



Briefing for Navigation Sector

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Mainstreaming aquatic restoration using Nature-based Solutions: Supporting Transformation

A collaborative approach with key economic sectors is essential to enable the H2020 MERLIN project to promote systemic transformative change. We will co-develop transformation strategies with different sectors to **mainstream restoration as a Nature-based Solution (NbS)**. Working with nature at landscape scale can contribute to the EU Green Deal objectives (climate resilience, improved biodiversity, zero pollution, sustainable food systems, health, and wellbeing).

NbS has been defined by the International Union for Conservation of Nature (IUCN) as “actions to **protect, sustainably manage, and restore** natural or modified ecosystems, that address **societal challenges** effectively and adaptively, simultaneously providing **human well-being** and **biodiversity benefits**”.¹

This briefing focuses on the **Navigation Sector**. It summarises MERLIN’s understanding of the sector’s current connection with rivers and wetlands, and how Nature-based Solutions (NbS) are viewed within the sector at the start of the collaboration. The briefing proposes how MERLIN (for more information visit www.project-merlin.eu) can support the Navigation Sector to implement NbS.

How can MERLIN support transformation?

The Navigation Sector can play a crucial role in responding to Europe’s Green Deal objectives, particularly sustainable transport. Transformation whereby NbS becomes the new normal will only happen through multiple actions involving government, markets, and citizens. MERLIN will support this through understanding how and why the Navigation Sector is already making positive changes, sharing good practice between European countries, and exploring how NbS could help overcome some of the challenges faced by the sector. The briefing is based on a range of insights from involving individuals actively engaged in the Navigation Sector (using Round Table Discussions (RTDs), questionnaires, interviews) and a desktop review of formal documents. We are very grateful for the insights shared to date, which have helped us understand the different positions. The synthesis provided in this briefing reflects the views of the authors and does not imply consensus within our developing **Community of Practice**. Our Community of Practice concerns EU and Member State level policy and commercial actors of the Navigation Sector who share a common interest in improving their practices better through regular interaction and sharing information.



Relationship of the Navigation Sector with freshwater restoration and NbS

Brief description of the sector

In MERLIN we are focusing on **inland navigation (domestic freight and inland waterway passenger transport)**. The development and maintenance of fairway conditions is one of the reasons for the significant alterations of the rivers' hydromorphological conditions, which might change by using NbS. The sector needs a waterborne transport infrastructure including fairway dimensions that guarantee and maintain the ease and safety of navigation where fairway conditions fit the navigation class of the river stretches and where water levels are stable and predictable for calculation of transport times and costs.

A waterborne transport infrastructure that takes into account relevant physical and other factors (e.g. proximity to market and connectivity to the wider transport network)².

Acknowledging conflicts as well as potential benefits with environmental interests, the sector actively seeks stakeholder engagement and aims to develop win-win solutions, which maximise environmental benefits in future waterborne infrastructure development. Synergies between the sector and restoration are most likely infrastructure optimisations involving restoration measures, targeting physical river structures (e.g. riverbed, banks, etc.).

Inland waterway infrastructure is mostly publicly funded, which reduces incentives of individual companies to invest directly in restoration, especially since a traditional and not widely reflected view is that the sector does not directly depend on healthy ecosystems and mostly has not the legal duty to care about that. Nonetheless, the sector could support restoration finance either through enabling investment, collectively through umbrella organisations, or in the form of offsetting requirements. Obviously, there is a paradigm shift to co-benefit from investments in restoration measures.

NbS and their potential for supporting the sector

One of the challenges to the Navigation Sector is the problem of too high or too low water levels which is critical to fairway depth and width conditions. NbS can't influence the water discharge (it highly depends on the precipitation), but might have an impact on mitigation of these unfavourable conditions of several interests. **NbS could improve** water availability, riverbed conditions and address issues of flooding and sediment balance or imbalance which is also a challenge for many sectors including navigation. NbS is also an effective tool to balance divergent interests of stakeholders.

Technical measures which have an impact on sediment balance already exist and these are usually similar to measures serving other purposes (flood risk reduction or restoration).

The NbS approach is an opportunity to get closer to the planning procedures and implement them (including the proposed measures) in a harmonised way.

Climate change, decreasing discharges, deepening riverbeds and filling floodplains, as well as significantly less amount of sediment are the conditions at which solutions need to be thought about, and taking into account the diverse roles and functions of water/rivers, the balance of the hydrological cycle which would ensure more stable fairway conditions as well.

Within this framework there are interventions from which navigation can benefit in the short or long term. Discharge can be directly influenced, with spot-like barrages but slowing down of the hydrological cycle can be achieved by breaking down coastal pavements and initialising sinuosity, tributaries and vegetation will be restored and the coastal part of the stoneworks regulating navigation will be demolished.



How the sector currently understands NbS

As discussed at the roundtable meeting with the Navigation Sector in MERLIN, while increasing the share of waterborne transport by Navigation (as a European Green Deal goal), restoration efforts may face the challenge of coping with intensifying traffic. Connected to this, risk of increased impact on riverine ecology cannot be excluded.

According to a roundtable meeting with the Navigation Sector, with regard to the EU level targets, waterways authorities take as a reference the **existing EU environmental legislation** for projects. These **do not contain any specific NbS targets but push for non-deterioration and enhancement of ecological values, to be reached e.g. by forward-looking restoration** which by their nature favour the trend towards more NbS.

Sustainable and smart mobility is more about zero emission and there is less attention on fairways' maintenance impact on rivers' hydromorphological and ecological conditions. Zero emission doesn't contribute to the no biodiversity loss principle and doesn't substitute that. Fields of cooperation need to be identified and developed in that respect.³

Solutions to climate change are also different among the sectors, nature conservation's view is to mitigate the effects and **make natural structures more resilient again**, e.g. make the sidearms able to keep water and the fairway maintenance structures hinder this in most cases; in spite of this Navigation Sector would still increase navigability days on intact sections as well which, especially on intact stretches lead often to a deterioration of ecosystem services.

More frequent and extended low water seasons are critical both to navigability and habitats' conditions. During low waters nature's demand are wide and shallow water conditions (in order to provide habitat suitability for adapted riverine biota), while Navigation requires a specific hydrological discharge in the main river course in order to provide the minimum water depth requirements). These are contradictory requirements which often require contradictory measures. Interventions without full understanding of collateral damages and load to other stakeholders is also a problem (e.g. increased capacity or year round navigability would bring even more traffic which has a negative effect for fish or macroinvertebrates but also for recreation), as it was a clear lessons learnt at the roundtable meeting.

There are **different types of waterways**, some historically have been modified more than others – context matters in decision making (e.g. difference between Rhine that is heavily modified and the Danube).⁴

NbS for the Navigation Sector is realised in concrete measures, where a complex view and planning is needed with the main focus on improvement of natural resources.

Good examples of NbS for the Navigation Sector

Fairway maintenance on Danube downstream Vienna

Danube is free-flowing and well connected to floodplains and has good ecological status under the WFD between Vienna and Bratislava. However, river ecology declined and hydromorphology was severely altered as a result of upstream hydropower dams, loss of continuity and the way the river was managed for Navigation.

The need for secure navigation and to prevent deterioration under the WFD in an integrated manner spurred a series of pilot projects between 2007 and 2014. The Danube Action Programme¹⁰ was developed to prevent deterioration in navigation or WFD status. The Action Program and pilot projects were both designed in close consultation between the competent authority and stakeholders.

The Action Programme included many projects on selected spots **to implement restoration actions like:**

- replacing groynes to significantly reduce the erosion of the riverbed, and to restore a natural shoreline and better fish passage,
- removing or reducing the height of embankments to allow more riverbank dynamics, and side-arm to be reconnected,



→ testing of 'granulometric' improvements to improve knowledge on solutions for stabilising riverbeds.

Very positive is the mutual understanding and cooperation between different interests, and the will of river managers to improve the ecological and morphological situation. However, important problems are not solved yet, and new problems arise.

→ Hydropower dams hold back sediments and cause erosion of the riverbed. This effect is amplified by dredging, done for waterway maintenance. Transport of sediment upstream helps to avoid further deepening of the riverbed. Nevertheless, erosion continues, though at a lower rate.

→ Increasing numbers of passenger ships (with a high velocity) cause increasing fish mortality, because of waves (washing young fish ashore).

Specific pilot projects demonstrate the ability⁵ to make substantial improvements to both navigation and ecology. Nevertheless, much more has to be done to prevent negative effects on threatened biodiversity features.



Challenges and Opportunities of the Navigation Sector

Challenges

- Low river flows, climate change, riverbed degradation, siltation of sediment, flooding (too much water), salt intrusion during drought impacting lock regimes are all concerns.
- Inland waterway transport is vulnerable to climate change because river navigation depends on water levels for its operations and extreme events may become more frequent.⁶
- NBS has been successfully identified as an important approach in combating climate change and biodiversity loss. In spite of potential benefits of NBS in maintaining and developing waterborne transport infrastructure have been less well recognised and considered in policy agendas. This has potentially contributed to lower market demand (by mainly public authorities) and the availability of financing.^{7, 8}

Opportunities

- **Flexibility in applying regulations** e.g. some sections of waterways on free-flowing sections can be exempt from minimum fairway width requirements – recognition that waterways need to be treated differently from other transport infrastructure such as roads. Flexibility is needed with waterways [i.e. more complex systems] to treat some sections as free flowing – where different parameters may be agreed.
- Rivers are living corridors and provide ecosystem services. These are not considered on the value which these could be. Further assessments (on valuing ecosystem services) would be necessary in selected Member States, or on certain river stretches). The impacts of harmful infrastructure developments on rivers (esp. free-flowing) are also risks on ecosystem services. The free-flowing character includes longitudinal and lateral connectivity, preserve, and protect the habitats, hydromorphological status, to maintain and support natural sediment mobilisation processes
- **Recognition that waterways are multifunctional systems** – Navigation is one of a number of other important aspects to balance and are interconnected (e.g. environmental considerations can benefit the Navigation Sector). This should be considered in decision making, however economic aspects still dominate.
- **Tourism and recreation benefits** recognised as linked to health, more natural freshwater ecosystems. More natural freshwater ecosystems support better tourism and recreation sectors.



- Section 2 of EU Regulation 1315/2013 deals with inland waterway infrastructure. The Regulation provides for the harmonisation of the Water Framework Directive and the Nature Directives (92/43/EEC, 2009/147/EC) at EU level. The Environmental Impact Assessment (EIA) procedure, the Strategic Environmental Assessment (SEA) and analysis under 4(7) paragraphs of WFD are the main tools for this. However, implementation of these procedures is challenging. The good morphological condition of natural rivers is often difficult to reconcile with the interests of Navigation.⁷
- **Recognise all dimensions of GD:** Recognition that Green Deal by the Navigation Sector relates to wider environmental challenges, not just emissions. Recognition that the Green Deal also implies “more transport over water”. Revising regulations: (to include environmental considerations better): Evaluation and revision of TEN-T regulations underway (over last 2 years) and involvement of water managers (e.g. not just with responsibility for navigation) with a focus on waterway maintenance to help (re)define the future requirements for inland waterways. This has highlighted the need to account for different characteristics of each waterways.
- Participants of the roundtable organised in March 2022 had little knowledge on what restoration and NbS means, they were open for further improvement of this knowledge. Dedicating staff capacity to that is a prerequisite to gather and share knowledge. It was also declared on the roundtable that currently NBS is no/less risk to inland navigation and fairway maintenance projects if properly and jointly designed: integrated sustainable projects, involving stakeholders – common and shared vision. Even potential opportunities to co-benefit for navigational targets are to be expected. There is a room for improvement in understanding NbS, which might motivate the cooperation with stakeholders from other fields of expertise.
- Financial influence – who, how and why make any steps for influencing financial decisions toward transition? What is the role of the market and regulations? Who could be eligible if joint project proposals are developed? Who has the responsibilities and what kind of?

When applying these opportunities, we concentrate on a) heavily modified rivers and b) more or less natural rivers which need more ‘training’ for navigational purposes. NbS can help in both cases.

We recommend to **differentiate the priorities and suggestions on NbS** in light of Navigation Sector **depending on rivers’ status and conditions** from hydromorphological point of view:

There are other opportunities on fully or partially channelized or dammed rivers (a) with relatively poor ecological status (rivers without bottlenecks for navigation); no big infrastructure developments are expected on these rivers, but maintenance works in the navigation corridor are necessary and improvement of the ecological status as much as possible is a high expectation. Here, emphasis can be on mitigation measures of previous waterway infrastructure developments. The sector expects that fairway conditions will not deteriorate.

Restorations or fairway improvement on rivers (b) that have more bottlenecks can have a different emphasis, because these are usually still rich in habitats in the main river course, have wide floodplains and side-branches (free-flowing rivers without dams). In these sections, the sector tends to expect infrastructure projects to improve the condition of the fairways. Under the guidance of the Green Deal, NbS can be an alternative to the traditional grey measures and allow improved navigation while preserving the integrity of hydromorphological conditions, habitats and rivers’ ecosystem services. Fairway conditions can improve, but not at the cost of natural conditions.



Cooperation (MERLIN & the Navigation Sector)

Whilst many different aspects of how the Navigation Sector may connect with NbS were discussed, we would like to focus on **integrated project delivery**. In the MERLIN project we will focus our work with the sector on the issues in bold:

- **Evidence of applying NbS** in sustaining fairways for navigation; evidence of applying NbS for delivering integrated solutions; showcasing results from navigable waterways where restoration was implemented with favourable effects on navigation and, or included clear navigational target – on Merlin case study sites if possible.
- **Reach and engage** other actors and cross-sectoral cooperation – river managers, water engineers and all who do the restoration, affected local communities, fairway maintenance administration bodies, etc.
- **Raise awareness** of NbS – improvement of the knowledge (training events on applying NbS in the Navigation Sector) is necessary from both practical / technical and decision making aspects.

Transformation and mainstreaming

- Currently NBS is no/less risk to inland navigation and fairway maintenance projects if properly designed: integrated sustainable projects, involving stakeholders – common and shared vision. Integrated planning principles to be approved and applied and using the 'case-by-case approach at all bottlenecks, which removal is requested to maintain fairway conditions.²
- Understanding rivers high ecological complexity requires comprehensive observations and management at the catchment scale – a holistic approach that is required by the EU Water Framework Directive.²
- Wide stakeholder involvement approach is necessary with participation of responsible governmental bodies, sectors' representatives (transport, nature conservation and other related ones), NGOs and research institutions.²
- it is important that new projects should be assessed with consideration for the main natural functions of river systems; in other words that they ensure maintenance of the key functions and ecological functions.⁹
- Opportunities: several financial mechanisms are available (see in NAIADES reports e.g. CEF etc.) – barrier is about planning integrated projects, environmental components shall be included, building shared vision. To show and justify benefits of NbS for navigation and nature conservation and other sectors and compiling cost-benefit analysis on project and programme level.
- The sector (its EU wide representatives) is keen on transforming/modernising sectoral policies/procedures; new guidelines are needed. Joint statements and their implementation increase the understanding of the two sectors (navigation, restoration).
- An innovative methodology for project cost-benefit-analyses is needed to display the multi-target effects to economic aspects.
- Keeping in mind the high sediment dynamics of the Danube and Rhine River, maintenance of navigation conditions is inevitable. Nevertheless, this should not contradict the natural sediment regime and navigation measures should aim to establish a dynamic equilibrium of the riverbed. (statement is from the Danube Sediment project's recommendations and is valid on other rivers, not only on Danube).

For **cross sectoral cooperation** (including ones outside MERLIN sectors) we need to understand the relationship between the Navigation Sector and freshwater NbS. In general all the MERLIN sectors (Hydropower, Navigation, Peat Extraction, Agriculture, Insurance) rely on the others to manage water resources better to avoid floods and droughts which means that their sectors can continue to operate profitably. Navigation – as with Insurance – requires stable flows. Navigation could benefit from water recharge from NbS upstream implemented on agricultural land and peatlands if it generates stable flows. River cruises also promote themselves partially based on the scenery and wildlife provided by river and floodplain restoration.



Next Steps

Overall, we are building a Community of Practice to support an understanding of NbS and how we can enable the mainstreaming of NbS in the Navigation Sector; and also how navigation can work with other sectors.

Together with participants from the six sectors, in the next year MERLIN will:

- Continue to engage with the sector to exchange ideas and develop understanding of their needs, challenges, and opportunities for NbS
- Examine the EU policy context and how in the future policy could better enable NbS.
- Incorporate issues of social justice alongside ecological and economic considerations in the process to mainstream NbS within the sector.

In the longer term until the end of the project MERLIN will:

- Identify opportunities for cross sector partnerships by applying a value chain approach.
- Co-develop route maps for transforming the sector's relationship with NbS.

For more information on how we will collaborate with the sectors' representatives or to discuss how you can help MERLIN please contact Anna Bérczi-Siket (Anna.Berczi-siket@wwf.hu) or Kirsty Blackstock (Kirsty.Blackstock@hutton.ac.uk).

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