

How is the linkage framework useful for the Water Framework Directive?

WHAT IS THE AQUACROSS LINKAGE FRAMEWORK?

The AQUACROSS Linkage Framework is a semi-quantitative tool designed for river basin managers to understand the links between human activities and the ecological system. It is a structured framework for understanding how human activities impact aquatic ecosystems, and how these ecosystems provide benefits to human society. It can be used at differing levels of complexity – simply to highlight priority elements or to more quantitatively assess risks and vulnerabilities within the system. It is based on the Drivers-Pressures-States-Impacts-Responses (DPSIR) to be consistent with the Water Framework Directive (WFD) approach ([see Linkage Framework](#)).

WHY IS THE AQUACROSS LINKAGE FRAMEWORK USEFUL FOR RIVER BASIN MANAGERS?

It helps to better understand the full picture.

Understanding the full picture helps identify the causes of failure to achieve good ecological status, and to prioritise effective measures and appropriate monitoring. Achievement of good ecological status is affected by human activities and ecological functions throughout the river basin and beyond the borders (i.e. beyond coastal waters) considered for WFD purposes. The linkage framework helps identify all human activities (e.g. agriculture) that place pressures (e.g. nutrient pollution) on each element of aquatic ecosystems (e.g. specific habitats, macrophytes, fish). It then identifies how each element of the aquatic ecosystem delivers valuable goods and services to society (e.g. recreation, fish) and finally reveals the links and relationships between these. The Linkage Framework particularly highlights drivers of biodiversity loss and impacts on ecosystem services, which are insufficiently taken into account in the DPSIR framework.

It helps you identify where best to act.

The Linkage Framework can be used to identify the most central, at risk, or vulnerable parts of the system, and what they affect or are affected by. This helps to target actions to protect aquatic ecosystems (e.g. focusing on specific human activities) and achieve good ecological status, and to prioritise what to monitor (e.g. specific species or pressures).

It incorporates aquatic biodiversity into river basin planning.

The Linkage Framework specifically incorporates aquatic biodiversity into the understanding of the system being managed and therefore allows it to be included in river basin planning. Considering biodiversity goals in planning decisions allows multiple policy objectives to be achieved simultaneously (such as the targets of the Biodiversity Strategy or conservation status under the Habitats Directive). Furthermore, protecting and restoring aquatic biodiversity helps to achieve good ecological status. For example, improving the biodiversity of riparian wetlands reduces nutrient pollution. Considering biodiversity and water policy targets simultaneously in this way provides additional funding to biodiversity protection (through Water Framework Directive funding) and enhances value for money.

It helps to structure socio-economic assessments (under article 5 of the WFD).

The Linkage Framework connects economic activities to ecological functions and ecosystem services. In this way, the assessments can be targeted towards understanding economic drivers of the human activities that put pressure on freshwater ecosystems and threaten the achievement of good ecological status, and the benefits that healthy ecosystems provide society.

The Linkage Framework can capture the broad values of multi-functional measures.

Measures designed for improving ecological status, such as wetland restoration to reduce nutrient loading, frequently provide multiple other benefits, including carbon sequestration, recreation and others. The Linkage Framework helps identify all of the ecosystem services provided by the measures and by improved status of waterbodies. In this way, the multiple benefits of multi-functional measures can be more accurately considered in decision-making.

It is useful for communicating the added value of the Water Framework Directive to stakeholders and financiers.

By identifying the multiple benefits of measures (in terms of ecosystem services), stakeholders and financing bodies can more easily understand the value of the measures in particular and the Water Framework Directive in particular.

BEST PRACTICE: TIPS FOR APPLYING THE AQUACROSS LINKAGE FRAMEWORK

TIP! Look beyond the borders of the river basin district – human activities in the river basin district affect coastal and marine ecosystems. The Linkage Framework can support collaboration with Marine Strategy Framework Directive-focussed colleagues by showing links between freshwater, coastal and marine systems and by providing a common terminology for understanding these systems. It can also assist coordination with nature managers (e.g. of Natura 2000 sites) whose biodiversity goals affect and are affected by river basin planning.

TIP! Mobilise existing information – this includes identifying data and stakeholder knowledge. Involving stakeholders in the development of the Linkage Framework increases accuracy and also supports buy-in and understanding.

TIP! Don't get lost in the detail – while the tool captures considerable complexity, this can be paralysing and confuse communication. Focus on the key stories, elements, and links that arise. Here, working iteratively with stakeholders can help.

CASE STUDY EXAMPLE – THE DANUBE RIVER

To prioritise floodplain restoration measures in the Danube River Basin, the AQUACROSS Danube case study ([see Case Study: Danube](#)) used the Linkage Framework ([see Linkage Framework](#)) to understand the complex socio-ecological system. The framework showed linkages between hydropower and navigability and alterations to hydro-morphology, as well as urbanisation and agriculture. This allowed for a greater characterisation and understanding of the whole system, relative to current management, and thus enabled new, balanced consideration of its management, which achieved multiple environmental targets at lower overall cost.



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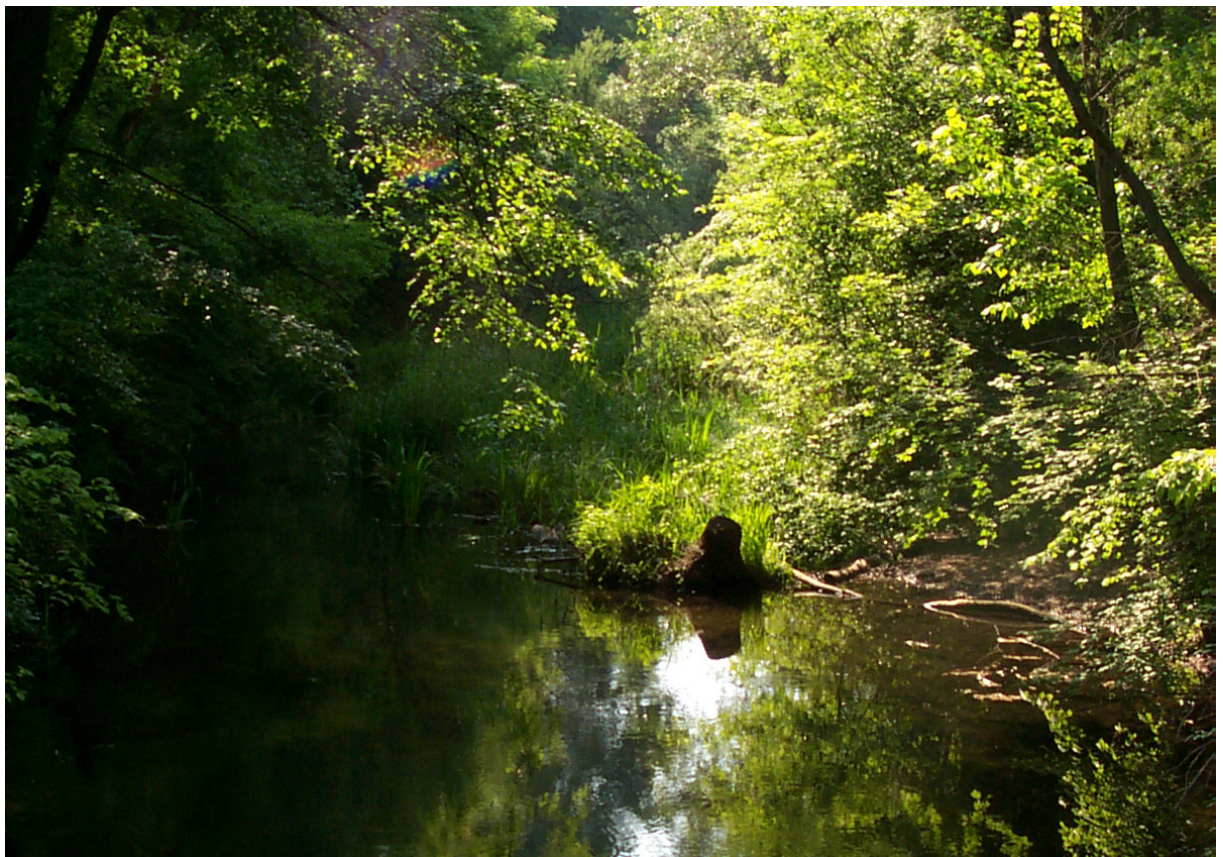
Go to Brief #25:
AQUACROSS Linkage
Framework: Marine



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:

- 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](#))
- Costea et al. (2018) Assessment of drivers and pressures in the case studies. Deliverable 4.2, European Union’s Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. ([Deliverable](#) and [Executive Summary](#))
- Teixeira et al. (2018) Assessment of causalities, highlighting results from the application of meta-ecosystem analysis in the case studies. Deliverable 5.2, European Union’s Horizon 2020 Framework Programme for Research and Innovation grant agreement No. 642317. ([Deliverable](#) and [Executive Summary](#))



Connected sidearm, Case Study Danube © Andrea Funk



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