"; Trondheim, Norway; 25-27 May 2011.

"Informal meeting of scientific organisations interested in IPBES";UNESCO, Paris, France; 10 June 2011; 10 June 2011.

modalities, procedures and institutional arrangements of IPBES. It came up with several conclusions concerning the structure and rules of procedure of the new platform.[4] Options and ways to implement the different IPBES work areas, however, were discussed in only preliminary manner in Nairobi. It is envisaged that decisions on the work programme of IPBES as well as other remaining issues will be taken at the second part of the plenary meeting, scheduled for April 2012.

Nevertheless, several options were discussed in Nairobi which will impact on the structure of the work program as a whole – and in particular on the interplay of the four work areas within any one work program – as well as the on work area of policy support itself (see also Chap.7). The Nairobi meeting report mentioned three options for designing the working group structure but recognizes that any agreement to establish working groups would take place only after more detailed discussion of the work program itself. Preliminary options for the establishment of working groups, mentioned in the meeting report, are:

> *Option 1*: Two working groups are established, one to undertake assessments, generate knowledge and support policy, and the other to oversee the capacity-building work on the platform in relation to knowledge generation, assessment and policy support. Both working groups are established with geographic, disciplinary and gender balance;
>
> *Option 2*: Two working groups are established, one to undertake assessments and the other to oversee the work on knowledge generation, policy support and capacity-building. Both working groups are established with geographic, disciplinary and gender balance;
>
> *Option 3*: Regional structures are established (whether working groups or centres), to oversee the full programme of work (knowledge generation, assessment, policy support and capacity-building) at the regional level. Regional working groups would comprise regional experts with gender, disciplinary and within-region geographic balance. In addition, ad hoc and time-bound working groups might be formed to undertake global and/or thematic assessments. Such global and/or thematic groups would be formed with geographic, disciplinary and gender balance. (UNEP, 2011a, Annex 3, Part C)

As this wording clearly indicates:

- With regard to further operationalizing the work program and the four work areas, much depends on the interplay between the four work areas as well as on the decisions to be taken about the working group structure of IPBES and the priorities involved in these decisions (e.g. whether one work area will be prioritized or whether regional structures are prioritized).
- Several options exist for operationalizing the work program and the interplay between the four work areas in a working group structure. The decision about how to establish such a working group structure and thus the structure of the work program of IPBES itself has strong impact on the functioning and mode of operation of the individual work areas and their interplay with each other.

Thus, the decisions on the working group structure of IPBES and on the functions and mode of operation of each individual work area affect each other; for this reason the discussions on both should be closely interlinked. In advance of this second session, the plenary in Nairobi agreed on an intersessional process and respective deadlines. To prepare further negotiations on the work program of IPBES, on October 31, 2011 UNEP circulated a document containing options for implementing the four work areas.[5] The aim of the document is to ask member states and other stakeholder groups (e.g. scientific organizations) to comment on these options and to provide further ideas regarding how to implement these work areas. Part C in this document contains several options for implementing the policy support functions of IPBES. Interested parties as well as other stakeholders are invited to provide comments on this work programme document until 15 December.

It is intended that the expert workshop in Bonn will provide input to the intersessional process. The outcome document – a chair's report to be compiled based on the discussions in plenary and breakout groups – will be sent to UNEP and may then also serve as an information document for the preparation of the second session of the plenary.

This short overview about the state of international negotiations clearly indicates that the range of potential options relevant to the work area of policy support is quite broad and diverse and is linked to ongoing discussions on the structure and procedural rules of IPBES. This again indicates that there is a growing need to identify options for implementing the work area of policy support and to devise a suitable approach for putting this function into practice.

Before the implementation options and ways of achieving these goals are identified and discussed, however, it is necessary to discuss the challenges and needs of the policy support function in the IPBES context in more detail. This requires referring to other information documents provided in the history of the consultations and negotiations concerning IPBES.

4 see http://www.ipbes.net/plenary-sessions/first-session-of-plenary.html (accessed 21 November 2011)

5 see http://ipbes.net/plenary-sessions/intersessional-process.html (accessed 21 November 2011)

Needs identified for the work area of policy support

The needs for the IPBES were analyzed in the IPBES gap analysis presented to the second ad hoc intergovernmental and multi-stakeholder meeting on IPBES in October 2009. This gap analysis stated that political decisions "on the ground" are not informed by the best available knowledge. The main shortcomings are:

- Form of presentation of knowledge/findings,
- Scale (national – regional – local),
- Underdeveloped tools, and
- Regularity of assessments

Form

Knowledge is often not presented in a format that is relevant and useful to decision makers. This deficit may result from different shortcomings.

First, there is a lack of information when it comes to response options because assessments – such as the IPCC assessments – mainly focus on the scientific knowledge base and the assessment of natural impacts. Questions of risk management play a marginal or secondary role. In these cases, there is a growing need to pay attention to and deliver an assessment of policy options that is not restricted to determining one single best solution but that highlights policy alternatives and includes a broad spectrum of response options. This also calls for systematically outlining the implications of different policy options in relation to detailed framing assumptions. These forms of knowledge promise to provide the necessary guidance for policy decision making.

Second, in many cases, different sources of knowledge are already available but the broad knowledge base has been inadequately synthesized and poorly communicated. In other words, scientific findings have not been sufficiently transformed into policy-relevant statements and the latter have not been effectively communicated.

Third, under conditions of great scientific uncertainty, the task of assessing the impacts of global changes and their implications for decision making at different levels in a clear-cut and decisive way is a difficult one. This problem also reflects the structural problem that scientists and decision makers operate in different worlds and follow different time frames, values, priorities and rationalities. The problem, then, is how to match "demand" for with "supply" of knowledge and to foster a shared understanding of the problems at stake.

To sum up, there is a need to consider alternative forms of presentation to the traditional assessment reports, although these will nevertheless still play an important role. Such novel forms may include coherent and accessible analyses of best practices (see Box 4 on TEEB) or the design of specific knowledge exchange tools, e.g. a common knowledge platform.

Scale

As the gap analysis states, the focus of knowledge provision today is very often more on identifying issues and formulating policies at the level of global (and sometimes national) governance and in relation to multilateral environmental agreements. What is lacking are inputs for policy options as well as support for policy implementation at regional and local level and for policy evaluation (UNEP, 2009, 16).

As experienced, for example, with the Millennium Ecosystem Assessment (see Box 2 on the MA), such knowledge (including mainly global trends and drivers) is helpful at the level of strategic policy formulation. Scientific findings often lack relevance in terms of policy implementation, as decisions – especially in the area of biodiversity and ecosystem services – are taken at the regional or even local level as a rule. For these levels, global assessment frameworks will often lack the level of detail and specificity required to support these processes. They also tend to abstract from local contexts. Accordingly, a scale-sensitive "contextualization" of scientific findings is of major importance for policy support.

Underdeveloped policy tools

Tools such as integrated quantitative models, scenarios and indicators (see below) are needed to understand and raise awareness about the relevance of biodiversity and ecosystem services to human well-being, but they are still not fully developed. While models and scenarios in the context of climate change have been developed now for over 20 years, modelling biodiversity and ecosystem services is more complex and needs to be approached at different scales. A recent review has shown that significant knowledge exists for specific ecosystems and regions (e.g. Europe) but that integration across the globe and coverage of regions is incomplete (Leadley et al. 2010).

Regularity of assessments

No regular, periodic multi-level (or even regional) assessment processes exist to provide a coherent conceptual and institutional framework for gathering, reviewing, synthesizing, communicating and monitoring relevant information. Such processes would also involve tracking changes in biodiversity and ecosystem services and their consequences for human well-being at the global, regional and national levels and across these levels. As a

result, there is also no regular analysis of policy options; the analyses that exist are generally restricted to efforts on a specific topic. However, in order to evaluate policy options effectively, regular reviews of policy options and of the implementation of instruments would be very helpful.

Chapter 3 conclusions

For the function of policy support, several challenges exist which are generic for this function. Looking at the gap analysis, however, reveals that some of them are particularly pressing for the area of biodiversity and ecosystem services, such as the scale sensitivity of knowledge provision. These challenges need to be addressed within the policy support function of IPBES, but with potential links to the other IPBES work areas, thus again highlighting the importance of an integrated approach for all work areas (see Figure 1 and further discussion in chapter 7)

Moreover, in order to serve these needs, IPBES will not be able to act on its own, but needs to build upon and collaborate with existing institutions and networks that already address the policy support challenge. The sciences – especially social sciences – are of crucial importance for improving the relevance of knowledge for decision making, but for an effective policy support function, the work area will also need cooperation across different societal sectors and across spatial scales (UNEP, 2011b).

Options for making science policy-relevant

One of the principles guiding the IPBES processes is to be *policy relevant but without being policy prescriptive* (UNEP, 2010a, Annex, 7e). This means that the platform has to provide options for policy making while also taking care that its advice does not narrow down the available response options but rather informs policy makers about the implications of their decisions. Its conclusions must be evidence-based rather than value-laden, i.e. they must be devoid of ideological concepts and value systems. However, it should be recognized that conclusions will be used within a range of value systems by different stakeholders (Watson, 2005). The wording "being policy-relevant without being prescriptive" is well acknowledged in similar institutions, such as the IPCC, and in scholarly literature (see Box 1). Yet it is no easy task to meet these requirements and to improve the policy relevance of IPBES – and additional efforts are probably needed to give a more precise meaning to this well-established but still vague concept.[6]

Very often science can provide no unambiguous answers that would resolve political conflicts over complex problems of global environmental change. There is a *need to differentiate scientific results from the policy significance* of those results. It is also necessary to go beyond the presentation of scientifically unambiguous statements regarding climate status and trends and to engage more actively in policy analysis, facilitating the creation of new and innovative policy alternatives while also stating the implications of those alternatives wherever possible. However, concerns have been raised that most scientists – even those asked to inform policy, such as those involved in the IPCC and MA assessments – typically eschew explicit discussions of the significance of their scientific findings for policy (Pielke, 2007, 30f). Scientists rarely go beyond describing their scientific results regarding trends, conditions and projections: they do not take the next step of explaining how these findings translate into different policy alternatives, and instead leave analysis of the policy implications of their findings to decision makers. Decision makers, however, often find it difficult to translate science into policy actions. For example, not having taken the further step of translating the MA findings into a more relevant context for national governments has been seen (House of Commons / Environmental Audit Committee, 2006; Norgaard, 2010) as one of the reasons why it did not have the expected results in shaping policies, particularly in developing countries.

6 See 'Leipzig Outcome', http://www.ufz.de/index.php?en=10436 (accessed 21 November 2011)

Box 1: The challenge of being relevant but not prescriptive – the example of IPCC

The IPCC introduced the phrase 'policy-relevant but not prescriptive' to define its political role. The phrase 'not prescriptive' refers to IPCC claims regarding its relative independence from politics and its neutrality. During the first assessment, the IPCC also functioned as a forum for political negotiations. The IPCC had to resolve deeply entrenched political conflicts; it thus proved vulnerable to political pressures and was at risk of losing its scientific credibility (Beck, 2011). Since its second assessment cycle, the IPCC aims not to address value choices or questions that are essentially political. For example, the IPCC tries to avoid openly advocating either support for or opposition to the Kyoto accords or any other particular policy response. Most notably, this approach has been seen as a way for the body to preserve its scientific credibility.

What is lacking are institutional arrangements within science-policy interfaces that enable a systematic assessment of the significance of science for policy and facilitate communication of the same. Such policy assessment – the essence of policy advice – implies presenting information and knowledge as an honest broker between a range of policy alternatives, systematically showing how alternative policy options would work themselves out in relation to different detailed framing assumptions, and revealing how these dependencies relate to the real world (Pielke, 2007).

To tackle the challenge described, there are different options for making scientific knowledge (more) policy relevant (see also some results from the SPIRAL project, Box 9).

- **Address the concerns and information needs of decision makers**: In order to make scientific findings policy relevant, it is necessary to address core societal, political and cultural problems that decision makers care about and to meet the information needs related to these problems – in short, it should be taken care, that the work of IPBES and its findings respond to policy needs and requests as far as possible.
- **Involve relevant stakeholders on a broad scale:** In order to be useful, an assessment must be demand driven and must involve experts from all relevant stakeholder groups in scoping, preparation, peer review and outreach/communication in an open, transparent, representative and legitimate way. The process should incorporate institutional as well as local and indigenous knowledge whenever appropriate. Assessments must present different points of view. At the same time, policy relevance should not compromise the reliability, scientific credibility and integrity of the information provided. The results and analyses provided to decision makers need to be technically accurate (Watson, 2005).
- **Address policy-relevant implications of scientific findings:** One of the major challenges for integrated assessments is to combine the quite precise statements of science with a set of more contested political interpretations of such knowledge or expert judgments (Hulme, 2009; IAC (InterAcademy Council), 2010). To address this challenge, policy-relevant implications of scientific findings may be assessed and translated into "expert judgments".
- **Communicate the context:** Similar to its precursors such as the MA and the TEEB study, this new platform also performs the role of raising awareness, of reminding policy and other decision makers that ecosystems have (both intrinsic and utilitarian) values. The task is thus to understand the relevance of biodiversity and ecosystem services to human well-being by identifying and demonstrating such values and to raise awareness accordingly (UNEP, 2011b).
- **Present information in an accessible and usable format:** At the same time, scientific and other relevant forms of knowledge have to be transformed into a format accessible and usable for stakeholders and for policy makers (see for example TEEB, Box 4).
- **Adopt a broad scope:** The IPCC and MA also sought to broaden the scope from the science dimension to the economic, political and social dimensions. They placed more emphasis on the political, economic and social aspects of the issues at stake: In order to make its work more politically relevant, for instance, the IPCC links climate change to political issues such as sustainable development. The TEEB study links the issue of safeguarding biodiversity to future economic development.
- **Tackle risk issues:** The IPCC and MA also broadened the scope of their assessments to include aspects of risk assessment and risk management. Assessments must not necessarily be restricted to monitoring natural variations and impacts. Integrated assessments can provide an additional type of information: they should identify the problem, including understanding the underlying causes of environmental change and the process of decision making, identify what the policy choices are, and then monitor and evaluate the effects of those policy choices (Watson, 2005).

- **Identify and address policy alternatives:** Tackling this task requires improving and opening up the assessment of policy options[7]: There is a growing need to provide policy alternatives and to understand the implications of different policy choices in relation to detailed framing assumptions. This also means providing guidance on policy implications, from the local to the global scale. Decision makers need to know how changes will affect specific political jurisdictions and, more importantly, what types of interventions will make a difference, over what time scales, at what costs, and to whose benefit. This may include elements such as an evaluation of real policy options and an assessment of a broad range of future policies via scenario building (Perrings et al., 2011). Such an approach feeds informed opinion about the effectiveness of response strategies over a wide range of plausible futures and their possible consequences (Dessai et al., 2009). Plausible future scenarios should be relevant to policy formulation over a range of spatial scales, from local to regional and global. Regarding policy implementation, potential side effects should be considered and the right scale of action identified. Thus, policy support tools and methodologies must be sensitive to national, regional and local conditions (in biophysical and societal terms) and relevant to the stakeholders involved (ICSU, 2002).

Actions to follow these options will often support several of them and support each other. In order to make use of them properly, it may be important to decide on the main functions of this work area (see chap.5) and on how the options available there could be linked to the other work areas (see chap.7).

Chapter 4 conclusions

The policy relevance of IPBES is a major focus of ongoing efforts to strengthen the science-policy interface for biodiversity and ecosystem services. Additional efforts and innovative approaches are required to achieve this, however. The work area on policy support is of pivotal importance here, but must be linked appropriately to the other work areas of IPBES.

The options to address the challenge of policy relevant output are manifold. First of all, policy relevance (e.g. the uptake of assessment findings within decision-making processes) can best be ensured if IPBES findings directly respond to policy needs and requests, based on the challenge of a proper institutional arrangement that systematically assesses and communicates to significance of science to policy,

This includes ensuring broad stakeholder involvement in the relevant processes in terms of both the knowledge they can contribute and the interests they may have with regard to policy. New forms of products and outputs might be needed for this. Additionally, addressing policy alternatives for the future could be an important way to improve the relevance of the work.

Functions of policy support tools and methodologies

Although the importance of policy support in general is widely acknowledged, it is still not clear how these goals can be achieved and how proper procedures and methods can be developed. An important starting point is to identify in more detail the aims and expectations that the policy support function is thought to perform. Policy support tools and methodologies in general are used to pursue a number of goals/expectations. These may include:

1. **Awareness raising**: Identify the values of biodiversity and ecosystem services and raise awareness of such values by delivering the relevant analyses to policy and other decision makers.
2. **Strategic policy support**: Support strategic policy development on different scales with appropriate tools and methodologies.
3. **Policy implementation support**: Support the implementation of policies by applying and further developing policy instruments on different scales.
4. **Policy evaluation:** Evaluate existing policies and account for their efficiency and effectiveness.
5. **Access provision**: Improve access to the relevant knowledge for policy makers.

7 In its new assessment cycle, the IPCC calls for the policy debate to be opened up to consider ‘practicable and consistent alternatives’ (IPCC, 2009, 18). The panel redefines its political role as presenting ‘policy-relevant’ alternatives and expanding the array of technically feasible options without ‘prescribing’ decisions (IPCC, 2009, 18). This also requires a deeper understanding of the nature of policy-relevant uncertainties and disagreement (see also Hulme, 2009).

Awareness raising

Policy tools are needed, for example, to improve understanding of the relationship between biodiversity and human well-being and to demonstrate the role of ecosystem services in "enhancing human well-being as it relates to health, material needs, social relations and security".

This task may include improving communication of knowledge through environmental reporting, presentations of issues using maps and graphics, use of public workshops, information sharing, networking, mapping, presentation of modeled simulations and scenario exercises, and communication through the media and professional journals (ICSU, 2002, 7).

Strategic policy support

Strategic policy support aims at identifying major challenges and seeks to provide strategic options for addressing these challenges, for example via indicator development and analysis, models and scenarios, and their inclusion in assessment processes. This is currently the area where most existing initiatives can be found. They might be triggered by assessments and studies (e.g., MA and TEEB) or inspired and driven by concrete policy needs, and they are generally formulated on the global scale, as with the Convention on Biological Diversity (CBD), for example, and other international conventions.

Policy implementation support

In the area of biodiversity and ecosystem services, a wide variety of policy instruments and options already exist to support decision-making and management. In this area in particular, knowledge has to be presented in the form of clear policy alternatives. In order to provide guidance, assessments, appraisal and other forms of scientific support have to systematically outline the framing assumptions underlying a particular policy option or instrument and to demonstrate the implications and impacts in terms of benefits, costs, effectiveness, legitimacy, and compliance. One of the major challenges is thus to take into account the specific (regional) context, the scale and the specific application. Analyses should help to identify win-win situations and informed trade-offs (UNEP, 2011b).

Policy evaluation

One very important role of science in decision making is to evaluate existing or planned activities or policy measures concerning their efficiency and effectiveness, but also concerning their impact on other societal sectors or other environmental processes. Thus policy support tools and methodologies in IPBES could inform decision makers about the consequences of their policies, regarding their effectiveness and efficiency in relation to biodiversity and ecosystem services, but also concerning other social or ecological impacts (e.g. on poverty eradication or water management).

Enable decision makers to gain access to available policy-relevant tools and methodologies

This last goal is more about the use of policy relevance tools and methodologies and not so much about the expectation concerning these tools itself. It is nevertheless necessary to state, that all this knowledge will hardly be valuable for decision making, if it is not made accessible for the decision makers. Reports alone will most probably not be sufficient for this goal and need to be complemented by other products (see also awareness raising function)

Chapter 5 conclusions and open questions

There is a need to discuss what goals the policy support function of IPBES is thought to achieve. The range of options extends from awareness raising only (the narrow version) through to the option of active assessment and policy evaluation (broad version). There are two lessons learnt from previous assessments (e.g., GBA, MA, and TEEB), however, on which IPBES might want to focus greater attention:

- in order to make a difference, it may be important to support policy implementation and policy evaluation
- stakeholder involvement at lower governance levels should be supported (in addition to the international level of multilateral environmental agreements), as the issues of biodiversity and ecosystem services management are mainly addressed at these levels (e.g. TEEB).

It is necessary to ensure that efforts of issue identification, policy formulation, implementation and evaluation are well orchestrated within an integrative process that reaches across all relevant scales and sectors. Ensuring proper access to relevant information and knowledge produced by the platform will therefore be highly relevant.

Scoping the range of policy support tools and methodologies to perform these functions

The policy support function of IPBES includes the task of identifying policy-relevant tools and methodologies to enable decision makers to gain access to those tools and methodologies. In identifying how IPBES should perform this policy-support function, one of the major tasks is to consider the scope (or range) of policy-relevant tools and methodologies that might be relevant to the work of the platform.

Most international environmental assessments already include the assessment of response options and respective policy-relevant tools and methodologies. In addition, resources such as guidebooks, manuals, training courses and best practice kits have been developed to promote specific tools and methodologies. Increasingly, such resources are available on web-based platforms.

Thus, a wide range of tools and methodologies exists, from assessments, models, scenarios and other forecasting techniques to risk analyses, cost benefit analyses and valuation and accounting methods. Indicators can also provide an important framework of reference for evaluating environmental performance and policy outcomes. Another important field for policy support tools and methodologies is the communication of knowledge through information sharing, networking, mapping and knowledge platforms (UNEP, 2011b, 1). A hybrid form that combines these categories is the "decision support system" [8].

Another issue relevant to policy support is the communication of knowledge. It has already been widely recognized that communication in general will be an important task for IPBES across all the work areas. For this reason, this issue will not be addressed in detail here.

In the following sections, a variety of proposed policy tools and methodologies are presented, based on the information document provided by UNEP (UNEP, 2011b, 24). These include:

- Assessments,
- Models, scenarios and other forecasting techniques,
- Risk analysis, cost benefit analyses, valuation and accounting methods,
- Indicators,
- Information sharing and networking, and
- Decision support systems.

These categories do not imply a classification of tools but rather constitute an attempt to present them in a more clearly structured manner, because many tools are hybrids. Depending on the perspective, they could also be further complemented by other tools (see discussion in section 6.7).

Assessments

A wide range of assessments exists (UNEP, 2010b). They are categorized according to their scope, scale and process. Their influence is dependent on their relevance, their scientific credibility, and on the political legitimacy of their process (UNEP, 2011b, 24).

The UNEP information document distinguishes between five commonly used approaches (UNEP, 2011b, 23):

- ***Environmental impact assessments*** *"are processes of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals or projects prior to major decisions being taken and commitments made."*
- ***Strategic environmental assessment*** *"is a systematic approach to incorporating environmental considerations into policies, plans, and programs". There are two main types: sectoral and regional SEA. They are conducted at a higher decision-making level than an EIA and are more specific."*
- ***Rapid environmental assessments*** *"are carried out immediately after a disaster or conflict in order to assess the extent of damage to ecosystems and the environment and to identify urgent environmental risks. The aim is to ensure that the environment is fully integrated in the subsequent reconstruction and development agenda."*
- ***Integrated environmental assessments*** *"are interdisciplinary and social processes, aimed at identification, analysis and appraisal of all relevant natural and human processes and their interactions which determine both the current and future state of environmental quality, and resources, on appropriate spatial and temporal scales, thus facilitating the framing and implementation of policies and strategies."*
- ***International scientific ecosystem assessments*** *"are characterized by deliberately designed and formalized international processes of interaction between scientific expertise and policymakers, with the view to ensure scientific credibility, relevance and political legitimacy."* The assessment of the IPBES work area of assessments might belong to this category in most cases.

8 "Decision support systems (DSS) belong to computer-based information systems that are tools for recording, storing, processing and dissemination of information to support group or individual decision making." (Volk et al., 2010, 834)

Recent global assessments such as MA, GEO4, AR4 (IPCC), IAASTS, AoA, CAWMA, GBO3, FRA and GIWA have all assessed policy-relevant tools and methodologies in their response sections.

Box 2: The Millennium Ecosystem Assessment

The Millennium Ecosystem Assessment (MA), released in 2005, is an international synthesis by over 1360 of the world's leading scientists and other experts that analyses the state of the Earth's ecosystems and provides summaries and guidelines for decision makers. They worked in four working groups coordinated by the UNEP: Condition & Trends; Scenarios; Responses, and one group for sub-global assessments complementing the global one. The MA is an integrated assessment that cuts across sectors at multiple spatial scales and involves natural science as well as social science perspectives.

The objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems.

The MA resulted in five technical volumes and six synthesis reports, providing a state-of-the-art scientific appraisal of the condition of and trends in the world's ecosystems and the services they provide, along with options to restore, conserve or enhance the sustainable use of ecosystems. Furthermore, it identified knowledge gaps at local and national scale and the need for further research efforts.

By further promoting the concept of ecosystem services for human well-being, the MA has had a major influence on strategic policy formulation from 2005 onwards.

Source: http://millenniumassessment.org/en/About.html (accessed 21 November 2011).

Models, scenarios, and other forecasting techniques

Models, scenarios, and other forecasting techniques are often used as a basis for assessments, but can also be applied independently in support of policy making by improving policy makers' understanding of ecosystems and how different actors affect the behavior of a system (UNEP, 2011b, 27).

Models and scenarios

Models and scenarios are two different tools that can be used both independently and in combination. *"While models are essentially science-based, scenarios can vary widely from exploratory, based on a range of uncertainties, to prospective, based on visions of what to achieve, and they often rely on participatory processes with stakeholders."* (UNEP, 2011c, 14)

While models are essentially a simplified representation of how a system works, scenarios are a plausible[9], simplified description of future development, based on assumptions about key driving forces and relationships. By presenting the relationship between environmental development and anthropogenic pressures, they can help policy makers understand the implications of policy alternatives and assist them by presenting anticipated outcomes of different types of policy action (UNEP, 2011b, 29). Furthermore, they can help to address uncertainty in complex systems.

Scenarios can be classified into three different types, each of which has a different approach to modeling plausible futures:

- **baseline trend scenarios** (predictive scenarios), where current trends are continued into the future,
- **normative scenarios** (pathway or vision scenarios), which describe a desirable future and possible ways to reach it (see for example GLOBIO, Box 3), and
- **explorative scenarios** (forecasting or descriptive scenarios) for forecasting the effects of specified measures (policies).

9 They do not predict the future; they just indicate what science can say about future consequences of alternative plausible choices.

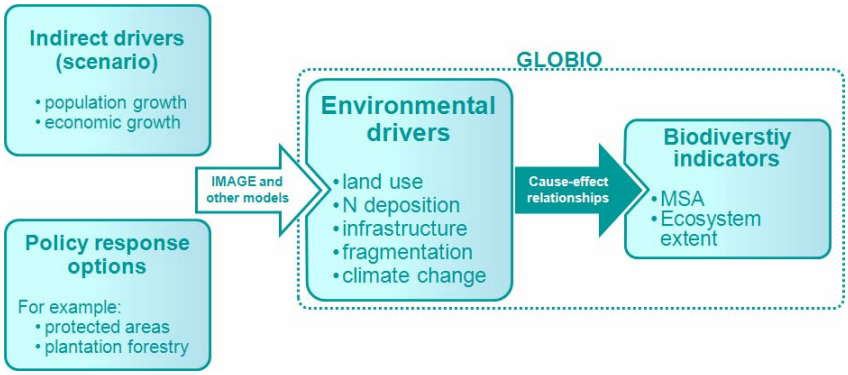
In a recent report on biodiversity scenarios commissioned by the CBD, Leadley et al. (2010, 36f) concluded:

- *"Models of the future of biodiversity and ecosystem services contribute to our scientific understanding and can inform policy.*
- *Models should* ***include interactions and feedbacks that link biodiversity, ecosystem functioning, ecosystem services and socio-economic processes****.*
- *Models need to* ***incorporate multiple drivers affecting biodiversity and ecosystem services and integrate interactions between realms****.*
- *Ideally models of biodiversity and ecosystem services should* ***incorporate dynamics and be process-based instead of the currently available static, pattern-matching models.***
- *Models of biodiversity and ecosystem services must be evaluated* ***using a standard set of indicators to assess the validity and limitations of the projections****.*
- ***Scenarios can inform the definition of post-2010 targets, both globally and regionally.***
- *IPBES, an IPCC-like mechanism for biodiversity and ecosystem services, could provide the stimulus for the major effort needed to evaluate and improve models." (Leadley et al., 2010, 36f)*

The same report suggests that there is a need for further elaboration of the relationships between biodiversity and ecosystem services on the one hand and socio-economic issues on the other, built on a more robust understanding of the interrelationships (UNEP, 2011c, 14). Further, Perrings et al. (2011) stated: "*Without an understanding of the feedbacks between the social and biophysical systems, it is not possible to assess the outcome of actions designed*." (1140)

Box 3: Scenario and modelling tools: The example of GLOBIO

GLOBIO is a tool to assess past, present and future impacts of human activities on biodiversity. The core of the GLOBIO model is a set of cause-effect relationships, describing the impact of five environmental drivers (land use, atmospheric nitrogen deposition, infrastructure, fragmentation, climate change) on biodiversity. It analyzes trends and future scenarios and calculates the effects of policy response options, such as climate change mitigation, plantation forestry and protected areas. GLOBIO supports international, regional and national decision makers with their strategic policies relating to biodiversity, often in the context of (integrated) environmental assessments. It has been designed to evaluate future developments before they occur and enables policy makers to compare the potential effectiveness of different policy options by evaluating new and existing policy response options. GLOBIO can be used to cluster future developments in a 'scenario' and can produce national biodiversity maps according to the biodiversity indicator Mean Species Abundance (MSA).



Source: http://www.globio.info (accessed 21 November 2011)

Horizon scanning and future techniques

In addition, there are also forecasting techniques and initiatives such as horizon scanning processes. Horizon scanning is defined by DEFRA as: "*The systematic examination of potential threats, opportunities and likely future developments which are at the margins of current thinking and planning. Futures research may explore novel and unexpected issues, as well as persistent problems or trends.*" (DEFRA, 2011)[10] The first stage in such an approach is to identify emerging issues and trends which can then be explored in detail. The concept is best developed in the business sector for analysis of future markets, strategic planning and risk management. But increasingly it is being used by governments and others in the area of international security and health concerns.

Risk analysis, cost benefit analysis and valuation and accounting methods

Other decision tools to support policy planning are risk analysis, cost benefit analysis, multi-criteria analysis, cost burden analysis and valuation and accounting methods (e.g. SEEA[11], WAVES). They aim to cover land, water, environmental expenditure and social issues in monetary and physical terms (UNEP, 2011b).
Decision support tools like InVEST, ARIES, ESR, EcoMetrix, EcoAIM, ESValue (BSR, 2011) identify, assess and value ecosystem services. Risk analysis, cost benefit analysis and valuation and accounting methods can be integrated into web-based tools, models and scenarios (see BSR, 2011). Decision support systems can combine the benefits of the policy support tools and methodologies discussed above. As a recent report from BSR's Ecosystem Services, Tools & Markets Working Group concludes, they do not appear to be ready for "immediate, widespread, off-the-shelf business application" without considerable effort (UNEP, 2011b, 34). This statement indicates the need to improve already existing and to develop new tools.

Box 4: Different products for specific user needs: The TEEB study

The global study on The Economics of Ecosystems and Biodiversity (TEEB), initiated by the G8 in 2007, took a user needs oriented approach in compiling its assessment of the question of how global loss of biodiversity and ecosystem services might influence human well-being and economies. Complemented by a scientific report on the economic and ecological foundations, the work was primarily focused on delivering 3 main reports for different user groups and their needs:

- *National and international policy making*
- *Local policy making*
- *Businesses*

For all three reports, different experts were involved in order to provide the specific knowledge needed to address the users. Accordingly, the focus of each report is different, reflecting the need to guarantee relevance for the clients. While the report for national policy is focused on different policy instruments for better stewardship of natural capital (e.g. rewarding of benefits through payments, reforming subsidies, regulation and pricing approaches), the report for local policy focuses on even more practical perspectives, e.g. for cities and rural areas, and the issue of spatial planning in general. This report additionally contains a series of practical case studies compiled from across the globe to show the chances and challenges that arise when the economic value of ecosystems is factored in more effectively to policy decisions (see http://www.teebweb.org/TEEBcases/tabid/29858/Default.aspx (accessed 21 November 2011)).

The business report focuses clearly on the challenge of identifying the impacts of businesses on ecosystems, the risks associated with business activities, but also the opportunities that arise from addressing the challenges more effectively.

This approach has proven to be quite helpful to address the actual needs of decision makers for better support in the area, and is now further complemented by numerous follow-up activities from the TEEB reports.

See www.teebweb.org for reports and further updates

10 Another definition is found in Sutherland et al. (2010, 10): „Horizon Scanning is the systematic serach for incipient trends, opportunities and constraints that might affect the probability of achieving management goals and objectives." (10)

11 covering land, water, environmental expenditures and social issues in monetary and physical terms

Indicators

The increased use of indicators[12] to inform policy processes is related to the increased use of quantitative targets in setting policy. Indicators generate useful information for decision makers on all levels. They can provide information on progress towards meeting targets (monitoring, evaluation) and are useful when communicating biodiversity and ecosystem services issues through the media (see Box 5 for example of the BIP).

The CBD defines indicators as: *"a measure or metric based on verifiable data that conveys information about more than itself. It is information packaged to communicate something important to decision-makers."* (Bubb et al., 2010) A recent report[13] commissioned by the CBD made the following recommendations (UNEP-WCMC, 2011, 64f):

- ***"Ensure objectives are clear"***
  - Clear objectives and targets help to identify and define indicators as specifically as possible to avoid misinterpretation.
- ***"Adopt a small set of specific, policy-relevant indicators"***
- ***"Go beyond provisioning services"***
  - Create indicators for different types of ecosystem service
- ***"Utilise existing data and proxies (but recognise limits)"***
  - Developing ecosystem service indicators is best viewed as an iterative process. Use available knowledge and indicators as a starting point. Qualitative metrics can be as useful as quantitative ones.
- ***"Think about sustainability – include indicators for both ecosystems and benefits"***
  - Measure both the supply of the service (including state/condition of the ecosystem or its relevant components) as well as the benefits from services and impacts on well-being.
- ***"Include biodiversity"***
  - Although in some categorisations biodiversity is classified as an ecosystem service they are not inter-changeable. It is important not to lose sight of the importance of biodiversity by focusing only on ecosystem service benefits.
- ***"Be sensitive to scale"***
  - The scale at which ecosystem services are measured and reported should be appropriate to the decision-making context.
- ***"Assess trends and consider synergies and trade-offs"***
  - Monitoring multiple services over time allows a better understanding of synergies and trade-offs.
- ***"Engage stakeholders early"***
  - Defining and developing indicators should involve all relevant stakeholders from the outset. Ecosystem service indicators should be chosen to meet the needs of specific users. Establishing a dialogue with data providers and end users of indicators is crucial. Mainstreaming is a key component of indicator development.
- ***"Focus on communication"***
  - Communicating indicators is important but sometimes neglected. It is important to use indicators that policymakers are likely to be most interested in, whilst presenting storylines in the most policy-relevant way. Some key communication messages include:
    - *"Be clear about what indicators are telling you"* (common language, definitions of key terms)
    - *"Be transparent about uncertainty"*: Keep in mind the limits of indicators, and uncertainty – use clear terminology. Provide accurate interpretation of the storyline.
    - *"Use maps"* (spatially explicit data) where possible. Be sure to present the findings at the scale most relevant to decision-makers.
    - *"Avoid over-simplification"*: Ecosystem services do not necessarily co-vary, and so aggregation is challenging and needs further work. Bundling indicators into related packages/storylines may aid communication.
    - *"Economic metrics are useful but don't ignore nonmonetary values"*. Not all indicators are practical to determine in monetary values but that does not lessen their utility.

12 Examples: SEBI2010 (Streamlining European 2010 Biodiversity Indicators is an initiative to facilitate the development of biodiversity indicators. (see Gap Analysis Annex M))

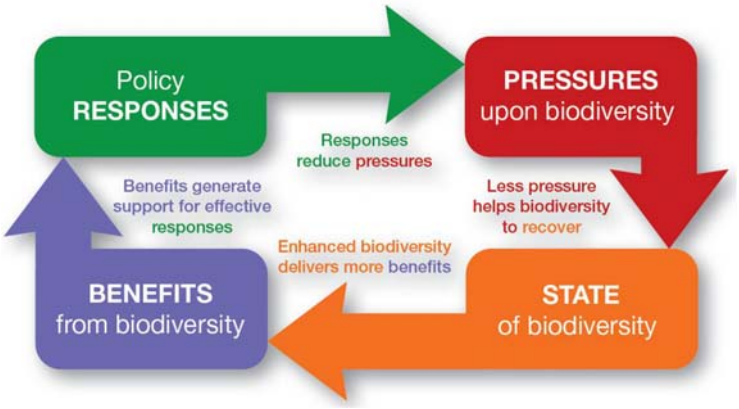
13 "The project has reviewed the use of ecosystem service indicators in MA sub-global assessments (SGAs) and in the wider literature, and has supported pilot work to explore how ecosystem services can be examined at different scales from local site-based assessments to global mapping exercises." (UNEP-WCMC, 2011, 35)

Box 5: The Biodiversity Indicator partnership

The 2010 Biodiversity Indicator Partnership (BIP) is a global initiative, mandated by the CBD, to further develop and promote indicators for the consistent monitoring and assessment of biodiversity. Over 40 partners joined forces towards the delivery and reporting of the indicators measuring progress towards 2010. In this way, the BIP contributed significantly to the 3rd edition of the Global Biodiversity Outlook.
The CBD has identified 17 headline indicators based on seven focal areas (status and trends of the components of biodiversity, sustainable use, threats to biodiversity, ecosystem integrity and ecosystem goods and services, status of traditional knowledge, innovations and practices, Status of access and benefits sharing, status of resource transfers) for assessing progress towards and communicating about the 2010 target at a global level. Each headline indicator can be made up of a composite of indicators.
The three main objectives of the 2010 BIP are:

(1) To generate information on biodiversity trends that is useful to decision makers;
(2)To ensure improved global biodiversity indicators are implemented and available;
(3)To establish links between biodiversity initiatives at the regional and national levels to enable capacity building and improve the delivery of the biodiversity indicators

Biodiversity indicators are easier to understand, communicate and act upon when they are linked together in a set that connects policies to outcomes. Four kinds of indicators are needed to make a joined-up set: responses, pressures, state and benefits. Linking indicators of these four types together makes it clear if – and how – policy responses are making a difference.



Currently the partnership is in a renewal phase and is aiming for greater collaboration with the CBD and other MEAs, IPBES, national and regional governments, and a range of other sectors. It hopes to provide the best available information on biodiversity trends to all its users and to promote the various ways in which the global indicators can be applied and communicated.

Source: http://www.bipindicators.net/ (accessed 21 November 2011)

Information sharing, networking, mapping and knowledge platforms

(Web-based) knowledge platforms are instrumental to provide decision makers easy access to assessment findings, technical briefs, tools and best practices and to promote specific tools and methodologies. They aggregate, combine and compare data from different sources "through virtual, dynamic, system-based and interactive platforms which process and analyze data and information, and cultivate and facilitate dialogue among policy makers and experts" (UNEP, 2011b, 41). The inclusion of geo-information and interactive maps (geo-referenced) can be a useful addition to these platforms for policy makers at local and national level. Knowledge platforms need to be supported by networks of information providers and they have to be complemented by training programmes for potential users (see for example African Forest Model Network, Box 6). Other platforms might focus less on data provision and sharing, but more on networking between scientists and outreach to society (see for example the German network-forum on biodiversity research, Box 7, and the BiodiversityKnowledge project, Box 9).

Box 6: Model Forests: An example for Networking

Model Forests are a place, a partnership and a process. The place is a landscape or ecosystem scale land use mosaic that has a territorial identity. The partnership is voluntary and inclusive, from national policy makers to local farmers, indigenous people, rural women, local governments, small and large corporations, park managers, NGOs, universities and research institutions. And the process is a journey of dialogue, experimentation, and innovation designed to understand what "sustainability" means within a given landscape and then to use the partnership to work toward it.

Model forests are best understood as multi-stakeholder governance processes. They are non-hierarchical nested networks dedicated to learning, knowledge sharing, and capacity development. Thus, a variety of people with differing interests, values and perspectives work to understand each other and overcome their differences and conflicts in order to collaboratively manage their natural resources. These are long term intergenerational processes that aim at making sustainable development a reality through collaboration, adaptation, social learning and innovation. Model forests establishes itself as a cohesive organization through a combination of clearly stated and documented goals and objectives, governance structures, decision-making processes and policies, management, follow-up processes, membership criteria and so forth.

There are currently over 60 Model Forests (in 30 countries) in the world, which are organized within the International Model Forest Network (IMFN) and within regional networks..

See www.imfn.net (accessed 21 November) for details.

Box 7: Example for combined networking of knowledge holders and interfacing with society: the German network-forum for biodiversity research

The network-forum for biodiversity research Germany, supported by the national board of DIVERSITAS Germany and funded by the Federal Ministry on Education and Research, aims at combining two major challenges for biodiversity research: On the one hand, to better network scientists and other knowledge, including a better awareness of them on the policy relevance of their work, and on the other hand an improvement of the interface to policy and the society.

Its activities include joint transdisciplinary workshops, support of scientific networking activities, information on policy processes like CBD and IPBES, and a service to the press to better access interesting and relevant results of biodiversity research in Germany.

Similar approaches exist in Belgium (www.biodiversity.be) and in Switzerland (www.biodiversity.ch), forming with other national activities a loose network of national biodiversity platforms.

(Source: www.biodiversity.de)

Decision support systems

Decision support systems can combine the benefits of the various policy support tools and methodologies discussed above. They are instrumental in particular to combine web-based features, models and scenarios (see for example InVEST, Box 8). At the same time, there is also a growing need to improve and development these tools (UNEP, 2011b, 34).

Box 8: InVEST as an example of a decision support tool

"InVEST is designed to help local, regional, and national decision makers incorporate ecosystem services into a range of policy and planning contexts for terrestrial, freshwater, and marine ecosystems, including spatial planning, strategic environmental assessments, and environmental impact assessments. InVEST models are based on production functions that define how an ecosystem's structure and function affect the flows and values of ecosystem services. The models account for both service supply (e.g., living habitats as buffers for storm waves) and the location and activities of people who benefit from services e.g., location of people and infrastructure potentially affected by coastal storms). Since data are often scarce, the first version of InVEST offers relatively simple models with few input requirements. These models are best suited for identifying patterns in the provision and value of ecosystem services. With validation, these models can also provide useful estimates of the magnitude and value of services provided.

(Source: www.naturalcapitalproject.org/pubs/NatCap_InVEST_and_Case_Study_Summary_TEEB_2010.pdf (accessed 21 November) by a recent BSR study (BSR, 2011))

Developers: The Natural Capital Project (www.naturalcapitalproject.org; accessed 21 November 2011), including: Stanford University (United States); University of Minnesota; WF (World Wildlife Fund); The Nature Conservancy.

Summary and options for further improvement[14]

Because the above mentioned tools and methodologies for policy support are quite diverse and sometimes have overlapping goals, it is difficult to present them in a clearly structured manner. Thus a different form of presentation might help to highlight their relevance, especially for different contexts and scales. In the context of the Millennium Ecosystem Assessment, the tools which can assist decision making are classified as follows:

- *"Deliberative tools* (which facilitate transparency and stakeholder participation). These include neighbourhood forums, citizens' juries, community issues groups, consensus conferences, electronic democracy, focus groups, issue forums, and ecosystem service user forums. These could use, for example, indicators, scenarios and other future techniques in their work.
- *Information-gathering tools* (which are primarily focused on collecting data and opinions). Examples of information-gathering tools include citizens' research panels, deliberative opinion polls, environmental impact assessments, participatory rural appraisal, and rapid rural appraisal.
- *Planning tools* (which are typically used to evaluate potential policy options). Some common planning tools are consensus conferences, cost-benefit analysis, multi-criteria analysis, stakeholder decision analysis, trade-off analysis, and visioning exercises" (Chopra et al., 2005, 73). These could include decision support systems and processes in the more general sense.

The majority of already existing policy support tools are planning tools that can be complemented by stakeholder approaches.

Box 9: Developing the science-policy interface on the European level: The EU projects SPIRAL and BiodiversityKnowledge

Within the European Union, the funding on national as well as on the European level has led to considerable networking in the knowledge landscape on the area of biodiversity and ecosystem services, e.g. via initiatives like EPBRS, Lifewatch, the project ALARM, the ERA-NetBiodivERsA, to name just a few. Nevertheless, the link between science and policy still needs strengthening. To investigate this area from a scientific perspective, the EU funded research project SPIRAL (Science-Policy Interfaces on biodiversity: Research, Action and Learning) is working on providing an overview across Europe on ongoing initiatives at the interface and tries to identify and analyse their different approaches with respect to governance, functions, outcomes and other factors.

The results of SPIRAL directly feed into another EU-funded project, a coordinated action to design and test a Network of Knowledge on Biodiversity and ecosystem services to inform decision making (BiodiversityKnowledge). Within this project, the concept of nested networks of different knowledge holders on biodiversity issues is taken up. The project analyses the knowledge holder landscape and tries to design a mechanism to be able to better engage these knowledge holders to address policy relevant questions. In May 2012 will be the projects' first major conference, which will include a discussion on how IPBES can be supported from a European perspective.

(Sources: www.biodiversityknowledge.eu, www.spiral-project.net)

Given the wide array of evolving policy-relevant tools and methodologies, different scales of application, and the broad spectrum of entities involved in their development, consideration will be needed regarding how to deal with this complexity. Several options exist, which are not mutually exclusive and could be carried out in a stepwise approach:

a) it could be discussed whether IPBES' focus should be broad, or whether its focus should be narrowed down – and how this could happen (UNEP, 2011b);
b) the possibility could be discussed to undertake an assessment of available tools and methodologies and the lessons learned from their application.

14 This subchapter is based on the options identified in UNEP/IPBES.MI/1/INF/5/Add.1(UNEP, 2011b), but includes further aspects of the other chapters of this report and additional perspectives

a) Narrowing down the focus:
Given the broad variety of tools and methodologies for policy support, it could be helpful to narrow down the scope towards tools most relevant for IPBES. A possible narrowed down focus could be to concentrate on

- tools particularly relevant for the work program of IPBES (such as assessments or indicators);
- new and emerging tools, or
- tools which are particularly suitable for wider replication.

Alternatively, IPBES may also want to focus on specific groups of tools, such as conceptual frameworks, economic instruments, and knowledge-based policy support tools.
For this, it would be important to decide which specific function (see chap. 5) is the focus of the policy support area. The tools and methodologies which are most relevant might change depending on the focus. For example, the scope could be narrowed down further by focusing on tools such as data and indicators and/or the quantitative models, monitoring systems, scenarios and indicators that will advance policy makers' understanding of the relevance of biodiversity and ecosystem services to current and future human well-being, thus mainly serving the function of awareness raising and strategic policy support.(UNEP, 2011b)
This task also calls for identifying where there is a need to promote and catalyze the further development of the policy-relevant tools and methodologies. A narrowed down thematic focus could also serve as a first step in a sequenced approach.
b) Assessment of available tools and methodologies
It is also important to discuss how to identify and recommend further options for assessing and scoping policy tools (UNEP, 2011b). One way of approaching the matter could be for IPBES to initiate an assessment of existing policy-relevant tools and methodologies, based on one of the following 3 approaches:

- **a separate (one-off) assessment of policy tools and methodologies**: To further identify the potential of the wide range of tools and methodologies available, a specific assessment could be carried out, as a one-off effort in the starting phase of IPBES. Such an assessment may yield detailed insights into the potential of existing tools and methodologies to perform the different functions outlined in chapter 5 as well as identify existing gaps;
- **as part of a larger assessment**: The Busan outcome indicates that assessments are one way of identifying such measures. A straightforward approach to identifying appropriate policy tools is to direct the global and sub-global assessments to identify and assess the availability, effectiveness and replicability of current and emerging policy-relevant tools and methodologies. This would link back the policy support function directly to the assessment function;
- **in the form of a rapid assessment (horizon scanning):** The IPBES can also go beyond assessment in identifying such measures. The assessment approach of the other two options could therefore be complemented by or combined with a rapid assessment and/or a horizon scanning process. The process could be multi-scaled and designed to draw on information from national and regional level. Such an approach would be particularly important if the scope focused on new and emerging or promising measures which may be suitable for wider application.

Such approaches could also be explicitly tasked with identifying the scope of the policy support function of IPBES: *"A useful first step might be … to identify and initiate an assessment of the range of existing policy-relevant tools and methodologies as a basis for determining the scope of the policy support function of the platform."* (UNEP, 2011b, 4)
An analysis of the uptake of scientific information by policy makers and of which tools and methodologies are most useful for policy makers could also be addressed in this way or else directly included in the assessment.

Links with other work areas of IPBES[15]

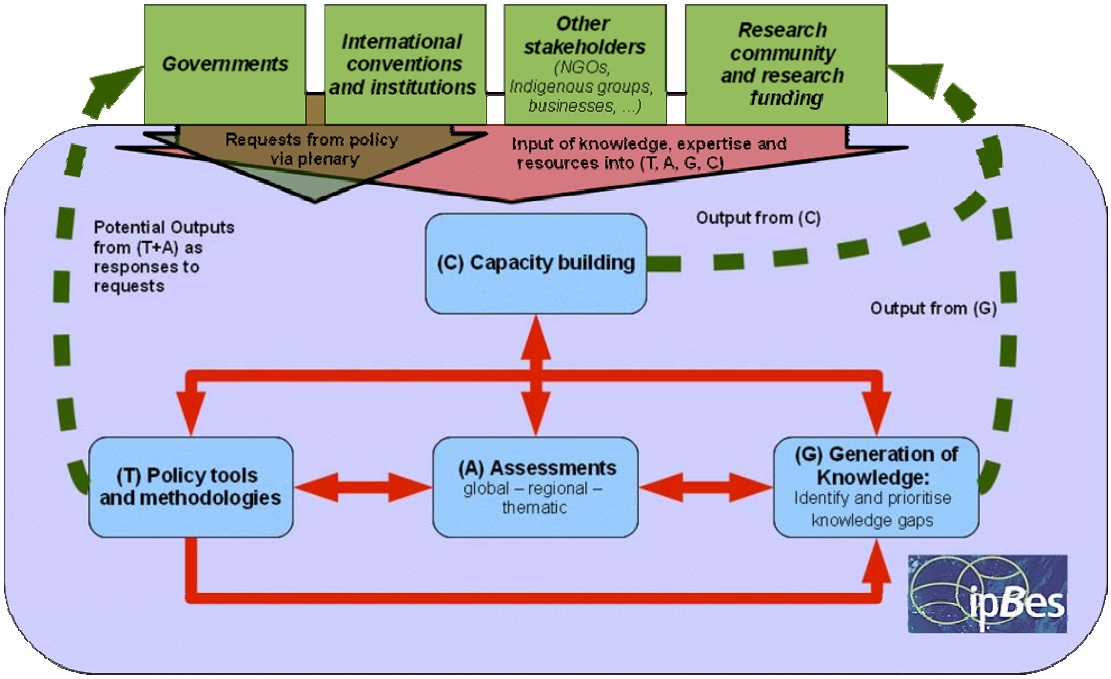
At the first session of the plenary meeting in Nairobi in October 2011, only initial discussions took place about the details of the IPBES work program, its implications for the structure and procedures of IPBES, or how the different work areas should interact. Since it is envisaged that a decision on the work programme of IPBES (as well as other remaining issues) will be taken at the second part of the plenary meeting in April 2012, there is a pressing need to consider both how the work areas can support each other and which implications emerge from the work areas for the modalities, procedures and institutional arrangements of IPBES (in particular the working group structure).
In the following we will focus mainly on the first aspect, namely, how the four work areas of IPBES can support each other, as summarized in Figure 1. In the next section, a short preliminary conclusion will be drawn for further consideration regarding the implications this may have for the working group structure and other modalities of IPBES. Following the principle of "form-follows-function", there is a need to discuss further how

15 Based on UNEP/IPBES.MI/1/INF/5/Add.1 (UNEP, 2011b), with additions based on earlier chapters of this document

IPBES might best perform its functions at all scales, including the roles and responsibilities of the IPBES plenary, its subsidiaries, its secretariat and its partners, when negatiations on the work program are more advanced. This also involves identifying the work program elements needed to perform its policy support function, keeping in mind how these elements may help provide support to - and benefit from - the program elements for performing the other functions.[16]

16 Options for implementing the policy support function of the intergovernmental science-policy platform on biodiversity and ecosystem services (UNEP, 2011b)

Figure 1: IPBES - work areas, their interrelationships, and the way they relate to different stakeholders. Red arrows indicate potential inputs from one work area to the other(s). The strongest input into the work area of policy support (T) can be expected from the assessments work area (A). Dotted green arrows roughly outline the potential outputs towards governments and other stakeholders. (Figure developed by the authors on the basis of UNEP documents.)



Relationship with the capacity building work program

Capacity building is an integral component of the IPBES work program, linking to all other work areas regarding input and output (see central place and arrows in Figure 1). It can support the assessment function as much as the knowledge generation and the policy support function. To ensure that capacity building is supportive, it is important to integrate capacity building into the policy support function and to consider both in an integrated manner. This would include addressing three interrelated aims:

1. improving the policy support function of capacity building,
2. improving the capacity building function of policy support tools and methods,
3. creating measures that improve both functions simultaneously.

The first aim addresses the capacity building function from the perspective of how to improve its ability to support policy making. It includes e.g. ensuring the participation of government representatives, other stakekolders, experts and knowledge holders in the processes of establishing the capacity building function, so that they can feed their information needs into these processes. Capacity building can improve the policy support function if it enables decision makers at all levels to make efficient and effective use of the policy supportive tools and methodologies.

The second aim addresses how policy support could be improved by capacity building measures. For example, IPBES may identify capacity building needs related to the development and uptake of new tools and methodologies as well as to existing ones which are particularly suitable for wider replication and/or upscaling. It may additionally need to consider capacity needs related to enabling decision makers to gain access to policy-relevant tools and methodologies. Capacity needs related to the ability to make use of the tools and related also to tool development and customization of such tools to local ecological, economic and social conditions could also be addressed.

The empowerment of local and regional decision makers may be a way to address the capacity building as much as the policy support function simultaneously. Here, capacity building directly addresses the use of information and communication tools and other forms of participatory stakeholder involvement to strengthen the policy relevance and policy support of IPBES.

Relationship with the knowledge generation work program

Concerning the knowledge generation function, the Busan Outcome clearly states that IPBES "*should identify and prioritize key scientific information needed for policy makers at appropriate scales* …". Thus, knowledge generation is clearly related to the needs of policy makers at different scales. To support the interplay of both work areas, the following steps might be appropriate:

1. address knowledge gaps relevant to decision making,
2. generate knowledge to further develop policy-relevant tools and methodologies,
3. monitor and evaluate the use of policy supportive tools and methodologies.

As the function of knowledge generation is about identifying and addressing gaps in knowledge, it is important to ensure identification of gaps which are relevant for decision making. It may be appropriate to identify these gaps in a dialog where the perspectives of scientists and decision makers are taken into account. Thematic assessments on emerging issues could also be one way of helping identify such knowledge gaps and thus improving the interplay between knowledge generation, assessment and policy support functions. Furthermore, it is also important to identify and acknowledge limits of knowledge and to communicate uncertainties where necessary.

Secondly, IPBES may want to give particular attention to how it can help stimulate scientific communities to engage in developing policy-relevant tools and methodologies. The science communities could, for example, be invited to address the need for tools and methodologies for multi-sectoral cooperation at every scale and across scales. Similarly, there is a need for tools and methodologies which present policy alternatives and policy mixes, accompanied by information regarding the assumptions and implications of such options. Also, science can help develop more integrated quantitative models, monitoring systems, scenarios and indicators that will aid understanding not only of biodiversity and ecosystem services themselves but also of the relevance of biodiversity and ecosystem services to human well-being.

Third, the science community may also have a role to play in assessing how the policy-relevant tools and methodologies which have been identified for further development actually assist policy makers, including the extent to which they are applied, their effectiveness, and the context and conditions in which they can be used effectively. To support this goal, it could be appropriate to monitor and evaluate how the tools and methodologies are used and how IPBES performs its policy support function. The IPBES plenary could request the secretariat to develop a knowledge management platform for all IPBES functions. Thus, in addition to being a platform for the IPBES policy support function only, it also could also serve as a platform for knowledge generation, assessments, and capacity building. Such a platform could help galvanize partnerships, especially among the knowledge generating partners.

Relationship with assessment work program

Assessments itself are in a tool used in synthesizing available knowledge and providing information to policy makers and the wider public. Improving the assessment function is thus closely interlinked with the policy support function. At least three aspects could be addressed when looking for synergies between these two work areas:

1. assessments of policy-relevant tools and methodologies,
2. improving timely and regular assessments by improving their policy relevance,
3. horizon scanning and conducting assessments on new and emerging issues.

A (rapid) assessment of tools and methodologies available to support policy making and analysis of experiences gained from using these tools could be a first step towards improving the policy support function of IPBES (see section 6.7). Such an assessment could build on existing assessments (e.g. TEEB for economic tools and methodologies) and link their results to the specific needs and processes of IPBES.

Global, sub-global and thematic assessments within IPBES can play a major role in identifying and assessing the availability, effectiveness and replicability of current and emerging policy-relevant tools and methodologies. Assessments could also help scope IPBES' own policy-support function. This implies that, in carrying out its assessment function, IPBES can simultaneously carry out its policy-support function, at least in part. In practical terms, IPBES could pay particular attention in its assessment scoping and endorsement processes to identifying and assessing policy-relevant tools and methodologies which present policy alternatives and policy mixes, accompanied by information regarding the assumptions and implications of such options. The function of assessing how the policy-relevant tools and methodologies which have been targeted for further development actually assist policy makers could be built into the assessment program as a way of supporting the policy support function of IPBES.

Possible activities in the area of horizon scanning and tool and methodology development could be made available to the assessment processes. The assessment processes could also be used to verify the scientific rigor of such findings, to do comparative analysis, and to communicate new tool developments to policy bodies at multiple scales through its assessment processes and findings.

In order to strengthen the policy relevance of IPBES, the Busan outcome defines policy support nevertheless as a self-standing work area of the platform. This feature constitutes a difference to former global assessments (e.g. the Global Biodiversity Assessment (GBA), the Millennium Ecosystem Assessment (MA), and the IPCC), where policy support is integrated into the broader assessment process. As a rule, assessments consist of three steps: assessment of scientific knowledge base, assessment of impacts, and assessment of policy responses. Particular outcomes (such as the 'summary for policy makers') and processes of approval by decision makers are instrumental in making information more policy relevant and politically authoritative. At the same time, approval of the summary for policy makers is part of the broader assessment process. The IPCC currently solves this in a particular way: once findings have been agreed at a chapter level, the most important conclusions are included in summaries for policy makers. These conclusions seek to convey a clear snapshot of information on climate change, potential impacts, and response options in a policy-relevant but not prescriptive fashion. Global assessments such as IPCC reports have focused mainly on improving the scientific knowledge base of the assessment, thus seeing policy support as a secondary or marginal function; for this reason the reports have failed to reach decision makers on the ground. The IPBES process may attempt to draw lessons from these cases and pay more attention to making assessments. The distinct outlining (setting up) of an autonomous area for policy support thus constitutes a procedural innovation and could be further developed by explicitly developing its own products, independently of its contribution towards assessments.

Potential consequences of the work program for structure and modalities of IPBES

As mentioned above (see chap. 2) at the current time three options have been identified concerning the structure of working groups: option 1 is about two working groups, one for assessments and one combining the three other work areas (capacity building, knowledge generation and policy support). Option 2 puts it the other way round and proposes one working group on capacity building and one on the three other work areas including assessments. Option 3 sets different priorities and favours regional structures in which all four work areas are interlinked on a regional basis[17]. In all three options, however, three or more work areas are closely linked with each other. It seems appropriate to implement the whole work program in an integrated manner, because decisions and activities in one work area are likely to affect other work areas. For example, a thematic assessment may also inquire about policy options currently in place to address the topic, or an overview of capacities on the topic across different regions. More specifically, following option 1, for example, creates the challenge to link work on assessments with the work area on policy support, because work is conducted in different working groups. The same challenge would exist with capacity building in option 2.

The organisation of the work program in several regional working groups (option 3), as opposed to two working groups in options 1 and 2, will have administrative consequences for IPBES, as each working group needs an agenda, chair and vice chair, regular meetings, a reporting system, and a mechanism for measuring success. This in turn may result in different financial needs, depending on the number and size of the working groups. These considerations have also to be kept in mind when discussing the work program.

Relationship with other relevant initiatives[18]

The IPBES plenary may want to give particular attention to the modalities of how it relates to other bodies of relevance to its policy support function and work-program. In particular, the IPBES may want to establish a structured working relationship with the scientific subsidiary bodies of the Conventions. Such a working arrangement could build on the function of IPBES to respond, for example, to requests from other intergovernmental bodies. It could take the form of reporting to these bodies on the tools and methodologies identified and seeking their views on tools and methodologies that may need further analysis or development. It could be structured in the form of a standing agenda item of the IPBES plenary and supported as necessary by any subsidiaries, work processes and the secretariat.

Another relationship that the IPBES plenary may wish to consider is with leading tool developers or initiatives, such as the Global Partnership for Wealth Accounting and the Valuation of Ecosystem Services (WAVES), the TEEB network, and the network of Sub-Global Assessments. Other relevant partners could be the tools developers listed in Table 1. IPBES may also want to work with IPCC, GEO and other international assessment bodies in performing its policy support function. Furthermore, a number of the other institutions referenced under point 2 could be interesting partners for IPBES.

Working relationships with tool developers or practitioners could be set up through formal agreements or, alternatively, IPBES may invite existing initiatives to undertake work and report back to the plenary on progress made.

17 see http://www.ipbes.net/plenary-sessions/first-session-of-plenary.html (accessed 21 November 2011)

18 Section replicated for convenience from UNEP/IPBES.MI/1/INF/5/Add.1 (UNEP, 2011b)

Chapter 5 conclusions and open questions

Given the multiple challenges and the scope of issues related to the policy support function, the task of determining the appropriate structure and work program of IPBES becomes even more pressing. Further consideration is needed regarding how IPBES might best perform its functions, including the implementation of the policy support function and the interplay of all four work areas, and thus how its structure might support this function most efficiently and effectively. To fully operationalize IPBES, including the roles and responsibilities of its bodies, e.g. the IPBES plenary, its subsidiaries, the potential working group structure and its external partners, it is thus necessary to consider the specific functions and the interplay of all the work areas at all spatial scales.

Overall conclusions and outlook

The policy relevance of IPBES is a major focus of ongoing efforts to strengthen the science-policy interface for biodiversity and ecosystem services. Additional efforts and innovative approaches are needed, however, to achieve this goal. The work area on policy support is of pivotal importance concerning this goal. It must, however, be linked appropriately to the other work areas of IPBES. One way of approaching this issue could be to initiate an assessment either in the form of a full and separate assessment on policy-relevant tools and methodologies, as a rapid assessment (e.g. in form of a horizon scanning procedure), or as part of a larger assessment (see section 6.7).

Additionally, several open questions needs further consideration:

- as for IPBES in general, the Policy Support function will explicitly need clear procedures on how to include non-scientific knowledge and how to involve the relevant knowledge holders. Bridging different knowledge domains is still a major challenge
- A clear link to the Capacity Building function is needed in order to ensure empowerment of stakeholders
- Participation of stakeholders in the assessment processes (in the policy support as well as the assessment function) will be needed, in order to align the work with actual needs in analyzing and further developing policy tools and methodologies
- Need for a continuous, independent and transparent self-evaluation
- Dissemination of policy support tools and methodologies through a clear and strong communication strategy towards media and education

Given the broad range of potential needs and functions for policy support, as outlined in chapters 3-5 of this report, and taking into account the potentially limited resources in a starting phase of IPBES, it seems feasible for the Policy Support function to start its work with concrete focused studies on specific and urgent policy needs as direct and visible contribution to the policy making on biodiversity and ecosystem services. This could be complemented by a detailed scoping exercise, analyzing existing policy tools and methodologies in the broader context, and linking it to the potential functions and to the other work areas.[19] This could be done, for example, by establishing a Task Force for this issue. Its results would then be taken back to plenary for further consideration in shaping the work area.

19 This options draws on potential activity 18 in the draft document on IPBES' work program of the platform (UNEP, 2011c)

Appendix

A1 Glossary[20]

Term	Definition
Cost-benefit analysis	A technique designed to determine the feasibility of a project or plan by quantifying its costs and benefits
Ecosystem services	The benefits people obtain from ecosystems. These include provisioning services, such as food and water, regulating services, such as flood and disease control, cultural services, such as spiritual, recreational and cultural benefits, and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth. Sometimes called ecosystem goods-and-services.
Environmental assessment (EA)	An environmental assessment is the entire process of undertaking a critical and objective evaluation and analysis of information designed to support decision making. It applies the judgment of experts to existing knowledge to provide scientifically credible answers to policy-relevant questions, quantifying where possible the level of confidence. It reduces complexity but adds value by summarizing, synthesizing and building scenarios, and identifies consensus by sorting out what is known and widely accepted from what is not known or not agreed. It sensitizes the scientific community to policy needs and the policy community to the scientific basis for action.
Environmental impact assessment (EIA)	An environmental impact assessment (EIA) is an analytical process or procedure that systematically examines the possible environmental consequences of the implementation of a given activity (project). The aim is to ensure that the environmental implications of decisions related to a given activity are taken into account before the decisions are made.
Geographic information system (GIS)	A computerized system organizing data sets through a geographical referencing of all data included in its collections.
Human well-being	The extent to which individuals have the ability to live the kinds of lives they have reason to value; the opportunities people have to achieve their aspirations. Basic components of human well-being include: security, material needs, health and social relations
Mainstreaming	Mainstreaming the environment into development policy making means that environmental considerations are considered in the design of policies for development.
Monitoring (environmental)	Continuous or regular standardized measurement and observation of the environment (air, water, soil, land use, biota).
Policy	Any form of intervention or societal response. This includes not only statements of intent, such as a water policy or forest policy, but also other forms of intervention, such as the use of economic instruments, market creation, subsidies, institutional reform, legal reform, decentralization and institutional development. Policy can be seen as a tool for the exercise of governance. When such an intervention is enforced by the state, it is called public policy.
Strategic environmental assessment (SEA)	SEA is undertaken for plans, programs and policies. It helps decision makers reach a better understanding of how environmental, social and economic considerations fit together. SEA has been described as a range of "analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programs and evaluate the interconnections with economic and social considerations".

20 Glossary taken from UNEP & Cleveland (2007)

A2 Acronyms of global assessment processes

AoA	Assessment of Assessments
AR4 (IPCC)	4th Assessment Report (IPCC)
CAWMA	Comprehensive Assessment of Water Management in Agriculture
FRA	Forest Resources Assessment
GBA	Global Biodiversity Assessment
GBO3	Global Biodiversity Outlook 3
GEO4	Global Environmental Outlook 4
GIWA	Global International Waters Assessment
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IPBES	Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
MA	Millennium Ecosystem Assessment
TEEB	The Economics of Ecosystem and Biodiversity
WAVES	Global Partnership for Wealth Accounting and the Valuation of Ecosystem Services

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A4 Global assessment initiatives relating to biodiversity and ecosystem services

Global assessment initiatives relating to biodiversity and ecosystem services (UNEP, 2009, AnnexQ)

Assessments	Focus	Timeframe	Key elements	Scale	Scientific Involvement	Target audience	Website
CAWMA	Water and Agriculture	One-off	Benefits, costs and impacts of water management	Global and national (developing countries).	~700 agricultural and environmental scientists	Investors, private sector, and decision makers.	www.iwmi.cgiar.org/Assessment/
FRA	Forest resources	Periodic (5 years)	State of forests, drivers of pressures and change.	Global, regional, and national.	Global advisory group guides compilation of national data.	National policy makers, and international negotiations	www.fao.org/forestry/fra
GBO	Biodiversity	Periodic - 2001, 2006, 2010	Status and trends of biodiversity and analysis of CBD implementation.	Global.	Summary of existing information by selected experts.	CBD and governments.	www.cbd.int/ gbo
GEA	Energy	One-off.	Issue analysis and assessment of challenges.	Global, regional, national, typological.	~25 experts.	UNCED, CSD, and EU Energy Initiative for Poverty Eradication.	www.iiasa.ac.at/Research/ENE/GEA
GEO	Environmental change and development	Periodic global and regional assessment.	Ongoing sub-global reporting. State and trends of environment, human dimensions of change, scenarios.	Global and regional.	~400 individual scientists involved as authors and reviewers in GEO4.	UNEP Governing Council, and governments.	www.unep.org/geo
GIWA	International waters	Global assessment in 2006 sub global assessments in 2005	Status and scenarios for transboundary waters (coastal and inland).	Global, regional, and subregional	~2000 experts and scientists. Decision makers, environmental managers,	GEF and its partners	www.unep.org/dewa/giwa/
IAASTD	Agriculture	One-off	Agricultural knowledge, science and technology.	Global and 5 regions	~900 experts and scientists.	National and local governments, and international agencies.	www.agassessment.org/
IPCC	Climate change	Periodic (~5 years)	Assessment causes, impacts, and scenarios for adaptation and mitigation	Global, regional, and sub-regional	~2500 authors and reviewers in AR4	Public, private sector, national and international conventions	www.ipcc.ch
LADA	Land degradation	One-off	Status assessments, monitoring methodology, strategy recommendations	Global, national and local.	22 international and national partner organizations and agencies	UNCCD and national governments.	www.fao.org/nr/lada/

Assessments	Focus	Timeframe	Key elements	Scale	Scientific Involvement	Target audience	Website
MA	Ecosystem Services and Human Well-being	One-off	global assessment 2001-2005. Sub-global assessments ongoing Assessment of status, scenarios and options	Global and ~30 subglobal assessments from local to regional.	~1300 individual scientists involved as authors and reviewers	CBD, Ramsar, UNCCD, CMS, and Private Sector	www.MAweb .org
Red List	Conservation status of species in the wild	Ongoing assessment, with periodic updates	Threat assessment of species	Global	~2500 members of IUCN's Species Survival Commission	Species conservation practitioners and policy maker	www.iucn.org /redlist s
TEEB	Economics of biodiversity and ecosystem services	One-off currently ongoing	Analysis of costs of biodiversity loss and ecosystem services, and costs of management	Global	Selected experts	Decision makers and CBD	ec.europa.eu/environment/nature/biodiversity/economic
WWDR	Water resources	Periodic - 2003, 2006, 2009	Status assessment on freshwater resources and analysis of management	Global, regional, and basin	24 UN agencies + international partners	Decision makers	www.unesco.org/water/wwap/wwdr

A5 Examples of future initiatives

Examples of future initiatives (UNEP, 2009, Annex R)

Organisation	Program	Description	Outputs
Africa Biodiversity Collaborative Group	Mapping future trends and interventions for biodiversity policy over the next 10 years.	On 15 May 2008 ABCG organised a meeting on *Mapping future trends and interventions for biodiversity conservation in Africa over the next 10 years* supported by the USAID/Africa Program148. The meeting sought to identify the drivers of past, present and future change in biodiversity in Africa, map trends and identify predictable trends and key uncertainties. This meeting was followed by a workshop on *The Future of Biodiversity in Africa* (September 2008) where African conservation leaders were engaged in narrating alternative futures for biodiversity in Africa and interventions appropriate for USAID and other stakeholders into the future. This exercise produced a shared vision statement and highlighted key necessary interventions for biodiversity. This was used by African partners and by US AID and other donors in their biodiversity programming.	Vision for biodiversity and reports
Institute for Futures Studies and Technology Assessment		German non-profit research institute. Addresses a range of sustainable development issues.	Various
IUCN	Future of Sustainability	This is an international consultative process aiming to develop a new sustainability vision and strategy relevant to the global challenges of the 21st century such as climate change, peak oil, continuing loss of biodiversity, poverty and unsustainable production and consumption. It aims to engage leading thinkers and institutions from around the world at global and regional level, and from different constituencies including conservation and environment leaders; government representatives; economists; the social justice community; business leaders; and young people. It is employing traditional discussion forums as well as Web2 and mobile phone technologies to generate and share new concepts. The ideas generated by the initiative will help inform the long-term direction and strategy of IUCN	Various
Landcare Research	Future Scenarios for New Zealand Biodiversity	Four contrasting futures scenarios	Reports and Scenarios game

Organisation	Program	Description	Outputs
OECD	International Futures Program	The OECD International Futures Program aims to provide the organisation with an early warning of emerging issues, pinpoint major developments, and analyse key long-term concerns to help governments respond. The Program uses a variety of tools including multi-year projects, high-level conferences, expert workshops, and consultations, a future-oriented online information system, and a network of contacts from government, industry, academia and civil society. Ongoing projects include 'The Bioeconomy to 2030149 – focusing on the broad range of economic activities arising from the biosciences (including biofuels).	Various
Scientific Knowledge for Environmental Protection (SKEP)- EU Framework project	Work packages include investigating emerging issues for future research planning	Network of Environmental research funders with aim of improving co-ordination of research.	Various. Including emerging technologies and review of horizon scanning approaches across European Member states
Shell	Global energy scenarios 2050	To assist thinking about the future of energy, Shell has developed two scenarios150 to describe alternatives ways that energy consumption and production may develop. Shell uses these scenarios to test their strategy against a range of possible long-term developments and to examine and communicate ways in which a more sustainable future could be achieved.	Scenarios reports and toolkits
Siemens	Pictures of the future program	Scenarios of tomorrow's world and technologies over next two decades, including environmental technologies	Quarterly publications
The next 20 years series .	Forecasts on the future	Online discussion and (US-based) seminar series on emerging trends and scenarios	Online resource includes selected articles on all key trends
University of Cambridge, UK and the Cambridge Conservation Initiative	Conservation Futures Program	Partnership between the university of Cambridge and 8 conservation organisations (BirdLife International, British Trust for Ornithology, Fauna and Flora International, RSPB, IUCN, TRAFFIC, Tropical Biology Association and UNEPWCMC) to identify and address emerging issues for conservation and to foster closer integration between research and policy	Includes Sutherland et. al. 'An assessment of the 100 questions of greatest importance to the conservation of global biodiversity' a collaborative exercise between CCI and a range of other partners
University of Stellenbosch	South African Institute for Futures research	Specialises in futures research as support for corporate strategic management	Various (e.g. ecosystems and business)
UK Global Environmental Change Committee	Global Biodiversity Subgroup	Group consisting of key government and other funders of biodiversity research in UK. Set up to identify and review research gaps and recommend strategic priorities for UK and EU science.	Most recent reports on Ocean Acidification and Biodiversity and climate change.

Organisation	Program	Description	Outputs
UK Government Office for Science	Horizon Scanning and Foresight programs	Regular cross-government strategic Horizon Scans, particularly to spot implications of emerging science and technology; and in- depth exploration of selected issues using a range of futures techniques. Current topics include Land Use and Sustainable Energy	Sigma scan- issues across public policy agenda Delta scan-future science and technology issues and trends and their implications Briefing papers on key S+T issues Reports on future evolutions and challenges and options to address these
US Environmental Protection Agency	Environmental Futures Program	Program to develop organisational capacity for foresight and pilot futures activity on key issues	Recent outputs include a review of 'Second life' and potential opportunities for EPA
Wildlife Conservation Society	Futures Group	The Wildlife Conservation Society (WCS) futures group was formed in 2004 to give WCS broad guidance on how it should think about the long-term future. Through a process led by Bio-era (an independent research consulting firm) the group developed a series of scenarios151 to explore how conservation activities and strategies might shift over the next 20 years in response to global circumstances and the interplay between politics, technology, economics; and to highlight where WCS might need to adapt its strategies and develop new capabilities. WCS view these scenarios as a 'first step' in thinking about how opportunities and challenges for conservation could change in the future; and to engage stakeholders in further discussion.	'Future of the wild' report- 6 scenarios and key questions raised for WCS/conservation