MERLIN

MERLIN Report: 2nd Hydropower Sector Roundtable on Obsolete Barrier/ Hydropower Dam Removal as part of a Nature-based Solutions Approach

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Imprint

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MERLIN Key messages

1. The licensing process (e.g. for issuing, reviewing and renewing licenses) could include a greater focus on obsolete barrier removal and hydropower dam removal (i.e. once operations cease) within an Nature-based Solutions (Nbs) approach with the sector.
2. Removal of obsolete barriers for NbS (undertaking and funding) is a clear entry point for the sector however, there is a need to better understand and refine what is meant by 'obsolete'.
3. Opportunities exist to inform barrier/dam removal initiatives within an NbS approach by building on current tools and sector sustainability standards.
4. The ability to measure impact (e.g. from a baseline) on freshwater biodiversity improvement is currently lacking for the sector.
5. The insurance sector was identified as one sector where cross-sector collaboration to shape win-wins

MERLIN Executive Summary

The H2020 MERLIN roundtables aim to build a community of practice linking the economic sector representatives with MERLIN scientific and implementation partners to understand how Nature-based Solutions (NbS)[1] can be more widely adopted within sectors for tackling different challenges experienced within the sector and wider societal challenges, whilst also delivering benefits for biodiversity.

Following the multistakeholder 1st Hydropower Sector Roundtable and the Sector Briefing, a **second hydropower sector roundtable was held on June 6, 2023.** This report presents the main discussion points of the event – the findings will contribute to the development of a strategy for mainstreaming NbS through barrier removal with the Hydropower sector, which will be the focus of the third sector roundtable in 2024.

For the hydropower sector the focus of these roundtable discussions is on understanding how the sector could contribute to the removal of on-line barriers (i.e. impoundments holding back water within river channels), that are either: 1) obsolete[2]; or 2) directly linked to current hydropower function (herein referred to as hydropower dams) within a wider NbS approach. This would help the sector better contribute to freshwater ecosystem restoration. Thereby, even when feasible[3], the removal of barriers/dams by the sector is not viewed as sufficient on its own, instead such action to restore free flowing rivers is often understood as a core aspect of wider nature-based initiatives that explicitly aim to address sector challenges whilst enabling freshwater ecosystem restoration.

This report presents the key themes identified from the discussions that took place within the roundtable. These themes are structured under five headings.

- **Cross cutting themes:** Key considerations to support decision-making for on obsolete barrier/hydropower dam removal within an NbS approach.
- **Obsolete barrier removal by the sector:** Catchment scale decision support tools
- **Hydropower dams:** Decision-making on future viability and removal.
- **Cross sector collaboration** for barrier/ dam removal initiatives within an NbS approach
- **Financing** obsolete barrier/ dam removal within an NbS approach

Key findings include;

- **The licensing process (e.g. for issuing, reviewing and renewing licenses) could include a greater focus on obsolete barrier removal and hydropower dam removal (i.e. once operations cease) within an NbS approach with the sector.** Hydropower is and will remain part of the renewable energy mix for the foreseeable future in some Member States. The focus needs to be put on how hydropower is being done and how the sector can have less impact on the environment and contribute to freshwater restoration across catchment. Licenses requirements across Members States for hydropower dams vary, generally after-use (when hydropower production is no longer considered feasible) is not stipulated.
- **Removal of obsolete barriers for NbS (undertaking and funding) is a clear entry point for the sector however, there is a need to better understand and refine what is meant by 'obsolete'.** The sector is willing to fund/ undertake removal of obsolete barriers to contribute more to restoring freshwater ecosystems within an NbS approach, whilst delivering a range of other public goods and help tackle some challenges and needs experienced by the sector. Examples of obsolete barrier removal programmes involving/ led by the hydropower sector can already be found (e.g. in Sweden and Finland) and these can inform European-wide barrier removal programmes for the hydropower sector. Developing shared understandings with the sector of what is meant by 'obsolete' is important. This is particularly important for guiding the development of tools aimed at supporting decision making on removal of obsolete barriers.

[1] Nature based solutions are not always adopted with the aim of restoring ecosystems. In MERLIN the focus is an NbS approach that contributes to freshwater ecosystem restoration whilst also tackling different societal challenges (e.g. challenges experienced by the sector and/ or more widely). For the difference between this NbS approach and a traditional ecosystem restoration approach see Ecosystem restoration and nature-based solutions: how do they differ and why does it matter? | The Freshwater Blog

[2] Obsolete barriers are defined within the EU Biodiversity Strategy 2030: Barrier Removal for River Restoration (2021) as "*barriers that no longer fulfil their original purpose of they are no longer needed*".

[3] As highlighted by participants within the second roundtable discussions, some hydropower dams are strategically important. It is not feasible, nor is proposed that all hydropower dams be removed. This does not preclude the need however for more holistic views that could help reframe decisions by the sector about future viability of some on-line structures.

- **Opportunities exist to inform barrier/dam removal initiatives within an NbS approach by building on current tools and sector sustainability standards.** Tools already exist for identifying where barriers are found, and which could be removed for maximum impact. There are also sector standards aimed at increasing sustainability within the sector. Tools need to be co-developed with the sector (and linked with sector sustainability standards) to ensure they are useful and useable within the sector. Open access tools are needed to inform such initiatives and to better understand the social challenges that could be addressed. Tools therefore need to adopt large scale (i.e. catchment scale), holistic perspectives (that consider a range of social, economic, environmental, financial and cultural dimensions and ecosystem service) and help to understand future scenarios (i.e. future implications of barrier/dam removal within an NbS approach versus inaction, and). This is critical to support collaboration and engagement, locally and across different sectors.
- While some energy companies have already developed strategies and targets for biodiversity, **the ability to measure impact (e.g. from a baseline) on freshwater biodiversity improvement is currently lacking for the sector.** This can hinder action that contributes to freshwater ecosystem restoration.
- As many barriers are multi-functional, cross-sector collaboration is considered essential, for example this can help understand and minimize potential trade-offs and unlock additional resources. **The insurance sector was identified as one sector where cross-sector collaboration to shape win-wins** for the hydropower and insurance sectors.

Content

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1 MERLIN Hydropower Sector Roundtable Approach

MERLIN's second Hydropower Sector Roundtable brought together 16 experts from the private sector (e.g. energy companies and their representative bodies) and non-governmental organisations. Discussions were framed around the cooperation points identified in the Sector Briefing informed by the first roundtable and a desktop review of peer reviewed and non-peer reviewed literature.

The roundtable commenced with a presentation that provided an example of an energy company (UPM in Finland) already actively engaging in financing and undertaking NbS through the removal of obsolete barriers. Following this example, three group discussions were held, informed by our MERLIN cooperation points. Specifically;

1. Obsolete barrier removal: Decision-making catchment scale tools for use in the sector
2. Hydropower dams: Decision-making on future viability and removal
3. Financial mechanisms and cross sector collaboration for delivering NbS at scale through obsolete barrier removal.

2 Example from Finland: UPM's Stream Water Programme

2.1 Why is barrier removal being undertaken by UPM?

UPM is a global company with several businesses, pulp, timber, plywood, biochemicals etc., 62% of business is based in Europe. UPM Energy is one of the businesses inside the UPM. The focus of the UPM Energy is on producing low emission energy. It is the 2nd largest electricity producer in Finland with a current capacity of 1900 MW through 8 hydropower, nuclear power and thermal power plants. Hydropower helps balance the electricity system e.g. as other renewable sources rapidly expand such as wind power. UPM also understands that hydropower operations can disrupt aquatic ecosystems, particularly migratory fish stocks as they create obstructions. UPM therefore see a need to understand how to better balance energy production with ecosystem needs. Overall, there are 220 hydropower plants in Finland and 5000 structures listed as barriers along river routes.

2.2 UPM's Stream Water Programme

UPM started considering biodiversity issues several years ago. Taking proactive action is a key part of UPM's strategy with the company aiming to go beyond statutory obligations to deliver ecological benefits. The approach to biodiversity began from their strategy – Biofore strategy: Performance, innovation and responsibility. A future beyond fossil fuels. The strategy is guided by the UN Sustainable Development Goals. Their 2030 targets for biodiversity include 2 indicators (Biodiversity | UPM.COM)

→ Positive impact and developing a monitoring system in forests in Finland and plantations in Uruguay.
→ Restore 500 km of stream waters by 2030 with a baseline of 2015.

They developed the UPM Stream Water Programme that focused on the removal of obsolete barriers across Finland. This strategic action has been informed by an interactive spatial tool provided by the Finnish Environmental Institute, that is open access. While on track with their programme, there is still a lot to be done. So far they have;

→ Participated in pilot and research programmes.
→ 174 km of river has been restored so far (by the end of 2022).
→ The focus is on removing energy-economically insignificant barriers.
→ To date barriers removed have been on land owned by UPM.

In the future this will widen with UPM also funding removal of other barriers (not on their own land). This action is voluntary (driven from within the company) and motivated by doing good for the environment (e.g. net positive biodiversity contribution), not by economic gain.

3 Key themes identified from roundtable discussions

The following themes arose from the group discussions and relate to the diversity of perspectives involved – they do not therefore represent a consensus. These themes relate to five key aspects of discussions within the roundtable.

1. **Cross cutting themes:** Key considerations to support decision-making on obsolete barrier/hydropower dam removal within an NbS approach.
2. **Obsolete barrier removal by the sector:** Catchment scale decision support tools
3. **Hydropower dams:** Decision making on future viability and removal.
4. **Cross sector collaboration** for barrier/ dam removal initiatives within an NbS approach
5. **Financing** obsolete barrier/ dam removal within an NbS approach

3.1 Cross cutting themes: Key considerations to support decision-making on obsolete barrier and hydropower dam removal within an NbS approach

To support a greater focus on NbS through barrier/dam removal involving the hydropower sector the following aspects were identified as important;

Clarify the focus on the types of barriers/ dams and links to the hydropower sector. The focus of these MERLIN discussions is on removing on-line barriers/ dams (i.e within river channels) that are an impediment to free flows, with this acting as a catalyst for NbS or as part of wider NbS initiatives (that help tackle different social challenges and deliver biodiversity benefits through ecosystem restoration). The scope includes obsolete barriers and hydropower dams, however outside the scope of these discussions are hydropower operations that produce energy using other means (e.g. off-line storage reservoirs, pumped storage etc.).

Build on existing tools and standards for decision-making relating to barrier removal. Various tools already exist or are being developed to support decision-making on barrier/dams. These include tools developed by the hydropower sector to assess service needs, types of hydropower technologies and electricity market needs (Ancillary Services Matrix - stage 1). Tools have also been developed by other stakeholders that are directly aimed at supporting decision making about if and where barriers could and should be removed (e.g. Vesivoimalaskuri; Assessment and Decision Making - The FutureDAMS Research Consortium).

The sector has also developed standards and recommendations for enhancing sustainability practice. This includes the San Jose declaration which sets out recommendations to decision makers, for example "*recommendation 5 'Use it or lose it': a). Explore options for integrating additional services and benefits into existing dams, such as retrofitting non-powered dams and adding solar PV to reservoirs; b). Review whether to decommission dams that no longer provide benefits to society, have safety issues that cannot be cost-effectively mitigated, or have adverse environmental impacts that cannot be effectively addressed; and c). Advance effective river restoration through improved mitigation and regulation in line with the Hydropower Sustainability Standard*". It also includes the Hydropower Sustainability Standard, which is a certification scheme governed by the multistakeholder Hydropower Sustainability Council. This was co-developed by financial institutions like the World Bank, environmental NGOs including WWF, development agencies, governments, and industry (operators, consultants).

These existing tools and standards can provide a good foundation to help structure decision making and a focus on identifying barriers/dams for potential removal. Decision making tools for identifying strategic action for barrier/dam removal need to consider a range of factors (see the subsequent sections detailing key themes from roundtable discussions about decision support tools for obsolete barriers and in relation to hydropower dams).

Taking holistic perspectives within decision-making processes. Decisions support tools for barrier/dam removal need to provide holistic perspectives by considering a range of social, economic, biodiversity and ecological dimensions[4], in terms of maintaining the status quo (not removing) or with removal as part of NbS initiatives involving/ lead by the sector (see section below). Alongside an explicit focus on addressing societal challenges, integrating an ecosystem approach into decision-making process relating to obsolete barriers/hydropower dams could also help to support more holistic decision-making within and with the hydropower sector.

[4] Many such dimensions are required in statutory Environmental Impact Assessments for formal approval before NbS with barrier removal can commence in practice.

It is however also necessary to consider how such dimensions interact across multiple obsolete barriers and/ or hydropower dams (e.g. within catchment) and their cumulative effects (in retaining these and/or to understand impacts of removal of a series of such structures together). This requires adopting large scales for assessments (e.g. catchment scale or region that entails a portfolio approach within the sector).

Ability to use tools by industry. It is necessary to develop tools to support decision making on barriers/dams with industry involvement and ensure industry stakeholders have the ability to use these tools in practice (e.g. training in using tools is important).

Language use and positive framing to build support. Constructive language is important to bring industry stakeholders into discussions about identifying barriers/dams for potential removal as part of an NbS approach by the sector. Identifying and highlighting potential positive aspects of removal initiatives (i.e. what can be gained) is also useful to support willingness of different stakeholders to engage and work together.

Measuring impact of action by hydropower on freshwater biodiversity. Some industry stakeholders have developed biodiversity targets. However, capacity is lacking for a baseline of freshwater biodiversity to measure impacts and outcomes of NbS action involving removal of barriers/dams. Measuring impact in freshwater ecosystems is more complex than terrestrial ecosystem measures commonly used (e.g. coverage of new habitat). This is a gap that needs filling.

Applying a river basin scale. The river basin scale is important for supporting more holistic assessment for identifying which barriers/ dams could be removed within a wide NbS approach. Barriers (i.e. related to other sectors and those that may be considered obsolete) and hydropower dams are considered in such plans in some Member States, e.g. Finland. The Water Framework Directive (WFD) adopts a river basin scale and in some areas the sector is contributing to this.

3.2 Obsolete barrier removal by the sector: Catchment scale decision support tools

To develop tools to support decision making within/ with the sector on the removal of obsolete barriers[5] the following aspects were identified as important.

Developing a shared understanding of 'obsolete'. The sector would consider the removal of obsolete barriers that are energy-economically insignificant for hydropower. However, what is understood as obsolete can shift over time as political and economic contexts shift (e.g. a focus on domestic energy production as a result of the war in Ukraine). Definitions of obsolete should make the distinction between those with future potential for hydropower production and those that do not, to provide a steer to help identify obsolete barriers for removal. This could build on work undertaken in the EU AMBER project that examined what is an obsolete barrier and where they are located. It also highlights the importance of strengthening coherence between nature and energy policies across Member States and a need for increased understanding in the sector about what 'barrier/ dam removal within an Nbs approach' means in relation to freshwater ecosystem restoration.

Relevance of optimization tools for catchment scale. There are different types of tools that can be used to support decision making to identify obsolete barriers for removal. Optimization tools are good for catchment scale perspectives to assess the different options (assessing links between multiple barriers) and to understand how and where NbS could be most effectively deployed to support freshwater ecosystem restoration.

Considering the multifunctionality of barriers. Whilst obsolete can be understood as a barrier that no longer provides its primary purpose (as defined in the EU Biodiversity Strategy 2030), the full range of present and future impacts and benefits need to be considered. In Austria for example, most barriers have been built to hold back water in rivers - a function that may still be necessary in some locations, such as for agriculture. Thus, removing some barriers would pose a challenge for other sectors. Different sectors need to be considered in tools aimed at supporting the identification of obsolete barriers for removal (i.e. some barriers are linked to other sector functions and therefore are not obsolete).

Structural integrity. Structural integrity is important to consider for identifying obsolete barriers for potential removal as this can lead to safety concerns (e.g. this is a key consideration in Romania). This can be a core issue with historic obsolete barriers where maintenance is no longer undertaken, however ownership of these barriers (and therefore responsibility) can be unclear.

[5] Removal of obsolete barriers can also be undertaken by other sectors, but the focus here is on supporting the involvement of the hydropower sector in obsolete barrier removal and NbS initiatives for restoration of freshwater ecosystems

Identifying land ownership. Removal of obsolete barriers is more straightforward on land owned by energy companies or when ownership is known. For many obsolete barriers ownership is unclear.

Considering future viability for hydropower production of obsolete barriers. Some obsolete barriers may have the potential for new uses in the future (e.g. for retrofitting to for small scale hydropower production). Any future economic viability for energy production needs to be assessed and barriers with no potential for hydropower prioritized for potential removal.

Removal costs. The cost of removing obsolete barriers should be included in decision support tools.

Assessing different ecosystem services with and without obsolete barriers. Barriers, by holding back water in rivers, create different biophysical conditions and decisions about whether to remove an obsolete barrier and undertake nature-based initiatives, or not, entail different ecological and social consequences, for example the type of species found and the way people interact with rivers. A full range of ecosystem services provided now and options for the future with the removal of barriers should be considered, for example ecosystem services for regulating water quality and quantity (flooding and drought), for fisheries, recreation and tourism to support local economies and carbon sequestration.

Climate change risks and resilience. Extreme weather events are becoming more frequent and more severe with climate change. The role of barriers (and removal of barriers within an NbS approach) in exacerbating or reducing these impacts within a catchment needs to be considered.

Expanding the focus for freshwater ecology and conservation. Freshwater migratory fish are a strong focus in many existing barrier removal tools and initiatives. There is also often a strong focus on impacts on protected areas. A full range of ecological aspects however need to be considered to inform obsolete dam removal initiatives.

Sedimentation and water quality. Sediment control and water quality are challenges for hydropower operations that should be considered as part of decision support tools (e.g. where obsolete barrier removal and NbS could help relieve such challenges in the future).

Understanding current local socio-cultural views of barriers. Social opposition to obsolete barrier removal can hinder action. There is a need to consider the level of attachment to a barrier locally and, with skilled stakeholder engagement, to understand local aspirations for the future, potential public social benefits that could arise (as a core part of NbS) and to co-develop these with local stakeholders to help overcome this opposition.

3.3 Hydropower dams: Decision-making on future viability and removal

The following factors were identified within the roundtable discussions as important aspects that influence decision-making about the future of hydropower dams (i.e. on-line structures located in river channels that hold back water for hydropower production).

Strategic importance of hydropower dams. Some hydropower dams are strategically important for energy production in some Member States (e.g. Finland and Sweden). The mix of hydropower technology in use does however vary within and between different Member States.

Economic viability of hydropower dams. The balance between financial costs and value of energy generated is a key factor in the sector for decision making on the future viability of hydropower dams. Knowledge on climate change can alter such assessments. In addition to power generation, other socioeconomic and environmental functions that dams typically serve must also be considered in assessments.

Financial cost of removal of hydropower dams against maintenance/ upgrade. Within the sector the cost of removing dams is assessed against the cost of maintaining and/ or upgrading a hydropower dam to inform decision making on its future viability and whether it needs to be retired/ removed.

The age of hydropower dams is not a relevant factor. The age of a hydropower dams was not considered an important factor in decision making about removal. Hydropower dams are regularly evaluated and maintained by the sector, which influences other factors (e.g. safety and economic viability). Adjustments (i.e new technologies) can be incorporated to maintain or enhance a hydropower dams energy production capacity. Digital technologies could help enhance hydropower conditions and operations. The life cycle of a hydropower dam should therefore not be understood simplistically in terms of age.

Hydropower related license requirements. Licenses are largely country specific. In some countries there is an increasing focus on environmental considerations. There are also concerns about the length of some licenses. In Finland for instance, licenses for hydropower are permanent, and environmental obligations can be outdated.

Currently, there is pressure on the legal system in some Member States with some people looking for more environmental mitigation from some water management operations. For example, in Italy, a permitting renewal process of hydropower operations is being planned and requirements to meet the accurate environmental mitigation measures are also being examined in Germany. The need to account for biodiversity in renewing license is important. Furthermore, there is no requirement for after-use planning (i.e. for removal of dams and to act to restore freshwater ecosystems once licenses expire and operations cease). Improving license conditions could support a stronger focus on NbS to contribute to ecosystem restoration in the sector and prevent hydropower dams creating more obsolete barriers in the future.

License to increase hydropower capacity and ecological compensation. For additional hydropower capacity (e.g. if the size of a dam is increased) a licence needs to be renewed, in which case ecological compensation should be included and undertaken. Action to offset impacts however risks being seen as 'greenwashing'. This action by the sector should be seen as positive, be encouraged and planning of initiatives supported to maximize the potential social and ecological benefits (for the sector and more broadly) that could arise.

3.4 Cross sector collaboration for obsolete barrier/ hydropower dam removal initiatives within an NbS approach

There are many barriers found within Europe's rivers (including those consider obsolete and those continuing to meet their primary function, including hydropower dams). For example, the EU AMBER project mapped barriers across Europe identifying ~ 630,000 barriers, 30,000 of which are linked with current hydropower sector activities. Obsolete barrier removal is therefore a cross sector issue and cross sector collaboration to bring this about in practice could be one way to help create more opportunities to adopt NbS that involves barrier/ dam removal.

Cross-sectoral links that could help/ hinder removal initiatives. One key economic sector identified as a potential beneficiary of NbS through obsolete barrier/ dam removal is the insurance sector, for example where flood risk can be reduced, particularly within a wider NbS approach for such initiatives. Collaborations with the insurance sector could therefore support the design and delivery of removal initiatives within an NbS approach (that help address challenges for the insurance and hydropower sectors in unison). Other sector links are multidirectional - some sectors could support and/ or resist barrier/dam removal plans in different locations e.g. navigation, agriculture or drinking water supply. It is therefore essential to understand the different sectoral links to barriers/ dams and to identify common ground between sectors to support collaborative action, which can also potentially unlock on alternative sources of funding.

Coordination between the private and public sector to deliver removal initiatives. Without alignment between the public and private sector, removal initiatives within an NbS approach are unlikely to progress.

Importance of leadership for obsolete barrier removal within an NbS approach. Developing collaborative initiatives takes time and resources - it can take up to 2 years from initial ideas to then bring different stakeholders together to agree if and how barrier/dam removal can and will proceed. Usually, the responsible water management authorities are leading such initiatives with the assistance of Environmental NGOs. Private sector stakeholders can be involved, but this does not always include the hydropower sector. Public sector leadership is particularly critical where ownership of obsolete barriers is unclear. Collaboration (involving multiple stakeholders, including from different economic sectors) can be enhanced through a co-development approach, e.g. in Switzerland different actors came together to jointly identify common ground on river restoration measures.

3.5 Financing obsolete barrier/hydropower dam removal within an NbS approach

Funding as a hinderance to action by the sector for improving ecological status of rivers. Funding can be lacking in the sector for delivering ecological requirements under licenses and for the Water Framework Directive (e.g. there have been good contributions by the sector but funding to deliver more is often lacking).

Existing funding sources for obsolete barrier removal. There are some existing funding programmes aimed at the removal of obsolete barriers. Examples include the NOUSE programme in Finland (Migratory fish programme NOUSE - Maa- ja metsätalousministeriö), with a similar programme in Sweden. These funding programmes provide 0-50% of the funding with the remaining being provided by the company undertaking this work. Other funding pathways include the EU Life programme and Open Rivers grants. Advice on funding obsolete barrier removal is also provided by Dam Removal Europe (e.g. on crowdfunding). Projects may also be able to engage with climate markets to fund obsolete barrier removal within an NbS approach.

Funding provision by the hydropower sector for obsolete barrier removal. The sector is willing to fund the removal of obsolete barriers for ecological benefit. Creating public benefits (in addition to those for the companies) can contribute to social responsibility aims in the sector. One example is the UPM Stream Water Programme.

Attracting investment for NbS with obsolete barrier/hydropower dam removal. Attracting investment for barrier/dam removal within an NbS approach can be aided in several ways. First, as is often the case, consultation companies can gather and analyse data to calculate removal and maintenance costs[6] to develop a funding proposal/ business case for owners. A European wide open access platform with useable and useful tools for assessing where barrier/dam removal could be part of NbS initiatives could also help incorporate other non-financial considerations to identify what should and could be removed. Assessing future options (e.g. without a barrier/ dam) could help develop a positive vision about what comes after removal to help engage a range of stakeholders in planning – for example, there could be new benefits for recreation, bioeconomy, flood management and water quality. Currently municipalities are mostly asking for recreational projects and not for those driven by biodiversity, but this is slowly changing.

4 Next steps

- A draft Sector Strategy will be developed to set out strategic actions identified for mainstreaming a NbS involving obsolete barrier/ hydropower dam removal in the hydropower sector. This will draw on the multiple data sources (e.g. MERLIN D4.3 Briefing on policy opportunities for mainstreaming Fresh Water Nature Based Solutions, Hydropower sector desktop review, 1st and 2nd hydropower sector roundtable data and reports).
- The 3rd and final hydropower sector roundtable will be organized in the Spring of 2024 for continued development with the hydropower sector of the Sector Strategy.
- An EU cross-sector routemap will be drafted to identify needs, opportunities and challenges for mainstreaming NbS approaches for freshwater ecosystem restoration across multiple economic sectors (i.e. insurance sector, water supply and sanitation sector, agricultural sector, inland navigation sector and peat extraction sector) roundtable in 2024.

For more information about this 2nd roundtable report or on other MERLIN project activities focused on mainstreaming NbS across economic sectors please contact esther.carmen@hutton.ac.uk

[6] Five major types of costs that should be considered are: acquisition, establishment, maintenance, transaction, and opportunity costs.