# Further research needs

Based on AQUACROSS work and results, the AQUACROSS Consortium has identified five key areas for further related research.

## 1 Integrating biodiversity protection into sectoral policy agendas

### Background

Based on the findings of AQUACROSS, biodiversity protection has not yet been mainstreamed into sectoral policies, and therefore, sectoral policies often are in conflict with existing environmental targets. This limits the effectiveness of existing biodiversity protection measures.

### Goal

Objectives of the European Environmental Directives are truly reflected in the objectives of relevant sectoral policies. Furthermore, implementation of the EU Biodiversity Strategy should be assessed with quantifiable targets and objectives.

**Proposed research questions**

- How could the EU implement a holistic approach to biodiversity protection within their policy framework? What would be the institutional framework?
    - Explore the possibility of a 'third wave' of EU environmental policy aligned with theSustainable Development Goals, i.e. EU Directives and Regulations that consider multiple objectives in an integrative manner.
- How can sectoral policies (Common Agricultural Policy and Common Fisheries Policy) more effectively help to conserve biodiversity?
- Would it be necessary to go from overall policy objectives for biodiversity to species/habitat-specific objectives; or to develop different aims for different types of habitats/species, such as migratory, terrestrial and aquatic species?
- How can EU policy objectives be effectively transposed into local biodiversity management strategies, whilst recognising transboundary and scale challenges?
- How can short-term decision making be overcome when dealing with long-term aspects of biodiversity protection? How could policy cycles be detached from management requirements?

### Expected impacts

By continuing research on the topics above, reporting and monitoring for environmental policies could be improved. Furthermore, the implementation of the environmental policy framework could be made more effective and EU sectoral funds could be better allocated to achieve biodiversity and other environmental objectives. Sustainable economic growth could be supported while taking into account environmental boundaries.

## 2 Improving the understanding of links between biodiversity, ecosystems and ecosystem services Background

### Background

The AQUACROSS Linkage Framework (see Linkage Framework) included components such as biodiversity, ecosystems, ecosystem functioning and ecosystem services. Nevertheless, the development of local ecosystem-based management plans during the project showed that major research gaps on the links between these different components still exist.

### Goals

Links between biodiversity and ecosystem service provision are better understood and therefore measures to protect biodiversity in order to enhance or maintain a supply of ecosystem services are developed based on an improved knowledge base.

**Proposed research questions**

- What are the causal links between changes in ecosystem state and specific provision of ecosystem services? For example, investigate further the role that habitat connectivity related to the dispersal of species and transport of matter and energy plays for ecosystem services provision? How can the large scale movement of species be considered for?
- Which species and habitats are most at risk and why is this the case? What can be done to stabilise their populations? How can we identify critical habitats for species, and how can we to protect them?
- Do some aquatic species produce ecosystem functions that are irreplaceable? Can large species, which typically require large habitats, fulfil umbrella functions for other species for freshwater biodiversity in general?

### Expected impacts

Improved knowledge on the link between biodiversity and ecosystem services will support prioritisation of policy decisions on biodiversity protection. Funding for environmental protection will be applied to protect habitats/species with greatest ecosystem services provision. A focus on habitat connectivity will ensure that protection is not done in isolation but under consideration of the linkage between different ecosystems.

## 3 Further developing practical models of the social-ecological system to support effective decision making at the local level

### Background

The AQUACROSS Assessment Framework includes environmental but also socio-economic aspects and the links between these different components. However, due to a limited duration of AQUACROSS, research gaps remain. Better understanding of the social-ecological system, and translating this into practical tools to support local managers will support effective management.

### Goal

Improve tools for understanding the aquatic biodiversity and socio-ecological systems. This will improve the accuracy of respective models in the future and support the development of more holistic protection approaches.

**Proposed research questions**

- To what extent is climate change impacting biodiversity and consequently ecosystem services provision? Will climate change hinder biodiversity protection measures?
- What role does aquatic biodiversity (and healthy aquatic ecosystems) play in mitigating climate change? And adapting to climate change?
- Which spatial and temporal scales are most relevant to improve aquatic biodiversity and ecosystem service provision model results?
- Which human interactions with aquatic ecosystems positively influence its biodiversity or reinforce ecosystem functions for long-term ecosystem services provision?
- How can the baseline information for ecosystem-based management be improved (e.g. detailed spatial maps of social-ecological system)?
- How can trade-off assessments between society and the environment be improved?
- How can we extend the AQUACROSS Linkage Framework to support local managers of biodiversity e.g. include spatial data, valuation?

### Expected impacts

Further research on socio-economic modelling approaches could improve the accuracy of the results and hence the knowledge base for decision making. The consideration of climate change impacts in the development and prioritisation of protection measures will become increasingly important, especially to inform management choices under climate adaptation. The understanding of human dependence on ecosystem-services and biodiversity will be improved. Management will be improved through more practical tools and guidance.

## 4 Communicating the complex issue of biodiversity to different stakeholders (general public, policy, businesses)

### Background

A major issue in local biodiversity protection is a lack of communication with the local stakeholders, which hinders the understanding of the issue of biodiversity loss and benefits of ecosystem services, and thus consequently limits the implementation of ecosystem-based management measures. This was apparent in the AQUACROSS case studies. In addition, the increase in local acceptance that biodiversity is of value to the local economy and wellbeing will support effective biodiversity protection.

### Goal

Testing and identifying suitable tools for communicating the issue of biodiversity loss, stakeholder's role in biodiversity decrease and protection, and the benefits of ecosystem-based management.

**Proposed research questions**

- How to be strategic about the identification and involvement of relevant stakeholders?
- How can relevant businesses down the value chain be involved in the discussions (e.g. supermarkets)?
- How can local stakeholders be effectively informed, what communication techniques are necessary to reach the public?
- Can we develop stakeholder-accessible databases for economic valuation of ecosystem services?
- How can data be made available to stakeholders in a FAIR way (Findable, Accessible, Interoperable, and Re-usable)?
- How do we increase the willingness to pay for ecosystem restoration?
- Freshwater species are out of sight, often hidden below the surface - how are these species perceived in society? How can the normal public be educated to become interested and caring for biodiversity (assuming that by public interest pressure can be built up for politicians to work towards changes)?
- How can society be convinced of the value of functioning ecosystems in relation to the value of economic growth?
- How can policy language be adapted to enhance communication and understandings and to avoid lack of confidence (at local level)?

### Expected impacts

An increased public awareness of the economic benefits of pristine aquatic ecosystems and linked biodiversity with increased knowledge on how ecosystem-based management can be applied to protect aquatic biodiversity. This would result in broader public engagement when ecosystem-based management is integrated into local aquatic biodiversity management, which would increase likelihood of successfully protecting biodiversity.

## 5 Putting ecosystem-based management into practice

### Background

The AQUACROSS project identified a number of local limitations that can hinder the application of ecosystem-based management to a certain extent. These range from existing structures (i.e. regulatory, sectoral etc.) up to local participation.

### Goal

To identify how ecosystem-based management as a tool can best be made available to local practitioners linked to an endangered aquatic ecosystem or species. Further research the limitations of ecosystem-based management that hinder application in local management areas.

**Proposed research questions**

- Which of the ecosystem-based management steps/principles have the greatest impact on management decisions? How can these be structured / used to have greatest impact for stopping biodiversity loss?
- How can governance aspects be further integrated into ecosystem-based management?
- How can successful case studies be scaled up?
- What (additional) practical tools are required by local policy-makers to implement ecosystem-based management?
- What financing options are optimal? Are there sustainable and profitable public-private partnerships for the protection of aquatic biodiversity available?
- What are the long-term impacts of ecosystem-based management, for example in the AQUACROSS case studies?
- Is ecosystem-based management being implemented by the relevant decision makers/ practitioners? Why is ecosystem-based management not being implemented? What are the reasons ecosystem-based management is not being widely applied?

## Expected impacts

Ecosystem-based management will be widely applied in local aquatic management sites as it is known to deliver optimal results in efforts towards aquatic biodiversity protection. The regulatory framework for application is straight-forward and cross-sectoral. Local nature managers would be inclined to apply ecosystem-based management rather than traditional management methods that avoid a holistic approach to biodiversity protection.

← **Go to Brief #37: Recommendations: Fisheries**

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**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:

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