



Managing aquatic biodiversity: from local to global – an EU perspective

Introducing the EU research project AQUACROSS

This brief highlights the links between EU policy objectives and global targets for sustainable development, centring on aquatic ecosystems. It describes current research within the EU Horizon 2020 project **AQUACROSS (Knowledge, Assessment and Management for AQUatic Biodiversity and Ecosystem Services aCROSS policies)**, focusing on an integrative approach – ecosystem-based management (EBM) of aquatic ecosystems – to understand and balance common social, economic, and environmental objectives towards a more sustainable future.

KEY MESSAGES

- 🌊 The **EU Biodiversity Strategy, Convention on Biological Diversity (CBD) Aichi Biodiversity Targets, and Sustainable Development Goals (SDGs)** are closely aligned in their objectives and provide a global opportunity to address causes of biodiversity loss in aquatic realms as well as promote changes in models for socioeconomic development affecting biodiversity.
- 🌊 **Ecosystem-based management** is a management approach for **aquatic ecosystems**, well suited to support the achievement of economic, social, and environmental goals - useful to help identify tradeoffs and capitalise on win-win synergies that benefit both biodiversity and human wellbeing.

Through co-building management approaches with **stakeholders** and **local authorities**, policies to protect aquatic biodiversity can be designed, developed, and tested at a local level, contributing across scales and informing EU and international policy processes and goals.
- 🌊 An **advanced understanding and new science to assess aquatic ecosystems and the complex interactions** they hold is needed to generate better descriptions and quantifications of the linkages between socioeconomic and ecological systems so practitioners can begin to consider the practical application of EBM across aquatic ecosystems.
- 🌊 The **lessons learned through local case studies** in the European research project **AQUACROSS** will provide valuable knowledge and real-world examples for improving the holistic management of aquatic domains both within Europe and around the world.



GROWING PRESSURES ON AQUATIC BIODIVERSITY

Freshwater, coastal, and marine ecosystems are rich in biodiversity and home to a diverse array of species and habitats. Both within the EU and beyond, these aquatic ecosystems provide numerous economic and societal benefits in the form of ecosystem services. For example, they supply individuals with food, help to prevent floods, and provide sources of energy and minerals. Many of these valuable aquatic ecosystems and the services they provide are at risk of being irreversibly damaged. Human activities lead to pollution, contamination, invasive species, overfishing and climate change, among others (EEA, 2015). These pressures are intensified by global challenges such as population growth, increasing competition for natural resources, and climate change.

"based on current trends, pressures on biodiversity will continue to increase at least until 2020, and ... the status of biodiversity will continue to decline."

Secretariat of the Convention on Biological Diversity, 2014

The SDGs represent an ambitious plan to reach a sustainable future by 2030. They also show that biodiversity is not simply an environmental goal. It is also essential to social and economic ambitions. The CBD Aichi Biodiversity Targets also recognise biodiversity for a sustainable future – both as a means and a goal. Similarly, the EU has identified that biodiversity in freshwater, coastal, and marine ecosystems, amongst others, is of great significance and that there is a risk of damaging it irreversibly. The EU's goals are formulated in the 2020 Biodiversity Strategy, which seeks to address the main factors driving biodiversity loss and to reduce existing pressures on nature.

The EU Biodiversity Strategy 2020 headline target is 'To halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, restore them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.'

LINKING EU POLICY TO GLOBAL GOALS

The EU Biodiversity Strategy is translated into action in aquatic realms through a complex array of overlapping and at times poorly aligned and implemented environmental policies and laws, including the Marine Strategy Framework Directive (MSFD), Water Framework Directive (WFD), Birds and Habitats Directives (BHD), and the Invasive Alien Species Regulation (IAS), as well as a number of sectoral policies, such as the Common Agricultural Policy (CAP). Despite some progress and effort, EU directives have, as of yet, not been able to halt and reverse the trend of declining biodiversity in aquatic ecosystems.

The 2015 mid-term review of the EU Biodiversity Strategy concluded, *"at the current rate of implementation biodiversity loss and the degradation of ecosystem services will continue throughout the EU and globally, with significant implications for the capacity of biodiversity to meet human needs in the future."*

By considering common policy goals, data streams, objectives, and definitions, existing EU policy frameworks could potentially be streamlined to help meet global initiatives. The EU Biodiversity Strategy establishes six targets to halt the loss of biodiversity and ecosystem services. As shown in the figure below, **the EU biodiversity policy is closely aligned with international goals.** The figure was constructed by conducting a crosswalk exercise and matching the 6 headline EU Biodiversity Targets (and their twenty specific actions) with the CBD's Aichi Targets and the SDGs (and their 169 specific targets) based on keywords. For example, EU Biodiversity Target 5 Combat Invasive Alien Species aims under action 15 to, *"provide a legal framework*

to fight invasive alien species" within its lifetime of 2011–2020. This can be considered a close match for Aichi Biodiversity Target 9: *"By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment,"* and Target 15.8 of the 15th SDG, Life on Land, which states that *"by 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species."* While some of the links between overarching targets and goals displayed are easy to identify, for others it is necessary to go to the action or specific target level to see the link.

Aichi Biodiversity Targets (2011–2020)

EU Biodiversity Strategy to 2020

Sustainable Development Goals (2015–2030)

- 2. Integrate biodiversity values
- 5. Decrease loss of natural habitats
- 11. Conserve ecosystems
- 12. Save threatened species
- 13. Safeguard genetic diversity
- 14. Restore ecosystems with essential services
- 15. Restore ecosystems for the climate

- 1. Protect species and habitats**
Improved conservation status for 100% of protected EU habitats and 50% of species by 2020

- 6. Clean Water and Sanitation
- 11. Sustainable Cities and Communities
- 12. Responsible Consumption and Production
- 14. Life below Water
- 15. Life on Land

- 2. Integrate biodiversity values
- 3. Reform biodiversity incentives
- 5. Decrease loss of natural habitats
- 10. Impacts from climate change
- 11. Conserve ecosystems
- 14. Restore ecosystems with essential services
- 15. Restore ecosystems for the climate
- 19. Improve biodiversity knowledge

- 2. Maintain/restore ecosystems**
Using green infrastructure and by restoring at least 15% of degraded ecosystems, by 2020 all ecosystems are maintained or enhanced

- 6. Clean Water and Sanitation
- 13. Climate Action
- 14. Life below Water
- 15. Life on Land

- 2. Integrate biodiversity values
- 3. Reform biodiversity incentives
- 4. Produce/consume sustainably
- 5. Decrease loss of natural habitats
- 7. Manage agriculture, forestry, and aquaculture sustainably
- 8. Decrease pollution
- 13. Safeguard genetic diversity
- 17. National biodiversity strategy

- 3. Sustainable agriculture/forestry**
By 2020, species and habitats and associated ecosystem services reliant on agriculture and forestry show improved conservation status

- 2. Zero Hunger
- 6. Clean Water and Sanitation
- 8. Decent Work and Economic Growth
- 11. Sustainable Cities and Communities
- 12. Responsible Consumption and Production
- 14. Life below Water
- 15. Life on Land

- 2. Integrate biodiversity values
- 4. Produce/consume sustainably
- 5. Decrease loss of natural habitats
- 6. Fish sustainably
- 7. Manage agriculture, forestry, and aquaculture sustainably
- 11. Conserve ecosystems
- 13. Safeguard genetic diversity

- 4. Sustainable fishing/healthy seas**
By 2015 fishing is sustainable and by 2020, fish stocks are healthy and oceans are ecologically diverse and clean, healthy, and productive

- 2. Zero Hunger
- 6. Clean Water and Sanitation
- 8. Decent Work and Economic Growth
- 12. Responsible Consumption and Production
- 14. Life below Water

- 2. Integrate biodiversity values
- 9. Manage Invasive Alien Species (IAS)

- 5. Combat Invasive Alien Species (IAS)**
By 2020, identify IAS, control or eradicate priority species, and implement preventative measures

- 6. Clean Water and Sanitation
- 15. Life on Land

- 2. Integrate biodiversity values
- 3. Reform biodiversity incentives
- 4. Produce/consume sustainably
- 5. Decrease loss of natural habitats
- 8. Decrease pollution
- 10. Impacts from climate change
- 13. Safeguard genetic diversity
- 14. Restore ecosystems with essential services
- 15. Restore ecosystems for the climate
- 16. Share biodiversity benefits
- 20. Mobilise financial resources

- 6. Protect global biodiversity**
Step up EU contribution to protecting global biodiversity by greening the EU economy and reducing international pressures

- 2. Zero Hunger
- 6. Clean Water and Sanitation
- 12. Responsible Consumption and Production
- 13. Climate Action
- 14. Life below Water
- 15. Life on Land
- 17. Partnership for the Goals

Note: The wording of the CBD Aichi Targets has been shortened to fit this table. The full wording can be found here: www.cbd.int/sp/targets. The SDGs and their underlying targets can be found here: <https://sustainabledevelopment.un.org/sdgs>.

ECOSYSTEM-BASED MANAGEMENT (EBM)

The lack of success by EU policy is the result of amongst other things, an isolated view towards EU policies, their fragmented implementation, and the management divide between the public and private sector (Joint Meeting of the Nature, Marine and Water Directors, 2013). Developing a holistic, integrated approach to managing biodiversity in alignment with competing policy and societal objectives is a crucial step for the EU to reach its biodiversity targets.

Ecosystem-Based Management (EBM) is an adaptive management approach which considers ecological integrity, biodiversity, resilience and ecosystem services to allow multiple benefits to human well being and contributions to a range of societal goals to be considered by managers and policy makers. Thus, within EBM social-ecological interactions are acknowledged and the balance between ecological and social concerns is sought, rather than treating society and the environment as separate entities. In this regard, it is essential that EBM is carried out at appropriate scales and takes into account stakeholder knowledge and multi-disciplinary knowledge.

By identifying the links between economic, social, and environmental goals, EBM can help identify tradeoffs and pinpoint win-win synergies – with benefits for biodiversity and human wellbeing. EBM's system-wide approach and integration of social and environmental factors make it an attractive match for the inherently multi-sectoral, trans-boundary and spatial nature of managing aquatic biodiversity.

AQUACROSS: EU AQUATIC BIODIVERSITY RESEARCH

The EU, which aspires to be a leader in global research and change for a common, sustainable future, is well suited to bring new and innovative ideas and management approaches for protecting biodiversity into the world discussion. With its 28 Member States, the EU spans numerous and diverse cultures, political landscapes, and administrative boundaries, as well as freshwater, coastal, and marine ecosystems. In this sense, it offers a valuable laboratory for identifying, testing, and developing ideas to achieve global biodiversity goals.

The AQUACROSS project will develop an Assessment Framework for operationalising ecosystem-based management that will both draw on and be put into practice in eight case studies. The case studies have been specifically selected to

- 1 showcase specific elements of the objectives of the EU 2020 Biodiversity Strategy relevant for the management of aquatic ecosystems;**
- 2 understand the most relevant challenges surrounding the protection of aquatic biodiversity;**
and
- 3 maximise the lessons learnt and up-scale results.**

In this regard, the AQUACROSS project draws on **local expertise and knowledge, focusing on site-specific challenges** and **co-building solutions with end users and stakeholders** to ensure the relevance and usefulness of the Assessment Framework.

Of particular relevance to international sustainability goals, AQUACROSS includes a case study in the archipelago of the Azores, an autonomous region of Portugal situated in the North Atlantic Ocean and one of Europe's Outermost Regions. Due to their exceptional biodiversity and increasing anthropogenic and natural pressures, these regions face many of the same challenges as Small Island Developing States around the world: how to balance the need for economic development with the pressure it places on the islands' essential biodiversity.

AQUACROSS - EU BIODIVERSITY STRATEGY LINKS

AQUACROSS outputs	EU Biodiversity Strategy 2020
A consolidated and coherent outlook on EU policy for aquatic ecosystems	Target 1
Increase knowledge on biodiversity and drivers of aquatic ecosystem change	Targets 2,3,4, 5 and 6
Integrated assessment for all aquatic ecosystems including freshwater, coastal and marine systems and their linkages and mapping of ecosystem service provision	Targets 2 and 4
Better understanding and uptake of (i) the application of blue/green infrastructure and (ii) broader EBM for aquatic ecosystems	Targets 3, 4, 5, 6
Support the management of Natura 2000 sites and invasive alien species	Targets 1 and 5
Testing business models for the provision of ecosystem services that will contribute to ecosystem protection.	Targets 2, 3, 4, 5, 6

Note: see table above for link to international goals

AQUACROSS will contribute at local, national and European levels to the achievement of the goals of the CBD, namely those related to art. 6, 7, 10 (conservation and sustainable use of biodiversity), and 17 (exchange of information), and the SDGs (especially goals 6, 14, and 15 relating to aquatic ecosystems). It also contributes to a host of relevant protocols (e.g. Cartagena Protocol on Biosafety; Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization) and conventions (e.g. Convention on International Trade in Endangered Species; Bonn Convention on Migratory Species; Bern Convention on the conservation of European wildlife and natural habitats). With its focus on local stakeholder co-built solutions and international outlook, the findings of the AQUACROSS project are relevant for practitioners and policymakers striving to protect biodiversity and achieve sustainability goals across the world.

REFERENCES

-  EEA, 2015. State of Seas report. European Environment Agency Copenhagen, Denmark.
-  EU Biodiversity Strategy 2015, Mid-term Review Conclusions; <http://biodiversity.europa.eu/mtr/biodiversity-strategy-plan/eu-mid-term-review-conclusions>
-  Joint Meeting of the Nature, Marine and Water Directors, 2013. "Strengthening consistency, coordination and cooperation between nature, biodiversity, water and marine policy". Outcome of the 1st Joint Directors' Meeting.
-  Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4 Montréal, 155 pages; <https://www.cbd.int/gbo/gbo4/publication/gbo4-en.pdf>

THE AQUACROSS PARTNERS

Ecologic Institute (ECOLOGIC) | Germany

Leibniz Institute of Freshwater Ecology and Inland Fisheries (FVB-IGB) | Germany

Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO) | France

Stichting Dienst Landbouwkundig Onderzoek (IMARES) | Netherlands

Fundación IMDEA Agua (IMDEA) | Spain

University of Natural Resources & Life Sciences, Institute of Hydrobiology and Aquatic Ecosystem Management (BOKU) | Austria

Universidade de Aveiro (UAVR) | Portugal

ACTeon – Innovation, Policy, Environment (ACTeon) | France

University of Liverpool (ULIV) | United Kingdom

Royal Belgian Institute of Natural Sciences (RBINS) | Belgium

University College Cork, National University of Ireland (UCC) | Ireland

Stockholm University, Stockholm Resilience Centre (SU-SRC) | Sweden

Danube Delta National Institute for Research & Development (INCDDD) | Romania

Eawag – Swiss Federal Institute of Aquatic Science and Technology (EAWAG) | Switzerland

International Union for Conservation of Nature (IUCN) | Belgium

BC3 Basque Centre for Climate Change (BC3) | Spain

Contact aquacross@ecologic.eu

Coordinator **Dr. Manuel Lago, Ecologic Institute**

Duration **1 June 2015 to 30 November 2018**

Website <http://aquacross.eu/>

Twitter [@AquaBiodiv](https://twitter.com/AquaBiodiv)

LinkedIn www.linkedin.com/groups/AQUACROSS-8355424/about

ResearchGate www.researchgate.net/profile/Aquacross_Project2