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# Planning an EBM response: Evaluating ecosystem-based management options

## WHY IS IT IMPORTANT FOR AN ENVIRONMENTAL DECISION-MAKER TO EVALUATE ECOSYSTEM-BASED MANAGEMENT OPTIONS?

After identifying ecosystem-based management measures (see Identifying ecosystem-based management measures and policies: taking action), the evaluation step allows decision makers to compare the impact of different options. Here, decision makers compare new management measures and policy options to existing ones, as well as to different alternative options, according to their effectiveness, efficiency, and equity.

## WHICH STEPS NEED TO BE FOLLOWED WHEN CARRYING OUT AN EVALUATION?

### 1. Identifying the baseline

To realistically compare the impact of management measures, it is important to identify a clear baseline. The baseline scenario, i.e. what would happen if management stayed the same, is a shared view of the past, current and prospective trends in society and the ecosystem (see Developing Scenarios). It describes the impacts of current environmental and sectoral policy and management and expected external conditions (e.g. impact of climate change in the future) on an aquatic ecosystem. Evaluating management measures relative to a baseline scenario is preferable to evaluating immediate impact, as it by definition has a long-term focus, considers impacts on the whole system, and incorporates the influence of external factors (e.g. population growth).

### 2. Defining evaluation criteria

Within AQUACROSS, three minimum criteria are used for the evaluation: **effectiveness, efficiency**, and **equity and fairness**. Next to these basic criteria, others can be added (social acceptability, potential for funding, etc.), according to the priorities of the decision-maker.

> **Tip!** Decision makers need to reflect on what information is most interesting for them, and what data and capacities they have available. However, even though priorities may differ, all three minimum criteria identified in AQUACROSS (effectiveness, efficiency, equity and fairness) should be considered, even if different degrees of depth and detail are applied. This avoids the risk of failing to identify important weaknesses of a management measure.

### 3. Defining indicators

All criteria are assessed on the basis of indicators (see Developing relevant indicators), which specify the extent to which certain criteria are fulfilled. The choice of indicators needs to be carefully adapted to each situation, and will depend on the objectives which you aim to achieve (see Integrative environmental objectives), and the information available.

### 4. How to evaluate effectiveness?

The evaluation of effectiveness assesses the extent to which different management options reach an environmental goal. This goal might be a combination of physical and biological conditions of the ecosystem (e.g. water quality objectives, species distribution, ecological continuity, etc.). Depending on time and resources available for the evaluation and the complexity of the issues being considered, a risk assessment and/or simulation models can provide support (see Modelling approaches supporting EBM, also see Case Study: North Sea).

### 5. How to evaluate efficiency?

The evaluation of efficiency looks at the costs and benefits (i.e. the impacts on human wellbeing) of implementing environmental management options. Next to the direct costs of measures (e.g. investment costs necessary for restoring river floodplains), the evaluation of efficiency includes the identification – and ideally quantification and monetisation – of any changes (positive or negative) in ecosystem services (see Introducing EBM) that can be expected from different management choices. This can be linked for example to changes in services of water purification, recreational opportunities, biomass production, etc.

**Tip!** Ecosystem-based management evaluation requires interdisciplinary input – i.e. natural and social science. For example, to assess the economic value (i.e. social science) of the change in fish catch due to new management, you first need to understand the induced changes in the ecosystem and fish stocks, which depends on natural scientists.

### 6. How to evaluate equity and fairness?

Once you have identified the costs and benefits of different management measures, it is important to assess how these are distributed among different groups in society (e.g. stakeholders from different sectors, locations, or generations). This provides important information on the expected acceptability of proposed changes. If you find that those bearing costs (e.g. farmers which are required to change their practices) are not the ones benefitting from the changes (e.g. increased recreational potential), policy instruments (see Identifying EBM measures and policies: taking action) that balance the distribution of benefits and costs (e.g. taxes and subsidies) can increase social equity (e.g. see Case Study: Azores).

### 7. How to bring everything together?

Once you have undertaken the evaluation exercise and you know how effective, efficient and equitable the different management options you consider are, these results need to be brought together to take a final decision. This should ideally be done in collaboration with relevant stakeholders, to which results can be presented and discussed. It is very likely that different types of information will be available for different criteria – varying between quantitative, indicator-based information, monetary information, or qualitative evaluations.

**Tip!** Trade-offs will always exist. The evaluation exercise helps to render potential trade-offs transparent, but it is up to the decision-maker – ideally in cooperation with relevant stakeholders – to set priorities and to make the choice accordingly.

**Tip!** Any evaluation exercise will be subject to uncertainty, which can be linked to the choice of the method, to available data, or to the interpretations of results. Being transparent is important so that as new information becomes available, choices can be adapted.

## CASE STUDY EXAMPLE – THE DANUBE RIVER

AQUACROSS's Danube case study (see Case Study: Danube) evaluated the effectiveness and efficiency of a newly proposed allocation approach for restoration sites along the Danube River, which resulted from a spatial optimisation process. The evaluation indicated that the new sites would reach environmental and biodiversity-related objectives at lower cost than the baseline. These results can be used to help decision makers ensure efficient use of available resources for river restoration projects along the Danube.

### 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:


- Gomez et al. (2016) Developing the AQUACROSS Assessment Framework. Deliverable 3.2, European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. (Deliverable and Executive Summary)
- Piet et al. (2017) Making ecosystem-based management operational. Deliverable 8.1, European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. (Deliverable and Executive Summary)
- Mattheiß et al. (2018) Evaluation of Ecosystem-Based Management Responses in Case Studies. Deliverable 8.2, European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. (Deliverable and Executive Summary)
- Funk et al. (2018) Danube River Basin – Harmonising inland, coastal and marine ecosystem management to achieve aquatic biodiversity targets. Deliverable 9.2, Case Study 3. European Union's Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. (Report and Executive Summary)


Connected sidearm, Case Study Danube © Andrea Funk

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