

Understanding the socio-ecological system: Developing Scenarios

WHAT ARE SCENARIOS AND WHY ARE THEY USEFUL FOR MANAGING AQUATIC BIODIVERSITY?

Scenarios are valuable as they consolidate diverse information into a comprehensive, actionable vision of the expected future. Scenarios compile into a coherent picture or story the impacts of current environmental and sectoral policy and management, as well as of expected external conditions (e.g. impact of climate change in the future), on an aquatic ecosystem. They identify how these will affect the environment and the society in the future. Scenarios can be based on quantitative data or can be descriptive, or some combination thereof.

A scenario that describes what will happen under business as usual conditions, including the impacts of current policy and management, is called a **baseline scenario**. The baseline scenario is important as it clearly identifies the deficits between objectives for the ecosystem and its expected future under current management.

A **management scenario** considers what will happen to society and the ecosystem under a change of management or policy. The management scenarios are important as they show the broad impact of management for aquatic ecosystems and therefore can be used as the basis for evaluating management options. They are also useful to communicate the impacts of different management options with stakeholders.

1 Step 1 – Choose your scenario approach: Model-based vs. narrative/qualitative approaches

The first step is to consider your aims to determine whether quantitative approaches to scenario development or more descriptive, qualitative approaches are more useful, and whether you have sufficient data and capacity for your choice. Data needs depend on the chosen indicators ([see Developing relevant indicators](#)), which are selected according to the objectives for the ecosystem ([see Integrative environmental policy objectives](#)). Quantitative scenarios can be helpful to explore consequences of potential future developments, but require data and modelling skills, and can also take longer and be more expensive ([see Case Study: Swiss Plateau](#)). Qualitative scenarios include narrative approaches, which can be collaborative exercises that use stakeholder and expert knowledge to describe a realistic outlook for the future ([see Case Study: Lake Ringsjön, Sweden](#)). Semi-quantitative methods, which sit between the two approaches ([see Linkage Framework](#)) can also be very helpful in quantitatively describing the impacts of future management without requiring extensive modelling capacity ([see for example Case Study: North Sea](#)). Combinations are also possible.

2 Step 2 – Describe your baseline scenario

A baseline scenario provides a shared view of the past, current and prospective trends and vulnerabilities in ecosystem services and biodiversity. As well as including environmental policies, this baseline scenario should also include future trends for sectors that affect the local environment, e.g. tourism policy targets or trends in agricultural pressures. It can be important to also think about how external factors will affect the ecosystem in the future (e.g. in the Case Study: Swiss Plateau), scenarios considered population growth and economic trends.

TIP! Use the information you have already gathered on policy objectives (see Integrative environmental policy objectives) and stakeholder objectives (see Mobilising stakeholders), as well as your understanding of ecosystem responses to human activities and external factors obtained from applying the Linkage Framework (see Linkage Framework) and Indicators (see Developing relevant indicators), to construct your baseline scenario.

TIP! Collaborate with stakeholders on scenarios – local fishers, farmers, or environmental NGOs, among others, can provide useful data, insight, expertise, and feedback to ensure realistic scenarios, such as in AQUACROSS’s Swedish Case Study (see Case Study: Lake Ringsjön, Sweden). Involving stakeholders in scenario development helps to increase their sense of ownership of the process and will facilitate engaging them later in the ecosystem-based management process.

TIP! Business and government stakeholders at AQUACROSS’s final conference reported that scenarios are useful to communicate complex issues, like environmental and societal trends, and to provide clear options (see AQUACROSS Final Conference).

3 Step 3 – Using scenarios to prioritise management options

Once you have a baseline scenario, you can compare the expected future it predicts to the stakeholder and policy objectives you previously identified. Any gaps between the baseline scenario and your objectives can then be used to identify the measures and policies in the next step (see Identifying EBM measures and policies: taking action). Once identified, the expected impacts of measures and policies can be formulated into management scenarios, following the process used to develop the baseline scenario (see Evaluating EBM options).

CASE STUDY EXAMPLE – SWISS PLATEAU

AQUACROSS’s Swiss Plateau case study (see Case Study: Swiss Plateau) aimed to support cost effective improvement of the ecological state of rivers by restoring ecosystems and reducing the impact of human activities. They used models to develop a baseline scenario based on the business as usual situation, including current environmental policy, the location of dams and other barriers and expected population growth. Stakeholders provided feedback and data to ensure this was realistic. They then used models to find management strategies that would improve environmental and societal outcomes without increasing cost, relative to this baseline.

Further information

This is one of 38 short briefs summarising the key results of the AQUACROSS Project. For more detailed information on the topics covered in this brief, see the following:

- Martin et al. (2017) Scenario Development. Deliverable 7.2, European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. ([Deliverable](#) and [Executive Summary](#))
- Kakouei et al. (2018) Assessing modelling approaches in selected case studies. Deliverable 7.3, European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. ([Deliverable](#) and [Executive Summary](#))
- Kuemmerlen, M., Reichert, P., Siber, R., & Schuwirth, N. (2019). Ecological assessment of river networks: From reach to catchment scale. *Science of The Total Environment*, 650, 1613-1627. <https://www.sciencedirect.com/science/article/pii/S0048969718334375> .



Revitalisation Chriesbach, Case Study Swiss Plateau © EAWAG, Peter Penicka



AQUACROSS has received funding from the European Union's Horizon 2020 Programme for Research, Technological Development and Demonstration under Grant Agreement no. 642317.