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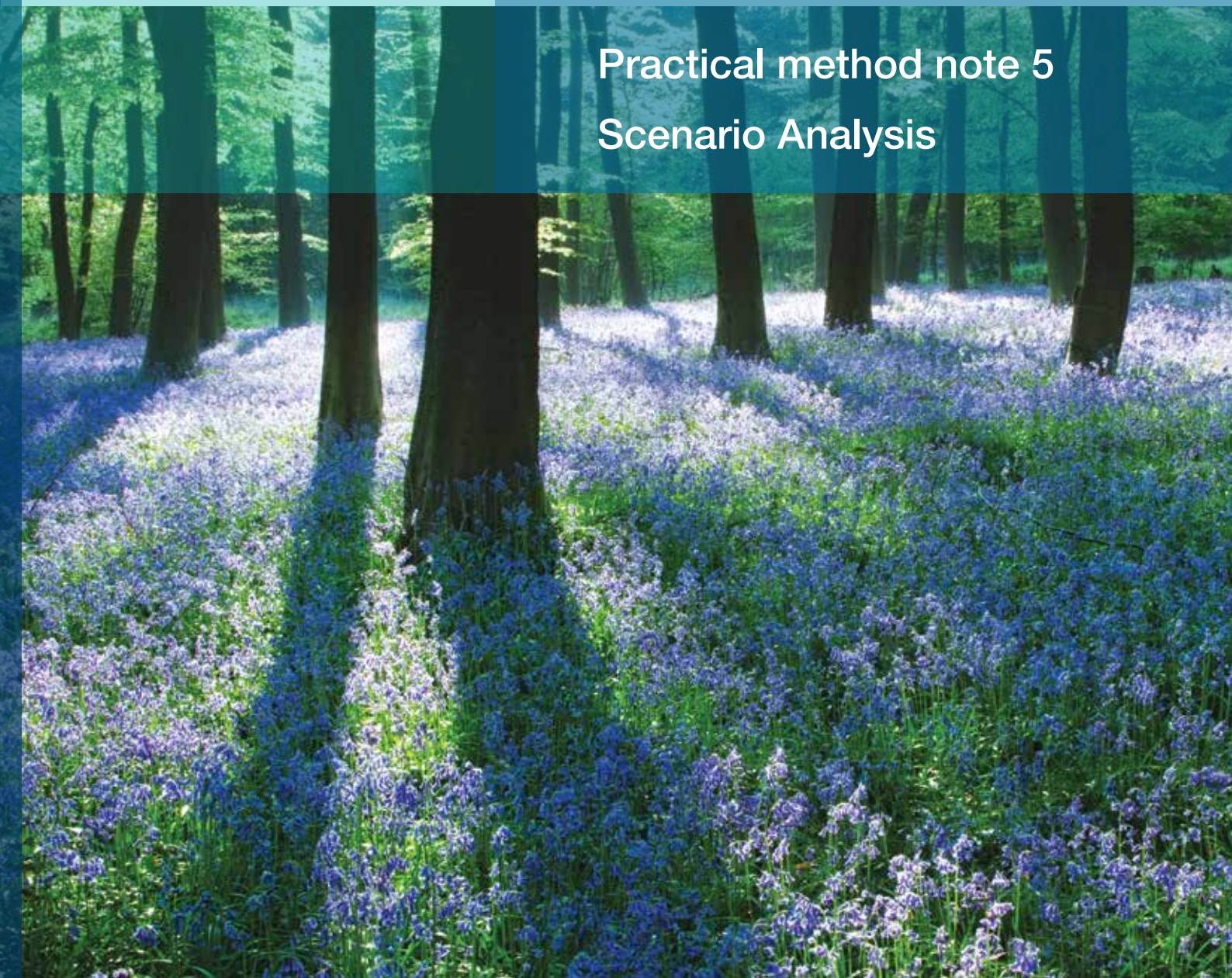
Annex 1

Practical method note 5

Scenario Analysis



PRACTICAL METHOD NOTE 5

SCENARIO ANALYSIS

WHAT IS SCENARIO ANALYSIS?

Scenario analysis enables management choices, strategic planning and decision-making to be better-structured for stakeholders. The process of mapping out different scenarios and what may be required to implement them can help stakeholders consider the implications of a range of options when the future is uncertain. The UK NEA[1] states that "scenarios are neither predictions nor projections and sometimes may be based on a 'narrative storyline'. Scenarios may include projections but are often based on additional information from other sources."

WHY ENGAGE STAKEHOLDERS IN THE DEVELOPMENT OF SCENARIOS?

By engaging stakeholders in the process of developing scenarios, it is possible to voice conflicting opinions and different worldviews, and to create scenarios that have greater relevance to stakeholders. For example, Tress and Tress[2] found that a participatory approach to scenario development built trust and increased acceptance of planning decisions, whilst enabling planners to produce better plans through integrating local knowledge. Reed et al.[3] suggested that there are three key benefits of engaging stakeholders in scenario development:

- Co-developing scenarios with stakeholders makes the scenarios more relevant to stakeholder needs and priorities, and hence more useful in decision-making.
- It is possible to significantly extend the range of scenarios (or options within scenarios) you can develop.
- It becomes possible to move beyond scenario development to actually facilitate action to reach or avoid future states.

APPROACHES TO SCENARIO ANALYSIS

Two general approaches to scenario analysis exist; forecasting and backcasting:

1. **Forecasting** – Creating projections about what may occur in the future and the alternative paths to getting there. Here, scenario analysis is employed to choose the path or future point that is desired, and groups work to identify how to create that desirable future situation. Patterns and trends from the past are identified to help make projections about likely change in the future; such patterns and trends may be identified through research and statistical analysis or via formal and informal observation.

2. Backcasting – Project groups determine a desired future situation, and the group works backwards from this point to identify steps needed to reach the desired future position. Backcasting has been found to be particularly useful where problems are complex and a significant change in direction is required. The group must reach consensus on a desired future end point and 'work backwards' defining what goals, objectives or activities are considered instrumental to achieving this desired end point.

HOW TO CONDUCT SCENARIO ANALYSIS WITH STAKEHOLDERS

The following steps may be used to create scenarios with stakeholders:

1. Define the context in which you wish to develop scenarios (biophysical, socio-economic and political) and establish whether there is a basis for stakeholder engagement in scenario development. It should not be assumed that participation is always necessary or advisable, for example where stakeholders do not have decision-making power to take action and respond to scenarios. In some contexts you may need to build capacity amongst stakeholders to engage effectively in more technical scenario development exercises.

2. Systematically identify stakeholders to ensure that all **relevant stakeholders are represented appropriately** in the process (see Part 3 of this *Handbook* on how to identify stakeholders).

3. Define clear objectives for scenario development with stakeholders including spatial and temporal boundaries. By doing this, stakeholders have ownership of the process, the outcomes are relevant to them, and they are more likely to act on the outcomes of the work.

4. Select relevant participatory methods for scenario development:

I. During initial **construction of scenarios**, consider using data from interviews, qualitative conceptual modelling or fuzzy cognitive mapping (see practical method note 3 on developing models with stakeholders in Annex I of the *Handbook* for more ideas), or the Delphi method (see practical method note 8 on the Delphi method in Annex I of the *Handbook* for further guidance). For simple scenarios, key driving forces may be placed on two axes to create a 2x2 matrix containing four scenarios. More complex processes may involve stakeholders identifying drivers of change, system components, potential outcomes, and estimating or quantifying relationships between each of these.

II. To evaluate and **select scenarios** for further investigation, consider using visualization techniques, participatory GIS or multi-criteria evaluation (see practical method note 11 on MCDA and participatory GIS in Annex I of the *Handbook* for more ideas). The optimum number of scenarios is between two and five. The scenarios should be plausible, but there may also be a desire to prepare for surprise, or extreme, scenarios. Scenarios are often re-drafted multiple times and can be represented by both quantitative and qualitative data, visually or textually.

III. To **support decision-making** based on scenarios, consider backcasting from desired scenarios; identifying steps that could be taken to reach particular future states. Alternatively, scenarios may be used as management options in a multi-criteria decision analysis (see practical method note 11 on MCDA in Annex I of the *Handbook*).

BENEFITS AND DRAWBACKS OF SCENARIO ANALYSIS

Scenario analysis helps to explore a range of possible and plausible futures. The process of defining scenarios provides opportunities for individuals to consider different futures instead of accepting the inevitable. It can help those involved appreciate that uncertainty is normal and to sensitise them to probabilities of risk. As such, participatory scenario analysis may also help communities become more resilient to future changes. Through scenario analysis, it is possible to visualise how multiple variables interact. This can facilitate more critical thinking and stimulate creative ideas and solutions. However, there is a risk that scenarios can oversimplify an issue, as detail must be balanced with available time and resources. Mixing qualitative and quantitative information may help to overcome this. Finally, scenario analysis is often used in situations where there are sensitivities and conflicts, due to the competing agendas and perspectives of participants. Therefore, the process must be well designed and (often professionally) facilitated to ensure it is constructive.

CASE STUDY

EXPERIENCES FROM BIODIVERSITY RESEARCH

EXPERIENCES OF SCENARIO ANALYSIS IN BIODIVERSITY RESEARCH

Use in informing model development: The FIREMAN project (see the *Handbook* for details of BiodivERsA projects) engaged with stakeholders involved in fire management to develop scenarios for future fire management under a changing climate. Stakeholders were asked what likely management options they would undertake. For example, moorland managers in the Peak District in England were asked how their approach to prescribed burning would vary under a range of future climatic conditions. This provided researchers with valuable information that was used in complex climate–fire–vegetation models to predict impacts on biodiversity and vegetation composition under the scenarios developed with stakeholders. The results were therefore of interest and relevance to the stakeholders. Researchers noted that stakeholders found it quite difficult to think about management on long timescales (50 years in this case), so good facilitation skills were required. More information on the model development in FIREMAN can be found in practical method note 6 on co-development of research outputs with stakeholders.

The timing of the method can enhance the impact of the results: The HUNT project used scenario analysis to consider the future of game management and hunting in Europe and Africa. Essential to the success of this project, was ensuring that the scenario process was carried out during ‘a window of opportunity’. For example, in an Ethiopian case study, there was a high level of uptake by influential stakeholders, because the scenarios were focused on the revision of legislation for the sharing of hunting revenues and therefore of direct relevance to current policy development.

Ensure clarity over language, objectives and use of results: Stakeholders can be mistrustful of scenario analysis. In the HUNT project, stakeholders were sometimes reluctant to explore scenarios as they felt this signified that they accepted that these visions of the future could not be changed. This is problematic as one of the benefits of the method is allowing stakeholders to have the freedom to consider different visions in a creative way. One stakeholder thought this misconception arose from

the differences in language between researchers, practitioners and policy makers. It is advisable to clearly outline the aims of the objectives and how the results will be used. A stakeholder reported that their organisation declined to take part in scenario analysis on another project due to a fear they would subsequently be put under pressure to alter their management practices as a result. The BIOSCENE project was focused on the development of scenarios for reconciling biodiversity conservation with declining agricultural use in the mountains of Europe. The rationale behind the use of scenarios was explained to stakeholders in detail during semi-structured interviews before they participated in scenario workshops. It was also explained that the results would only be communicated to decision makers with the consent of the stakeholders. The researchers based initial scenarios on the data from interviews and excluded scenarios that the stakeholders were reluctant to explore.

Consider how scenario analysis will add value to the research: Before using a complex method such as scenario analysis, consider whether it is the right tool for achieving the project aims. Scenario analysis was used to explore the future of deer management in Scotland as part of the HUNT project. This approach was considered by some stakeholders to be an overly academic and complicated approach to an already highly complex issue. While the opportunity for open discussion was viewed positively, some of the stakeholders were sceptical about the value of the process for determining good practice for deer management.

A neutral party may help take the process forward: The scenarios developed in the BIOSCENE project were subject to a sustainability assessment from researchers external to each case study, and often from other countries; these individuals were generally viewed by stakeholders as neutral and objective. These assessments provided a useful basis for further discussion and refinement of the scenarios. Although stakeholders were reluctant to explore more extreme scenarios and did not consent to the communication of results to policy makers in some cases, the project demonstrated the potential for integrated ecological and socio-economic information about sustainable development (for further details see Tzanopoulos et al.[4]).

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Annex 1 of "*The BiodivERsA Stakeholder Engagement Handbook.* BiodivERsA, Paris (108 pp).
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The BiodivERsA Stakeholder Engagement Handbook is available online at http://www.biodiversa.org/577

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