| Scoping | Evaluation | Approval | Use of findings |

GETTING STARTED WITH SCENARIOS

WHEN in the process should this step be carried out?

Once it has been decided that scenarios will be included within the assessment, the next step is to identify which scenario methodologies will be used. During the evaluation stage, the relevant authors will get started on synthesising and developing these scenarios based on the methods chosen.

WHO does this stage relate to?

Evaluating potential futures and seizing the whole range of benefits of developing scenarios in a national ecosystem assessment requires diverse expertise. The responsibility for selecting authors with the necessary skills for developing scenarios will depend on the governance structure of the assessment (see governance structure and selecting authors 2-pagers).

Identifying the type of scenarios and the methodological approach to scenarios for the assessment will go along way towards identifying relevant authors and knowledge holders. For example, scenarios that help to raise awareness on environmental problems often requires expertise from academics working in natural sciences and indigenous and local knowledge holders. Assessing policy and management options usually draws from the experience of social scientists, policymakers and other practitioners.

TOP TIP

It can be useful to include a broad range of expertise and world views to maximize benefits from the scenarios included in the assessment.

HOW to carry out this stage?

To determine how best to develop and answer the policy questions using scenarios, the following list of example questions may help to identify scenarios which are to be answered within the assessment:

- What is the risk of future loss of nature, or nature's benefits to people?
- What visions do different groups in society hold for the environment where they live?
- What are the biggest threats from different future developments?
- Which drivers cause most problems in different futures?
- Which policies and management options could help mitigate drivers or address environmental problems?
- Which unintended consequences could these policies have?
- Which alternative or complementary measures could be taken?
- What are the requirements for the implementation of policies and complementary measures?

> **TOP TIP**
>
> Clearly define how the selected methods will help to harness the benefits of scenarios and achieve the overarching goals of the assessment.

The following table 1 highlights the various methods available to synthesise existing scenario materials and/or develop scenarios for a national ecosystem assessment, the expected time the work will take to complete, and expertise and materials needed to carry them out. All four of the methods included could be used in developing any of the different types of scenarios presented above (Figure 1), Identifying which methods to pursue is influenced mostly by the availability of knowledge, the capacity to conduct certain methodologies, and the type of data used. For example, if the data used to create an exploratory scenario does not have a spatial component, then mapping might not be suitable.

Table 1: Methodologies for synthesising scenarios for a National Ecosystem Assessment

Method	Outcome	How it is done	Time needed	Experts and Expertise needed	Materials needed
Literature review	Synthesis of existing scenarios studies of, e.g. how variations in policy options change biodiversity and ecosystem services	Identify search criteria, systematically search scientific and other literature, screen results, extract and synthesise findings, interpret and write up	Weeks/ Months	Basic understanding of scientific and grey literature on scenarios	Literature, reference management system, standardise system to store and compile relevant results
Modelling	Quantitative projections of future changes in biodiversity and ecosystem services, e.g. based on varying policy options	Identify type of modelling and modelling software, adapt software to assessment goals, identify and assemble data, run analysis, prepare visualisations/ maps, interpret and write up	Months/ Years	Experts with statistical and modelling skills, software skills	Data sets, data base to store. results, software, computing power
Mapping	Spatial visualization of synthesis results or quantitative projections	Identify and assemble data (e.g. from modelling or literature synthesis), prepare visualisations/maps, interpret and write up	Weeks/ Months	Experts with GIS skills, software skills	Data sets, data base to store results, software, computing power for GIS applications
Expert/ Participatory approaches	Scenarios storylines of future changes in biodiversity and ecosystem services, e.g. based on varying policy options	Select method of engagement, stakeholder analysis, plan and implement engagement process, document and analyse results, interpret and write up	Weeks/ Months	Experts with engagement skills, ILK, facilitation skills, content analysis skills	Facilitation materials

Conducting a literature review and consulting experts and stakeholders on existing scenarios, are often the most appropriate and feasible initial steps. Modelling and mapping methods should be pursued if appropriate but may be limited by resources and capacity, such as financial, logistical, technical, and data constraints. Encouraging expert and stakeholder participation throughout the methodologies identified in the above table 1 is recommended.

Literature review

When undertaking a literature review the decisive questions above can be used for defining the scope: a) topics to focus on (e.g. a particular policy or policy sector, driver, problem, ecosystem, indicators, etc.); b) spatial scale (e.g. local, national, international); c) temporal scale (e.g. 10 or 50 years into the future); and d) type of literature: e.g. scientific, reports from non-governmental organisations, policy documents, indigenous and local knowledge.

Expert/participatory approaches

Expert-based and participatory-based approaches can be used to identify drivers and construct scenarios and models. Expert-based approaches use the opinion, knowledge, or judgement of multiple experts. For example, natural scientists could guide the development of exploratory scenarios and models seeking to highlight environmental trends, and the experience of policymakers and social scientists may be used to assess possible policy and management intervention scenarios. Participatory-based approaches seek to consult a broader range of stakeholders, including mobilising indigenous and local knowledge holders, and develop more comprehensive scenarios and models based on their collective input and values.

Modelling

Modelling enables the assessment and projection of biodiversity and ecosystem services responses to different scenarios. Biodiversity modelling can be used to predict dynamics at the level of evolutionary adaptions, species or populations, ecological interactions, and ecosystems. See table 4.3 in IPBES (2016) for biodiversity models and approaches. Modelling nature's benefits to humans can use expert-based modelling, such as matrix models and Bayesian belief networks, or pre-developed ecosystem services modelling tools, such as InVEST and Co$ting Nature. See tables 5.3 and 5.4 in IPBES(2016) for examples.

Mapping

Spatial data enables trajectory dynamics to be mapped. For example, mapping future land-use changes, species distribution, and physical climatic factors. Mapping is a powerful tool for the visualisation and communication of future threats, and for identifying priority areas for policy and management interventions. Data outputs from modelling can often be entered directly into mapping software for visualisation, such as QGIS, ArcGIS, and Google Earth Engine.

RESOURCES

x   IPBES (2016) 'The methodological assessment report on scenarios and models of biodiversity and ecosystem services.' Ch.3, pg. 88-90; Ch.4, pg. 133-142; Ch.5, pg. 169-177. https://doi.org/10.5281/zenodo.3235428

x   For Table 4.3 - IPBES (2016) 'The methodological assessment report on scenarios and models of biodiversity and ecosystem services.' Ch.4, pg. 141. https://doi.org/10.5281/zenodo.3235428

x   For Tables 5.3 & 5.4 - IPBES (2016) 'The methodological assessment report on scenarios and models of biodiversity and ecosystem services.' Ch.5, pg. 173-174. https://doi.org/10.5281/zenodo.3235428

x   Examples for chapters based on existing literature, look at the IPBES regional assessment chapters 5: https://ipbes.net/regional-assessments

x   Example for participatory scenario development in the IPBES context: https://niwa.co.nz/sites/niwa.co.nz/files/IPBES-Nature-Futures-report_2017.pdf

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