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Platform on Biodiversity and Ecosystem Services  
Second session**

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Item 4 (a) of the provisional agenda\*

**Initial work programme of the Platform:  
work programme 2014–2018**

**Initial scoping for the fast-track methodological assessment of  
scenarios and modelling of biodiversity and ecosystem services**

**Note by the secretariat**

**I. Introduction**

1. Recognizing that it would be necessary to move forward with the programme of work for 2014–2018 following its approval by the Plenary of the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services at its second session, the Bureau and the Multidisciplinary Expert Panel agreed to prepare, for consideration by the Plenary at that session, a number of initial scoping documents based on the prioritization of requests, suggestions and inputs put to the Platform and the deliverables set out in the draft programme of work (IPBES/2/2). The present note sets out the initial scoping for a proposed fast-track methodological assessment of scenarios and modelling of biodiversity and ecosystem services. It has been developed in accordance with the draft procedures for the preparation of the Platform's deliverables (IPBES/2/9).

**II. Scope, rationale and assumptions**

**A. Scope**

2. The objective of the proposed fast-track assessment of scenarios and modelling of biodiversity and ecosystem services is to establish the foundations for the use of scenarios and models in activities under the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services in order to provide insights into the impacts of plausible future socioeconomic development pathways and policy options on biodiversity and ecosystem services and to help evaluate actions that can be taken to protect biodiversity and ecosystem services. These foundations will be used to provide guidance on evaluating alternative policy options using scenarios and models, including multiple drivers in assessments of future impacts, identifying criteria by which the quality of scenarios and models can be evaluated, ensuring

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\* IPBES/2/1.

comparability of regional and global policies, including input from stakeholders at various levels, implementing capacity-building mechanisms to promote the development, use and interpretation of scenarios and models by a wide range of policymakers and stakeholders, and communicating outcomes of scenario and model analyses to policymakers and other stakeholders. The first phase of the assessment, to be completed by early 2015, will focus on assessing various approaches to the development and use of scenarios and models.

## **B. Rationale**

3. The rationale for this deliverable is outlined in detail in the report of an international science workshop on assessments for an intergovernmental science-policy platform on biodiversity and ecosystem services that was held in Tokyo from 25 to 29 July 2011 (UNEP/IPBES.MI/1/INF/12). In brief, the goals of using scenarios and models in assessments of biodiversity and ecosystem services are to better understand and synthesize a broad range of observations, to alert decision makers to undesirable future impacts of global changes such as land use change, invasive alien species, overexploitation, climate change and pollution, to provide decision support for developing adaptive management strategies and to explore the implications of alternative social-ecological development pathways and policy options. One of the key objectives in using scenarios and models is to move away from the current reactive mode of decision-making in which society responds to the degradation of biodiversity and ecosystem services in an uncoordinated, piecemeal fashion to a proactive mode in which society anticipates change and thereby minimizes adverse impacts and capitalizes on important opportunities through thoughtful adaptation and mitigation strategies.

4. Recent and forthcoming global environmental assessments (see references) have examined past trends in and the current status and future trajectories of biodiversity and ecosystem services. Assessments of status and trends are typically well understood by policymakers and stakeholders because they rely heavily on the analysis of observations. Looking into the future is more complex because it relies on coupling scenarios of future socioeconomic development with models of the impacts of global change on biodiversity and ecosystem function. Scenarios and models are explicitly or implicitly built on four main components:

(a) Scenarios of socioeconomic development (e.g., population growth, economic growth, per capita food consumption, greenhouse gas emissions) and policy options (e.g., reducing carbon emissions from deforestation and forest degradation, subsidies for bioenergy, et cetera.);

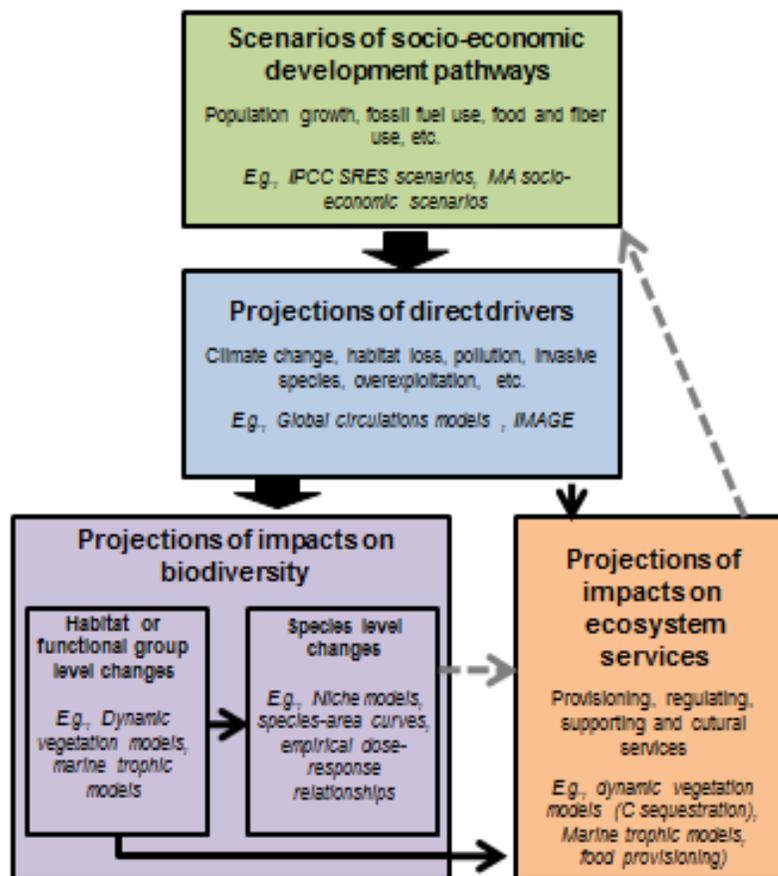
(b) Models projecting changes in direct drivers of biodiversity and ecosystem function (e.g., land use change, fishing pressure, climate change, invasive alien species, nitrogen deposition);

(c) Models assessing the impacts of drivers on biodiversity (e.g., species extinctions, changes in species abundance and shifts in ranges of species, species groups or biomes);

(d) Models assessing the impacts of drivers and changes in biodiversity on ecosystem services (e.g., ecosystem productivity, control of water flow and quality, ecosystem carbon storage, cultural values).

5. These elements correspond to the structure of the conceptual framework developed for the Platform, and the figure below illustrates how scenarios and models are typically coupled to provide projections of future trajectories of biodiversity, ecosystem services and human well-being. Elements can range from highly quantitative (e.g., econometric models of socioeconomic development) to qualitative (e.g., prospective scenarios of development based on expert-stakeholder dialogues (Coreau and others, 2009)).

**Integration of socioeconomic scenarios (indirect drivers), models of direct drivers and models of impacts on biodiversity and ecosystem services, as used in most assessments at global and regional scales**



Source: Pereira and others, 2010.

Note: Dotted lines indicate important interactions and feedbacks that have been infrequently treated in assessments.

6. Considerable preparation and thought is required to structure scenarios and modelling activities for the Platform to ensure that comparisons can be made across assessments, especially important when comparing regional and global projections, and that a standard of high quality is maintained in all assessment activities. In addition, a number of significant knowledge gaps remain that must be filled to enable better quantification of uncertainty, better understanding of the links between biodiversity, ecosystem services and human well-being (see figure) and an increase in the policy relevance of scenarios and modelling assessments (Leadley and others, 2010, De Groot and others, 2010). The assessment, guidance, promotion and catalysing activities in this deliverable are intended to provide a basis for such preparation at the very start of the Platform's operation so that all activities relying on scenarios and models are built on a solid foundation.

7. This deliverable responds to requests, inputs and suggestions from France, Mexico, the International Council for Science and the United Nations Environment Programme (UNEP).

### C. Assumptions

8. All phases of this deliverable will build on scenarios and modelling experiences under other global and regional environmental assessments. Particular attention will be paid to the most recent developments in socioeconomic scenarios and models used in global assessments, for example the "shared socioeconomic pathway" and "shared policy assumption" scenarios used by working group III of the Intergovernmental Panel on Climate Change in preparing its contribution (due out in 2014) to the Panel's fifth assessment report and the Convention on Biological Diversity *Global Biodiversity Outlook 4* (due out in 2014), as well as regional and national assessments such as the national ecosystem assessment carried out by the Government of the United Kingdom of Great Britain and Northern Ireland. Planning for scenarios for the sixth assessment report of the Intergovernmental Panel on Climate Change has already

begun and it is expected that work on scenarios will go even further than it has for the fifth assessment report in exploring linkages between climate change and land use, as well as other pressures on terrestrial and marine systems. The scenarios and modelling assessment and follow-up activities will provide an unprecedented opportunity to capitalize on the synergies between the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. The Platform will also work closely with other bodies involved in global environmental assessment such as UNEP, including its programme on the economics of ecosystem services and biodiversity, and the International Union for Conservation of Nature. In addition, there is a broad scientific community that can be mobilized and involved in the development of these methodologies. This deliverable will therefore require substantial mobilization of resources outside of the Platform's remit and close collaboration with such international research programmes as Future Earth, funders of international research such as the Belmont Forum and the scientific communities involved in assessments undertaken by the Intergovernmental Panel on Climate Change, the Convention on Biological Diversity, the Food and Agriculture Organization of the United Nations and UNEP.

### III. Chapter outline

9. It is contemplated that the results of the assessment will be presented in an eight-chapter report, as set out below.
10. Chapter 1. Overview of socioeconomic scenarios and models and critical review of their use in previous biodiversity and ecosystem assessments, including:
  - (a) Overview of socioeconomic scenarios;
  - (b) Socioeconomic scenarios used in global assessments including the Millennium Ecosystem Assessment, *Global Biodiversity Outlook*, *Global Environmental Outlook* and reports of the Intergovernmental Panel on Climate Change;
  - (c) Socioeconomic scenarios used in regional and national assessments;
  - (d) Overview of models of direct drivers of change in biodiversity and ecosystem services and their use in assessments on multiple scales;
  - (e) Overview of models of impacts of drivers on biodiversity and ecosystem services and their use in assessments on multiple scales;
  - (f) Critical review of the approaches used in previous assessments.
11. Chapter 2. Scenarios of the socioeconomic drivers of change and policy options in biodiversity and ecosystem services, including:
  - (a) The principal socioeconomic drivers of change and their dynamics;
  - (b) Methods used for developing plausible scenarios of future socioeconomic development:
    - (i) Storyline methods;
    - (ii) Probabilistic methods, e.g., econometric models;
    - (iii) "Backcasting" methods: working backwards from agreed-upon future goals;
    - (iv) Prospective scenarios based on interactions with stakeholders;
  - (c) Methods for examining policy options in scenarios;
  - (d) Incorporating input from stakeholders and indigenous and local knowledge holders into scenarios;
  - (e) Data needs for scenario development, parameterization and validation;
  - (f) Outputs from scenarios: inputs to models and indicators for communication;
  - (g) Assessing the quality of socioeconomic scenarios and sources of uncertainty;
  - (h) Guidance on the use of socioeconomic scenarios in assessment activities.

12. Chapter 3. Models of direct drivers of change in biodiversity, ecosystem function and ecosystem services, including:
- (a) The dynamics of the principal direct drivers of change: climate, habitat modification, exploitation of biodiversity, invasive species and pollution;
  - (b) Methods for projecting future changes in direct drivers;
  - (c) Assessing the quality of projections of direct drivers and sources of uncertainty;
  - (d) Guidance on the use of projections of direct drivers in assessment activities.
13. Chapter 4: Models of the impacts of drivers on biodiversity and ecosystem services:
- (a) Methods for modelling the impacts of drivers on species and species groups:
    - (i) Correlative species distribution models;
    - (ii) Dose-response models: empirical models relating global change drivers to impacts on species abundance and ecosystem services;
    - (iii) Process-based models: models, including in relation to organism physiology, adaptive capacity, population dynamics, dispersal capacity, species interactions and ecosystem dynamics;
    - (iv) Hybrid models;
  - (b) Methods for modelling the impacts of drivers on ecosystem function and ecosystem services;
  - (c) Data needs for model development, parameterization and validation;
  - (d) Biodiversity and ecosystem services indicators: outputs from models and their links to data and policy;
  - (e) Assessing the quality of projections of impacts on biodiversity and ecosystem services and sources of uncertainty;
  - (f) Guidance on the use of projections of biodiversity and ecosystem services in assessment activities.
14. Chapter 5. Examining the feedback between biodiversity, ecosystem services, people and policy using scenarios and models, including:
- (a) Accounting for feedback between biodiversity, ecosystems, people and policy;
  - (b) Accounting for feedback between biodiversity, ecosystems and the climate system;
  - (c) Operationalization of feedback in social-ecological systems:
    - (i) Global-scale methods of examining feedbacks: examples of coupling integrated assessment models with impacts, adaptation vulnerability models;
    - (ii) Local and regional scale methods for examining feedbacks between biodiversity, ecosystem services and human well-being;
  - (d) Recommendations for improving the coupling of socioeconomic drivers and responses with models of impacts.
15. Chapter 6. Compatibility and comparison of scenarios and models, including:
- (a) Defining a core set of socioeconomic scenarios: advantages and drawbacks of common, shared scenarios in global and sub-global assessments;
  - (b) Use of multiple socioeconomic scenarios and models of impacts: advantages and disadvantages of a diversity of approaches;
  - (c) Methods for model inter-comparisons;
  - (d) Methods for comparing scenarios and models across spatial and temporal scales;
  - (e) Limitations and validity of scenarios and models;

- (f) Guidance on compatibility and comparison of scenarios and model projections in assessment activities.
16. Chapter 7. Building capacity for the development, use and interpretation of scenarios and models, including:
- (a) Regional and cultural differences in the development, use and interpretation of scenarios and models;
  - (b) Involving policymakers, holders of local and indigenous knowledge and other stakeholders in the development of socioeconomic scenarios;
  - (c) Recommendations for improving the availability of and guidance on the use of:
    - (i) Tools and methods for developing socioeconomic scenarios;
    - (ii) Data and knowledge, including indigenous and local knowledge, for building, testing and using socioeconomic scenarios;
    - (iii) Tools and methods for developing and using models of biodiversity and ecosystem services;
    - (iv) Data for building, testing and using models of biodiversity and ecosystem services;
  - (d) Guidance on capacity-building for the development, use and interpretation of scenarios and models.
17. Chapter 8. Use of scenarios and models in decision-making and communication, including:
- (a) Using scenarios and models to explore policy and management options;
  - (b) Multi-criteria approaches to decision support;
  - (c) Coupling scenarios and models with decision support tools, including tools for risk management;
  - (d) Use of scenarios and models in interactive workshops as a means of reinforcing the science-policy dialogue (e.g., companion modelling);
  - (e) Dealing with uncertainty in scenarios and models when making decisions;
  - (f) Recommendations on improving the availability of decision support tools;
  - (g) Developing a strategy for communicating scenarios and models to stakeholders;
  - (h) Guidance on the use of scenarios and models in decision-making and communication.

## IV. Process and timetable

18. The proposed process for undertaking the assessment and the timetable for carrying it out are outlined in the following table:

<i>Time frame</i>		<i>Actions</i>
2013	Fourth quarter	The Plenary reviews and approves the initial scoping exercise prepared by the Multidisciplinary Expert Panel (14 December 2013)
	Fourth quarter	The Panel issues a call, through the secretariat, to Governments and other stakeholders for the nomination of experts (report co-chairs, coordinating lead authors, lead authors, and review editors) to conduct the assessment, based on the results of the scoping exercise approved by the Plenary (9 December 2013–10 January 2014)
2014	First quarter	The Panel, via e-mail and teleconferences, selects the chairs, coordinating lead authors, lead authors, and review editors using the approved selection criteria (see IPBES/2/9) (11–24 January)
	First to third quarters	The report co-chairs, coordinating lead authors and lead authors prepare an initial draft report and summary for policymakers (25 January–25 July). The authors meet in February to further develop the annotated outline and the sections and chapters that have been assigned to them, and again in early July to finalize the report and prepare the summary for policymakers
	Third quarter	The draft report and summary for policymakers are reviewed by experts and Governments and other stakeholders (26 July–12 September)
	Third/ fourth quarters	The report co-chairs, coordinating lead authors and lead authors revise the first draft report and summary for policymakers under the guidance of review editors and the Panel. The authors and review editors, with a small number of Panel members, meet once to prepare the final draft report and summary for policymakers (13 September–7 November)
	Fourth quarter	The summary for policymakers is translated into all the official languages of the United Nations (8 November–5 December)
	Fourth quarter	The final draft report and summary for policymakers are sent to Governments and other stakeholders for final review (6 December 2014–6 February 2015)
2015	First quarter	Governments send written comments on the summary for policymakers to the secretariat by 31 January
	First quarter	The Plenary reviews and accepts the report and approves the summary for policymakers (starting after February 8)
	First quarter	On the basis of the methodological assessment, the Plenary requests the expert group to prepare, for delivery by August 2015, a guide on how to use scenario analysis and modelling methodologies when preparing regional, subregional, global or thematic assessments under the auspices of the Panel

## V. Cost estimate

19. The table below shows the estimated cost of conducting the assessment and preparing the assessment report.

(United States dollars)

<i>Year</i>	<i>Cost item</i>	<i>Assumptions</i>	<i>Cost</i>
2014	First author meeting (70 co-chairs, coordinating lead authors and lead authors, plus 4 Multidisciplinary Expert Panel/Bureau members, plus 1 technical support staff member)	Meeting costs (1 week, 75 participants) (25 per cent in kind)	15 000
		Travel and DSA (56 x \$3,000)	168 000
	Second author meeting (70 co-chairs, coordinating lead authors and lead authors, plus 4 Panel/Bureau members, plus 1 technical support staff member)	Meeting costs (1 week, 75 participants) (25 per cent in kind)	15 000
		Travel and DSA (56 x \$3,000)	168 000
	Third author meeting (70 co-chairs, coordinating lead authors and lead authors, plus 15 review editors, plus 4 Panel/Bureau members, plus 1 technical support staff member)	Meeting costs (1 week, 90 participants) (25 per cent in kind)	18 750
Travel and DSA (68 x \$3,000)		204 000	
	Technical support	1 full-time equivalent professional position (50 per cent in kind)	75 000
2015	Participation by 2 co-chairs and 2 coordinating lead authors in the third session of the Plenary	Travel and DSA (3 x \$3,000)	9 000
	Dissemination and outreach (summary for policymakers (10 pages) and report (200 pages))	Translation of the summary for policymakers into all of the official languages of the United Nations, publication and outreach	117 000
<b>Total</b>			<b>789 750</b>

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