MERLIN

Deliverable D3.5

Diversifying Funding for Freshwater Restoration using Nature-Based Solutions: Lessons from the MERLIN project

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Imprint

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Key messages

1. Diversifying sources of funding and financing is necessary to scale up freshwater ecosystem restoration and meet current EU policy targets.

2. While restoration teams recognise the need to diversify, they reveal a marked cautiousness in exploring private sources of funding and finance.

3. Barriers relate to specialised language and terminology, perceptions of reputational risk, and difficulty to articulate viable business plans for opportunities unlocked by ecosystem restoration.

4. Committed restoration teams put significant efforts in building new skills and capacity in socio-economics, business, and finance to communicate and engage effectively with the private sector.

5. Support programmes, pilot initiatives, and guidance are needed to successfully accompany restoration teams in their diversification journey.

6. More effective enforcement of existing policies and regulations is needed to narrow the funding gap, while new ones must foster responsible private spending, lending and investment in restoration.

Executive Summary

Increasingly clear and tangible needs to protect the well-being of Europe's society and the competitivity of its economy are strengthening the arguments for ecosystem restoration and opening opportunities to rethink the private sector's role in it. Strained budgets and emerging demands widen the already large funding gap to upscale the restoration of European freshwater ecosystems, and to meet current EU policy targets. Filling this gap will require public and private actors to engage with restoration and Nature-based Solutions (NbS) in both conventional and novel ways. In this light, **diversifying the sources of funding and finance** used to pay for such initiatives appears necessary. Diversification may entail additional transaction costs in the design and operation of restoration work in the short term, as restoration teams will need to invest time and effort to build trust and partnerships with new sets of actors.

While restoration managers are knowledgeable about how to access public funding, raising capital from private sources will require them **to adopt a new mindset, and to build or source new competencies**, e.g. through hiring, training, and collaboration with specialised consultants and researchers. To grasp the logic of their new partners, restoration teams will have to become acquainted with concepts and practices in finance, economics, and business. They will need an ability to navigate across disciplines to communicate effectively. This wider perspective, combined with restoration planning at landscape scale, should ease financial diversification by embedding benefits across policy domains and stakeholder groups, **facilitating opportunity recognition and setting solid ground for joint public-private implementation**.

On the other end, despite the sustainable finance trend, private investment decisions continue to hinge primarily on conventional factors like financial return, market demand, risk, and uncertainty. As restoration teams evolve, so will the private sector. To ensure that more investments are "nature positive", the range of criteria and metrics used to evaluate opportunities will have to be broadened, their weights revisited so priorities are spread more evenly among financial, social and sustainable return on investment. This is relevant as the business and investment opportunities stemming from restoration and NbS initiatives should be compatible with biodiversity conservation and nature protection objectives, i.e. they will have to be tapped responsibly and giving serious consideration to ecological boundaries. Here, **the entrepreneurial spirit of investors and businesses will be instrumental.**

The lack of trust in the effectiveness of restoration and NbS in achieving anticipated benefits remains a challenge. Leveraging advanced tools and methodologies to enhance scientific understanding and improve the quantification of delivered Ecosystem Services (ESS) will be key to reduce the current levels of uncertainty. Pairing this with effective communication should help restoration teams raise the confidence of private actors to engage as funding and financing partners.

Economic assessments such as **Cost-Effectiveness Analysis and Cost-Benefit Analysis should be promoted** to help optimise restoration programmes and project design, and to identify financial solutions to support the implementation of restoration and NbS based on anticipated benefits. But the scope of these analyses needs to be sufficiently wide to capture the benefits of restoration adequately. Identifying and effectively communicating the full range of benefits and costs, including trade-offs, is key for fundraising and building support for restoration. MERLIN has developed and demonstrated tools and methods, based on EU-wide available data, to support Cost-Benefit Analyses that account for the broad spectrum of benefits offered by NbS in freshwater ecosystems.

When seeking to design and implement innovative private financing arrangements for restoration initiatives, early and meaningful engagement with local communities can be essential. Particularly when the initiative starts off in a research context or is handled as an open innovation process, **local stakeholders can be prime contributors of entrepreneurial ideas that align with on-the-ground needs**. Beyond the design phase, maximising the chances of effective implementation will require having **restoration team members with strong financial skills** that can navigate the planning, legal and administrative requirements along the way.

Lastly, governance frameworks must lay the groundwork for sustainable collaboration and for shrinking the funding gap further. Market failures must be addressed so that polluters pay the full costs of production. This requires attention to compliance to and enforcement of existing regulation – not just opening new opportunities for private sector actors. **Effective policy, regulation and enforcement will continue to be fundamental to foster and guide responsible private spending, lending and investment in restoration**. The engagement of private finance will be more viable if

a clear regulatory backstop is in place, e.g. to remove concerns of integrity and additionality. Beyond this, there is a clear role to create/orient incentives, to mitigate risk and uncertainty, and to manage conflict. Addressing gaps in communication and capacity, e.g. through support programmes, pilot initiatives, and legal guidance, can help address the relational and technical barriers that often block the way to collaboration.

Content

The MERLIN project (https://project-merlin.eu) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036337.

Acronyms

- CBA - Cost-Benefit Analysis
- CS - Case Study
- ESS - Ecosystem Services
- EU - European Union
- FRT - Forth Rivers Trust
- KNP - Kampinos National Park
- LENs - Landscape Enterprise Networks
- MERLIN - Mainstreaming Ecological Restoration of Freshwater Related Ecosystems in a Landscape Context - Innovation, upscaling and transformation
- NbS - Nature-based Solutions
- OTSIs - Off-the-Shelf Instruments
- RSPs - Regional Scalability Plans

1 Introduction

1.1 The need to diversify funding sources

The ecological state of European freshwaters including rivers, lakes, wetlands, and peatlands has significantly deteriorated in the 20th century and the biodiversity they sustain has declined fast. As of 2021, only 36% of surface water bodies in EU member states achieved good or high ecological status, and just 39% reached good chemical status (EEA, 2024). 81% of the protected habitats at EU level are in poor or bad conservation status, including most protected freshwater habitats, bogs, mires, and fens (EEA, 2020). Many freshwater ecosystems are losing their natural functions and biodiversity, hindering the delivery of the many goods and services they provide to society, such as water supply, food, recreation, and ecosystem regulation for mitigating droughts and floods through water retention.

To step up efforts in protecting and recovering freshwater ecosystems, the European Commission included objectives in the European Biodiversity Strategy 2030 to 1) restore degraded ecosystems and stop further damage to nature, and 2) restore at least 25,000 km of EU rivers to a free-flowing state. Targets were integrated in the recently adopted EU Nature Restoration Law 2024 (NRL), which sets a clear mandate for member states to restore freshwater ecosystems. Yet, turning these targets into actions will require mobilising additional (financial and non-financial) resources and public funds will not be sufficient to implement and upscale the nature restoration projects needed. As an indication, current levels of EU, national and private spending towards achieving the EU Biodiversity Strategy in the EU is estimated at around €23 billion annually, while the cost of delivering that same Strategy is estimated at €48 billion annually (Nesbit et al., 2022) and the additional needs to implement the Nature Restoration Law was estimated at an additional €6-8 billion annually (EC, 2022 as cited in IEEP, 2023).

According to UNEP (2021), 84% of expenditure on ecosystem restoration worldwide comes from public sources, in particular statutory agencies responsible for delivering environmental policy. In Europe, the share is likely to be higher: according to Nesbit et al. (2022), the private sector spent an estimated €371 million on biodiversity in the EU, which would therefore represent less than 1.5% of current expenditures on biodiversity. A recent report which analysed 1,364 European and United Kingdom restoration projects using Nature-based Solutions (NbS) found that only 3% received private sector funding. In those cases, the private funds covered more than half of the individual project's costs (EIB, 2023).

Given current trends, public funds will remain the key resource to cover the costs of any nature restoration strategy in the foreseeable future (den Heijer & Coppens, 2023). However, the current funding gap for implementation suggests a need for restoration managers to consider supplementary funding sources and explore collaborations with private donors, lenders, and investors. Yet, since ecosystem goods and services delivered by restoration often do not fit the profile of conventional investment assets, as they cannot be easily commodified or privately owned (Palmer & Filoso, 2009), there is no guarantee that diversifying funding towards private actors will always be possible. However, some opportunities exist as will be presented in this report. To involve society to a greater extent and at bigger scale, restoration managers need to consider if there are opportunities to build relationships with new partners and to diversify funding sources.

1.2 Purpose and scope of the report

This report was prepared for the H2020 MERLIN (Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling and transformation) project which aims to mainstream and upscale ecological restoration of freshwater-related ecosystems across Europe. To achieve this transformation, a sufficient and sustainable supply of money must be allocated to restoration, drawn up using sound economic principles. The aim of this report is to illustrate how restoration teams across Europe are finding different ways to pay for the costs of upscaling restoration action. *Restoration teams* are understood as multi-actor partnerships engaged in on-the-ground ecosystem restoration which may encompass public actors such as environmental agencies, municipalities, and private actors such as environmental non-governmental organisations, other civil society organisations, businesses, and firms.

This report aims to supplement existing guidance (e.g. Shames et al., 2014; Faruqi & Florence, 2017; Altamarino et al., 2021; Earth Security, 2021; Finance Earth, 2021; NatureScot, undated) for restoration managers on alternative funding and financing strategies by compiling and assessing experiences of various funding and financing instruments used to facilitate implementation and upscaling of restoration and NbS for freshwater ecosystems. *Funding* refers to the activity of paying for a project without expecting reimbursement or any

reflux of the expended capital (see Annex 4[1]). Funding instruments may include for instance grants and donations. *Financing*, on the other hand, is the activity of providing capital while expecting the reflux of that capital in the future (Davies, 2016). The range of possible funding and financing instruments in ecosystem restoration are discussed in Chapter 3.

The report has a specific focus on *private* sources of funding and finance, aiming to better understand if, why, and how restoration teams engage with the private sector to help cover the costs of upscaling restoration.

This report has the following objectives:

- To present alternative strategies for funding and financing NbS and restoration of freshwater ecosystems, particularly those involving private sources,
- To reflect on the barriers and enabling factors to successfully fund and finance restoration and NbS, particularly with regards to upscaling.

Building on observations and lessons learned in 20 case studies (CS), the report aims to provide a set of observations and recommendations to restoration teams who are looking to diversify the funding of their projects and who are considering engaging with private sources.

Moreover, this report accompanies two of MERLIN's major upcoming deliverables: the European Scalability Plan (D3.7) and the European Routemap (D4.7). Building on the project's work on biophysical modelling and natural capital accounting, the European Scalability Plan will provide a visual overview of restoration needs and potentials at European level. The European Routemap will bring together the perspectives of the six economic sectors who engaged directly with MERLIN – agriculture, hydropower, insurance, navigation, peat extraction, and water supply and sanitation – into a routemap for mainstreaming freshwater restoration and NbS in Europe.

These three resources combined will provide restoration managers, policy- and business decisionmakers across the region with a breadth of new information and a significantly clearer insight that will hopefully help to identify opportunities and establish priorities for the coming years.

1.3 Methodology

The report is based on a mix of documentary evidence and empirical learning from 20 CS, including 18 MERLIN CS and an additional two relevant cases (see Table 1). The approach taken was the following:

First, CS fiches (see Annex 1[1]) were used to collect information at the start of the MERLIN project and initial project activities, in particular the preparation of Optimisation Strategies and their supporting assessment (e.g. Self-Assessment Tool, Strengths-Weaknesses-Opportunities-Threats analyses) (Buijse et al., 2022[2]). The aim was to become aware of any previous experiences of the CS working with funding sources other than public grants, among other aspects. The templates were designed, filled in, and systematically reviewed by the research team to identify similarities and discrepancies between the cases and to uncover leads for further investigation.

Second, the research team working on socio-economic dimensions within MERLIN carried out a review of academic and grey literature on the topic of funding and financing nature restoration in Europe and beyond. Of particular interest were existing guidance documents on how to attract private sources of funding and financing, and documented examples of private sector entities supporting restoration and NbS implementation through financial, in-kind, and other contributions. As part of this, sectoral fiches were produced to collect information on the position and perceptions on nature restoration of members of the six economic sectors listed in the previous section (see Annex 2[1]).

Third, based on the literature review, a workflow for financial planning of restoration projects was prepared to present the key pillars needed to identify opportunities for private sector funding or financing (see introduction to Chapter 4, Annex 3[1], and the MERLIN Academy[3]). The workflow was used to accompany MERLIN CS in exploring alternative funding options for upscaling freshwater restoration, in particular with the view to inform funding of their future Regional Scalability Plans (RSPs)[4]. RSPs are a key output of MERLIN and offer visions for upscaling restoration at wider landscape levels with a time horizon up to 2050 created through collaborative efforts to upscale freshwater restoration initiatives. In addition to the workflow, a review of relevant public

[1] See https://project-merlin.eu/deliverables/articles/deliverable-d3-5.html
[2] https://project-merlin.eu/deliverables/articles/deliverable-d2-1.html
[3] https://project-merlin.eu/academy.html
[4] https://project-merlin.eu/outcomes/regional-scalability-plans.html

funding and financing programmes in Europe was also carried out to update existing catalogues and to supplement the information collected on the use of private funding sources (see Chapter 3).

Fourth, throughout the project, group activities and bilateral exchanges with CS representatives were used to collect observations on how restoration teams perceive and engage with the idea of diversification, and later on to verify our learnings and formulations. A training programme (the 'Zero Risk Nature Acceleration Programme') was also developed to explore additional funding and financing opportunities for nature restoration projects, aiming to reduce reliance on grants and enhance financial sustainability. Five MERLIN CS participated in the programme. In addition, two surveys – one at the beginning of the project and one in the final year of the project – were carried out to measure change in the level of awareness of CS restoration teams on options for diversification of funding and financing. Annex 9[1] provides more detail on these activities.

Fifth, a systematic review of the RSPs prepared by the MERLIN CS partners was carried out, first on their interim version (Pietilä et al., 2023[5]) and on their final version (Ojanen et al., 2024[6]). The RSPs outline the intentions of the 18 MERLIN restoration teams as regards future restoration measures for upscaling. The review screened for commonly mentioned target audiences, expected benefits, and business opportunities being associated to the restoration upscaling, as well as the sources of funding and financing being considered to cover the costs. The aim was to understand to what extent the restoration teams were further engaging with funding and finance concepts, taking up materials developed during the group activities, bilateral exchanges, and training on economics and financing, and to identify less elaborate aspects that could point to underlying challenges, barriers, or needs.

In the final phase, eleven semi-structured interviews with eight selected CS (six from MERLIN and two external ones) were carried out to add details to our collected evidence and to address remaining gaps. The two external cases were included because of their previous, voluntary input to the project, such as participation in webinars and exploration of private funding opportunities. Interviewees included restoration managers in public organisations (e.g. national park authorities), catchment organisations, environmental NGOs as well as scientists involved in restoration projects. Interviews typically lasted one hour and were recorded and transcribed for data extraction. An iterative, exploratory reading and reflexive note-taking approach was taken to distil key insights and emergent patterns from interview data.

[5] https://project-merlin.eu/deliverables/articles/deliverable-d2-2.html
[6] https://project-merlin.eu/deliverables/articles/deliverable-d2-4.html

Table 1. List of restoration case studies used in the report

CS number	Case study name	Type of engagement and data collection			
		Documentary analysis	Group activities	One-to-one support (CBA, capacity building) and deep engagement	Interview
CS1	Kvorning wetland rewetting (DK)	X	X		
CS2	Deba barrier removal (ES)	X	X		
CS3	Beaver river engineering (SE)	X	X		
CS4	Room for the Rhine (NL)	X	X	X	
CS5	Kampinos wetland rewetting (PL)	X	X	X	X
CS6	Hutovo Blato peatland rewetting (BiH)	X	X		
CS7a	Danube floodplain restoration (AT)	X	X		
CS7b	Danube sidearm reconnect (HU)	X	X		X
CS8	Danube floodplain reconnect (RO)	X	X	X	X
CS9	Tisza floodplain rewetting (HU)	X	X		X
CS10	Blue Belt Germany (DE)	X	X	X	
CS11	Emscher basin restoration (DE)	X	X	X	X
CS12	Lima river forest restoration (PT)	X	X	X	
CS13	Sorraia river restoration (PT)	X	X		
CS14	Komppasuo peatland rewetting (FI)	X	X	X	
CS15	Tzipori basin restoration (IL)	X	X		
CS16	Upper Scheldt restoration (BE)	X	X		
CS17	Forth basin restoration (UK)	X	X	X	X
CS18	Ervidel river restoration (PT)		X		
CS19	Biosphere Reserve Mittelelbe (DE)				X
CS20	Tweed (UK)				X

1.4 Structure of the report

The remainder of the report is structured into three core chapters and a concluding one.

Chapter 2 covers the concept of upscaling ecosystem restoration and NbS, and underpinning economic dimensions.

Chapter 3 explores the range of public and private sources of funding and financing for the restoration of freshwater ecosystems, and drivers behind the participation of key actors engaged in restoration.

Chapter 4 presents the experiences drawn from 20 European CS, i.e. 18 MERLIN cases and two additional ones. The analysis focuses on barriers and enabling factors to diversify funding and financing, structured around the MERLIN Financial Planning Workflow. Observations draw on group activities, one-to-one support, surveys, and interviews.

The concluding Chapter 5 reflects on lessons learned from the collected experiences and suggests avenues to consolidate the economic sustainability of restoration projects.

2 Scaling up the restoration of aquatic ecosystems

Scaling up restoration efforts of European aquatic ecosystems is necessary to address the increasing trend of degradation, preserve biodiversity, and sustain the ecosystem goods and services they deliver. This chapter presents the concepts of restoration and scaling up restoration efforts. To better understand the types of funding needed for restoration, it explores, on the one hand, the type of costs and their timing related to implementing restoration activities, and, on the other hand, the benefits that restoration managers can expect from restoring freshwater ecosystems. A good understanding and mapping of benefits is considered essential to motivate public and private actors in funding restoration, an issue further discussed in the following Chapter 3.

2.1 Defining restoration and its upscaling

Ecosystem restoration can be defined as supporting the recovery of degraded or destructed ecosystems, and protecting those that are still intact, with the aim to reinvigorate natural processes to create ecosystems that are both resilient and self-sustaining (Gann et al., 2019). Freshwater ecosystem restoration focuses on reviving the health, functionality, and biodiversity of rivers, lakes, wetlands and other freshwater systems, addressing challenges like pollution, habitat destruction, and altered water flows. It aims to reestablish ecological processes that sustain these ecosystems, ensuring their capacity to provide critical goods and services such as clean water, flood regulation and biodiversity support (Hughes et al., 2019; Cooke et al., 2022). Restoration measures can include a wide set of measures, including NbS (the concept of which is described in more detail below), but also grey infrastructure, such as wastewater treatment, to reduce key pressures.

Table 2 presents the key restoration measures and expected benefits considered in MERLIN RSPs, highlighting the diverse approaches and benefits of restoration and NbS efforts across the varied landscapes and contexts of the CS. Measures include rewetting, floodplain reconnection, dam removal, habitat restoration and sustainable land use practices. The expected benefits range from enhanced biodiversity and ecosystem service (ESS) delivery to climate change mitigation, flood and drought resilience and improved water quality. Additionally, many of these measures contribute to carbon sequestration, recreational opportunities, sustainable livelihoods and green growth.

Table 2. Restoration measures planned for freshwater ecosystems in the MERLIN RSPs (Source: extracted from the 17 RSPs of the MERLIN project. Note: MERLIN CS18 does not have an RSP)

Case study	Implemented measures	Expected benefits
CS1	Rewetting; biomass harvesting; construction of two gangways to ensure that cattle can graze the whole area	Reduced carbon emissions; retention of nutrients; improved biodiversity; recreational value
CS2	Removal of obsolete dams to restore river connectivity	Improved biodiversity and ESS delivery; climate change mitigation and adaptation; reduced carbon emissions
CS3	Building artificial beaver dams; removal of dams, allowing beaver to spread	Improved biodiversity; flood and drought resilience; climate change mitigation; recreational value
CS4	Floodplain reconnection; changing land use from (often) agriculture to nature; change of sluice management in summer dikes	Improved biodiversity; drought resilience; recreational value; sustainable food systems and land use; flood and drought resilience; climate regulation; sustainable transport
CS5	Floodplains reconnection and rewetting; channel restoration; rewetting and slowing water run-off by renovation of weirs, maintain forest	Improved biodiversity; climate regulation; flood and drought resilience; recreational value
CS6	Rewetting of peatlands, including restoration of water regimes and number of dried small creeks and streams, reconnecting isolated sinkholes and ponors to the main streams, and floodplains in the karst fields	Enhanced fish stocks; improved biodiversity; improved water quality; recreational value; flood and drought resilience; reduced sedimentation
CS7a	Removal of bank protection; integrative planning for river restoration and save, economic navigation; participatory river maintenance; reconnection of wetlands	Retention of nutrients; reestablishment and creation of habitats; improved biodiversity; recreational value; flood protection; water purification and recreational activities
CS7b	Restoration of river bank	Improved biodiversity; recreational value; sustained (clean) water supply; increased storage capacity of

Case study	Implemented measures	Expected benefits
		wetlands/soils; flood and drought resilience; climate regulation
CS8	Floodplain reconnection; synergies between floodplain restoration and nature protection	Flood and drought resilience; improved water quality; improved biodiversity; increased economic opportunities; recreational value
CS9	Provide the system with water; system flood reservoir; installing salon power water pumping and guarantee water and landscape	Habitat restoration (grasslands, forests, wetlands); sustainable livelihoods; climate regulation; improved biodiversity; flood and drought resilience; recreational value; sustainable food systems; green growth
CS10	Water regulation; floodplain reconnection	Improved water quality; improved retention capacity; improved biodiversity; support for navigation and shipping; recreational value; climate change adaption
CS11	Establishment of flowering meadows (with several sites)	Improved biodiversity; climate regulation; sustainable energy; drought and flood resilience; green growth; recreational value
CS12	Fish lift passage; restoration of floodplains; invasive plant species management; oomycetes pathogens management; passive restoration	Improved biodiversity and ESS delivery; drought and flood resilience; increased water storage; recreational value; improved water quality; carbon sequestration
CS13	Riparian rehabilitation; habitat enhancement for pollinators and key-species predators; construction of a small pond landscape network; improvement of river crossings and development of a crossings	Improved biodiversity; sustainable food systems; reduced emissions; recreational value; flood and drought resilience; green growth; sustainable transport, energy, and food
CS14	Planting of trees, wetland creation; afforestation of past peat extraction	Reduced carbon emissions; retention of nutrients; improved biodiversity; drought and flood resilience
CS15	Transition in land use; floodplain re-connection; riparian restoration; flood protection; channel restoration; water supply	Improved water quality; improved biodiversity; flood and drought resilience; erosion control; habitat restoration and connectivity; invasive species control; recreational value
CS16	Establishment and management of grass-flower buffer strips; channel restoration; fish migration barrier removal and installation of spawning beds for rheophilic species	Improved water quality; improved pollination; improved biodiversity; increased biomass production; climate regulation; flood and drought resilience; sustainable energy; recreational value
CS17	Restoration of channel and riparian habitats; floodplain reconnection; rewetting	Improved biodiversity; flood and drought resilience; climate change adaptation; reduced erosion; recreational value

Within the MERLIN project, a particular interest is how to restore freshwater ecosystems using Nature-based Solutions (NbS). NbS are commonly defined as efforts to protect, restore and manage ecosystems to effectively and adaptively address societal challenges, providing simultaneous benefits to both people and nature (IUCN, 2016; UN, 2022). NbS put particular emphasis on restoring natural processes, for instance, rewetting degraded wetlands to restore their capacity for water purification, establishing riparian buffers to reduce erosion, filter pollutants, and provide wildlife habitats, as well as reconnecting rivers with floodplains to reduce flood risks and enhance habitat diversity. In addition, NbS go beyond conservation objectives and emphasise the need to deliver benefits for society by enhancing natural processes to deliver ESS. This includes, for instance, enhancing soil and groundwater water storage and water retention in the floodplain and landscape. Beyond conservation and biodiversity outcomes, these measures help to reduce flood risk and buffer the impacts of droughts for specific communities, businesses, and society at large.

NbS require broad stakeholder involvement from the outset to include the perspectives of local communities and landowners, government agencies, businesses of various sectors and conservation organisations, to address both ecological and societal needs (Ferreira et al., 2020). An NbS perspective can, in theory, help with addressing common challenges in restoration projects, like overcoming oppositions from landowners and other affected stakeholders, by addressing upfront their needs and examining concrete benefits from the enhanced

delivery of ecosystem goods and services. In the rest of the report, the focus is on restoration using NbS, acknowledging however that restoration may need at times to be broader (Waylen et al., 2024).

This report also places a particular interest on *upscaling* freshwater restoration, understanding it as a means to enhance ecological integrity at landscape scale and to increase community resilience and well-being. This entails executing coordinated actions to expand the area of restored ecosystems and the provision of ecosystem goods and services substantially and efficiently. Without being exhaustive, this 'geographical' upscaling may include:

(i) expanding the spatial scope of effective restoration activities,

(ii) replicating successful restoration measures across multiple locations,

(iii) widening the range of restoration measures in a given site,

(iv) strategically planning restoration sites (e.g. regarding their position in the landscape) to maximise benefits.

However, upscaling of restoration cannot only be understood as a geographical or physical upscaling of restoration measures but must also be understood in terms of its socio-institutional and economic dimensions. Indeed, upscaling requires:

(v) building the capacity of restoration teams to access a wider set of technical, legal, political, and financial resources and skills to implement their activities,

(vi) widening the range of stakeholders involved to enhance opportunity recognition, increase buy-in, and prevent or mitigate conflict,

(vii) establishing policy and institutional frameworks that enable restoration activities in practice (e.g. by setting incentives and removing known barriers).

Using an illustrative (theoretical) case, *Textbox 1* aims to exemplify how all these aspects are important, interconnected, and can be integrated into a single restoration plan for an area. Such a plan should indicate possible timing and sequence of interventions and consider foreseeable changes that could affect the future practicability and efficacy of the planned measures.

Textbox 1. A worked example of upscaling based on the elements listed above

A small team of natural scientists and a project manager are launching an initiative to restore a straightened river to its former meandering state. The purpose is to recover the river's natural hydrological regime and habitat functions. Constrained by insufficient administrative capacities, funding and permitting issues, the restoration team kicks off the activity in a small stretch of the river, where the local community is keen to see the restoration take place and the authorities have provided the required permits.

To upscale this effort, the restoration team plans to expand both upstream and downstream of the initial restoration site, thereby *(i) expanding the spatial scope of the activity*. If successful, similar re-meandering measures are to be implemented across multiple river stretches within the sub-basin, hence *(ii) replicating the approach across different locations*. Subsequently, re-meandering will be combined with other restoration measures, such as riparian vegetation planting or floodplain re-connection, to *(iii) widen the range of ecosystem services provided at each site and at landscape scale*. The selection of replication sites is being planned strategically, informed by biophysical modelling and economic appraisals, so that the planned integrated measures are well coordinated and take place *(iv) strategically* where the associated benefits – such as improved habitat connectivity and enhanced floodplain function– are expected to be largest.

As the activity progresses, the restoration team *(v) builds capacity* by recruiting an expert on stakeholder engagement and participative processes, and hiring a consultant to support upcoming fundraising activities. With the first new funding stream coming in, the team *(vi) widens the range of stakeholders engaged* by planning and executing a series of informative sessions followed by stakeholder workshops in the vicinity of the restoration sites foreseen for the next phase of the project. Social scientists from the local university are now studying the case, collecting information on the hindrances that the team encountered along the way, and the factors that help to overcome them as well as those that propelled the project further. The results will be documented in a policy paper that will be handed to the local and regional authorities, providing concrete recommendations to support nature restoration in the area through *(vii) enabling policies and regulations*. This strategic approach to upscaling can enhance the overall effectiveness and efficiency of the restoration effort.

Source: own elaboration for illustrative purposes

Upscaling restoration efforts will lead to higher costs, but will also deliver larger benefits, potentially attracting interest from a larger set of public and private actors interested in securing or enhancing the provision of ESS unlocked by restoration. The next section discusses the range of costs and benefits that can be expected from restoration efforts, its upscaling and the implications for designing funding and financing solutions.

2.2 Costs of scaling up restoration

In general, the type and magnitude of expenditures associated with restoration interventions are influenced by the specific measures implemented and the local context in which they are applied. The aim, scope and nature of interventions will also vary, including, e.g. removing dams or barriers that disrupt natural water movement, re-meandering straightened rivers and restoring wetlands (see *Table 2*). Restoring freshwater ecosystems embeds upfront, one-off expenditures, as well as regular expenses for the day-to-day operation and maintenance of restoration efforts (see Figure 1).

The one-off expenditures associated with restoration efforts include expenses related to planning and project development, and the capital expenditure required for implementing measures, e.g. those for acquiring new assets (investments) such as land property, machinery, and buildings. These upfront expenses are typically the most significant financial outlay in restoration efforts. The ongoing expenditures include expenses necessary for the restoration project's continued operations, including management, maintenance and monitoring activities. These range from routine maintenance (e.g. energy, raw materials) and staffing to depreciation of equipment and infrastructure. It also includes ongoing expenditures to run collaborations and partnerships, as well as stakeholder engagement, communication, and dissemination. Restoration may involve compensating particularly affected stakeholders and those with a pivotal role in the successful implementation of restorative measures, such as farmers, foresters, and industries (who, for instance, may need to give up land, reduce their water use, or reduce emissions of pollution) as well as local communities and civil society (e.g. associations protecting historical barriers such as mills)[7].

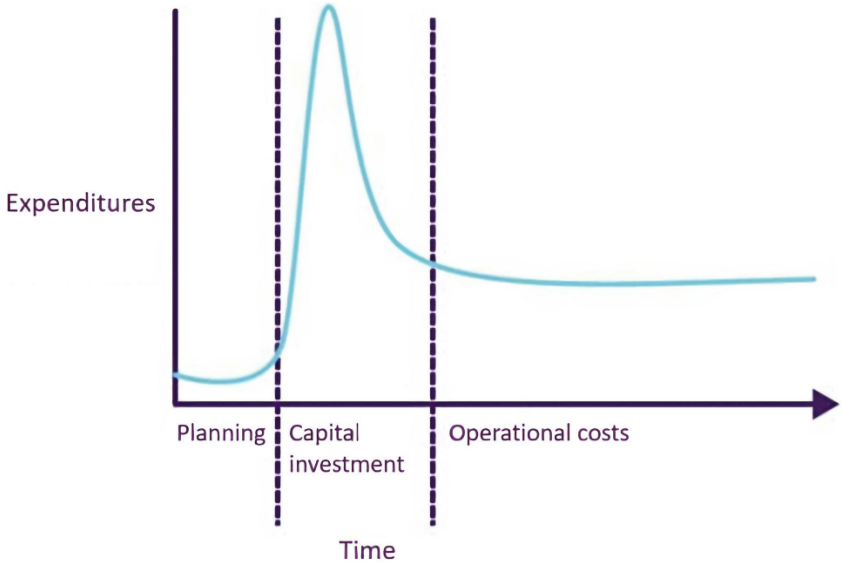


Figure 1. Development of expenditures for freshwater restoration over time, based on Mayor et al. (2021)

Scaling up restoration to enhance ecological integrity at landscape scale implies greater costs related to the physical dimensions of enhancing the ecosystem (e.g. longer length of river re-meandering, larger areas requiring action to block drains for rewetting). It also requires more preparation, coordination, political buy-in, and stakeholder acceptance to manage power dynamics and handle conflict (Perring et al., 2018; Menz et al., 2013). This has important implications on the speed of setup and implementation, and subsequently on costs and risks of restoration activities.

Expenditures for setting up and running restoration activities must be differentiated from the broader set of costs that should be considered when assessing the net worth of a project in a Cost-Benefit Analysis (CBA). In a CBA, the positive and negative effects of a restoration project on human well-being is assessed, including

[7] It is important to acknowledge the delicate balance between compensating specific users for restoration measures that affect their activities or livelihoods and holding polluters accountable for the externalities they impose on the environment and society. As the appropriate response is highly context-dependent, this document does not explore this question in detail.

impacts of ESS at different scales and for different social groups. Hence, a CBA would include also opportunity costs such as the 'disservices' of restoration, i.e. negative consequences of, for instance, abandoning hydropower production (e.g. loss in energy production, costs of increased carbon emissions to society) in order to improve river continuity. CBA can be used to guide and justify the selection of a proposed project and/or optimise its design. The use of CBA to support restoration projects is discussed later on, with regards to experiences in the CS in Chapter 4.

To conclude, restoration managers must raise sufficient funds to cover the initial, one-off costs, in particular the potentially prohibitive capital cost associated with large scale restoration (Brancalion et al., 2019; Zentner et al., 2003). In addition to mobilising more governmental funds, it may be necessary to raise additional finance through, for instance, debt or private investments – although these would need to be repaid at a later stage as discussed in Chapter 3. Another challenge lies in securing funds in the long term to cover the operational costs of restored areas, since the expected benefits may take a long time to be delivered (Hodge & Adams, 2016; Iftekhar et al., 2017). Such costs can be variable and may increase or decrease over time. This means that the estimation of these costs always carries some degree of uncertainty which creates additional risks for managers and funders (den Heijer & Coppens, 2023; McKay & Fischenich, 2014; Mohr & Metcalf, 2017).

2.3 Mapping benefits to unlock new funding options

Restoring freshwater ecosystems can result a wide range of benefits for both people and nature, including unlocked or enhanced ESS (see Figure 2). Healthy freshwater ecosystems contribute to environmental stability and resilience, playing crucial roles in climate change mitigation and adaptation, sequestering carbon and enhancing resilience towards floods and droughts. Moreover, they support a diverse range of species and unique habitats, which is crucial for biodiversity. Freshwater ecosystems also provide indispensable ESS to communities and businesses, such as supplying water for drinking, agriculture, manufacturing, and transportation, as well as offering valuable recreational services that promote physical and mental well-being (Hanna et al., 2017; Kumar et al., 2017; Bélanger & Pilling, 2019; Kaval et al., 2019).

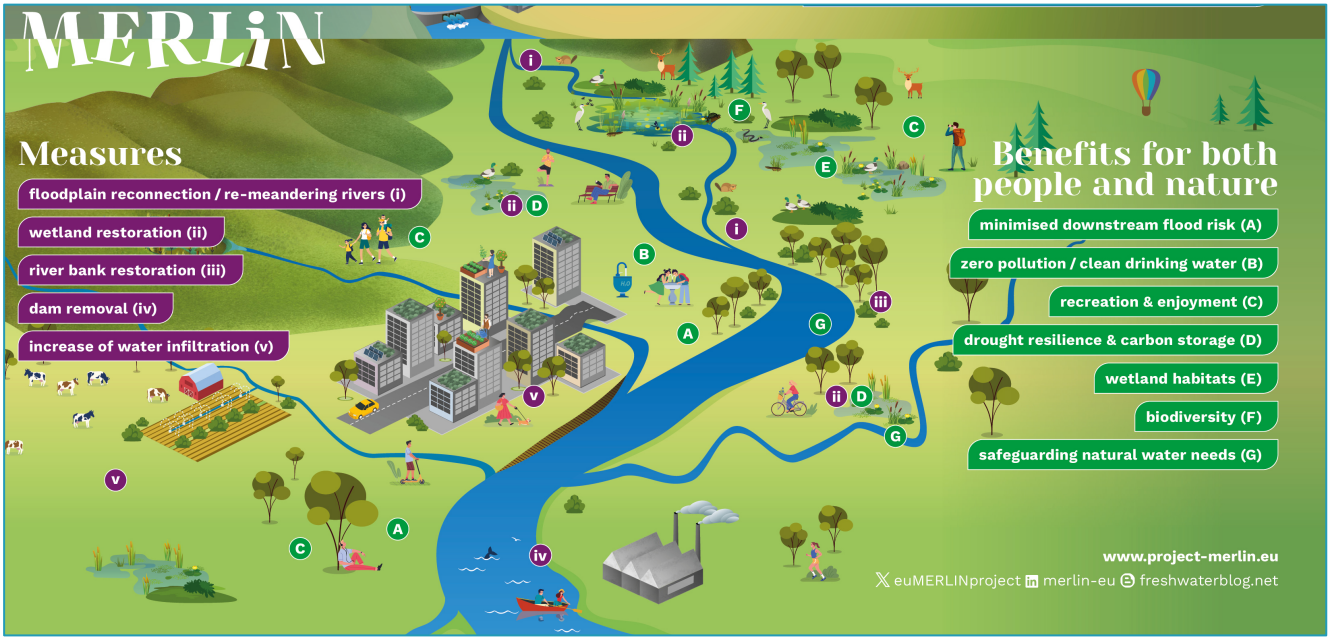


Figure 2. Restoration measures and benefits for freshwater ecosystems

Despite their substantial benefits of restoration efforts for nature and society, restoration projects often struggle to quantify their economic value because many of these benefits lack straightforward market prices (Gitz et al., 2020). ESS delivered by ecosystem restoration are usually available to all and do not dwindle in supply as people benefit from it (Kedwart., 2023). Consequently, profit seeking private actors have little incentive to invest in restoration projects to exploit the delivered ESS – unless new market institutions are established to trade the ESS as now established for carbon mitigation or some Payment for Ecosystem Service schemes (Palmer & Filoso, 2009; Zu Ermgassen & Löfqvist, 2024).

Despite a readily available market to trade most ESS, restoration projects can also generate direct business opportunities from exploiting more conventional goods and services associated with restoration. For instance,

materials such as clay, sand, or gravel extracted during floodplain restoration can serve as valuable resources for the mining industry, creating marketable outputs. These activities, when responsibly managed, can unlock additional economic opportunities and create the revenue streams needed to repay the initial financing for launching large scale restoration (Lambooy & Levashova, 2011; BenDor et al., 2015). They can be instrumental in securing the acceptance and commitment of communities, economic sectors, and eventually the support from private actors. Such opportunities associated with restoration projects are further explored in the case studies in Chapter 4.

To conclude, scaling up restoration efforts will require identifying, quantifying, and effectively communicating the benefits of restoration, including the mutually beneficial outcomes for the environment and society, along with the potential for revenue generation. Figure 3 exemplifies the relationship between, on the one hand, the delivery of ESS, and with them, benefits for nature and society, and, on the other hand, the funding and financing sources that can cover for the costs of implementation and scaling up restoration projects. The shift of focus towards the multifaceted co-benefits of restoration is important for engaging private sector actors and investors and thus to diversify funding sources in ecosystem restoration projects. The different funding and financing sources are explored in more detail in the next Chapter 3.

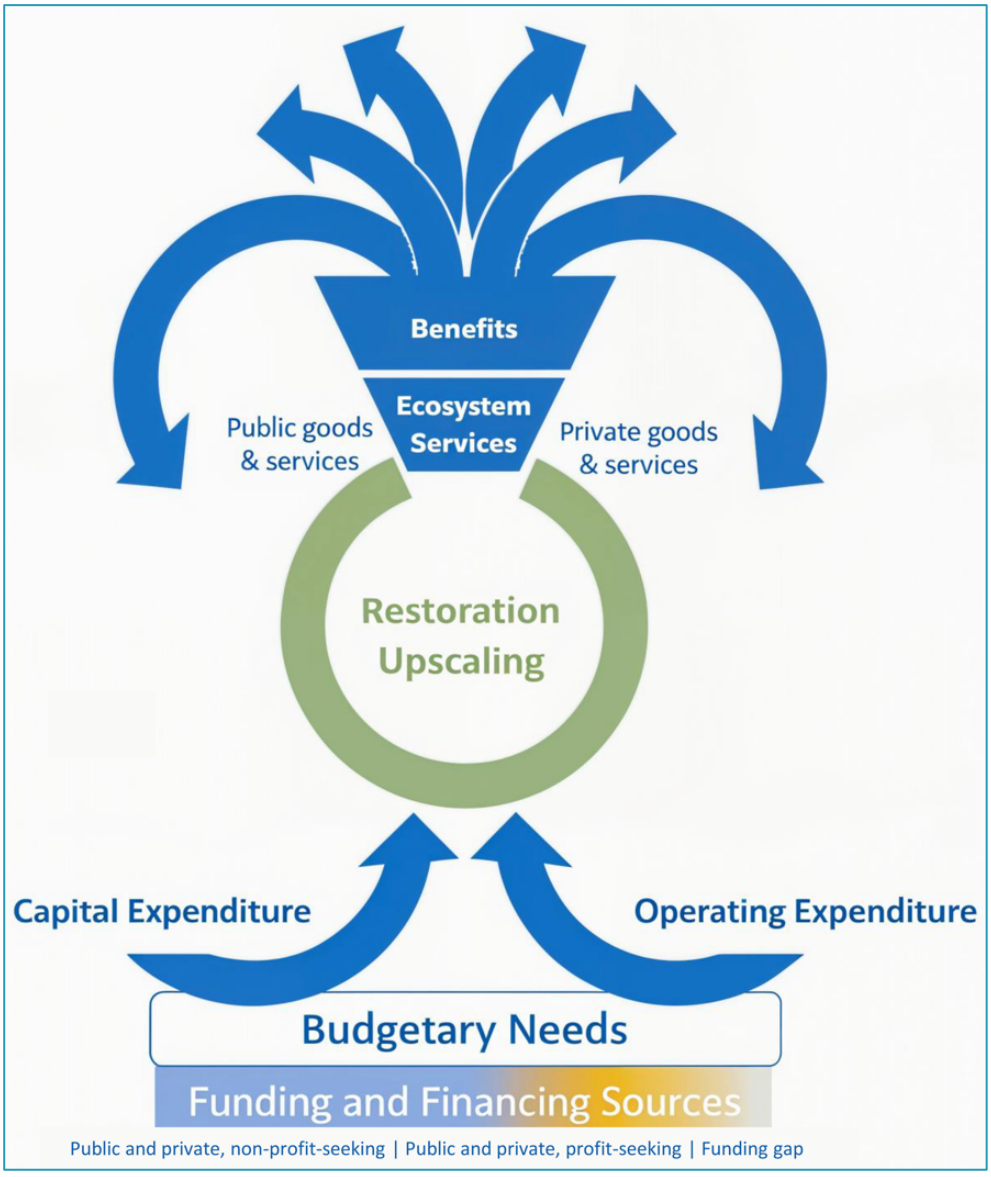


Figure 3. Relationship between ecosystem services and the diversification of funding sources for restoration

3 European landscape for funding and financing freshwater restoration and Nature-based Solutions

This chapter discusses the range of relevant sources of funding and financing for freshwater restoration, drawing on the literature and a review of existing programmes within the European Union (EU). While it does not aim to provide an exhaustive list (for a recent inventory, see e.g. McDonald et al., 2023), it seeks to illustrate the different actors that can be involved and some of the instruments and programmes that are available in Europe. It concludes by examining how combinations of public and private options are seen as a promising avenue for restoration upscaling.

3.1 Public sources

Restoration teams across Europe benefit from a suite of public *funding* sources that they can use to pay for restoration activities. Funding sources - which do not need to be repaid - include grant and subsidy money channeled through programmes at all administrative levels: international and EU, national, regional and local. Public funding is the preeminent source used to pay for ecosystem restoration and NbS, and it therefore plays an essential role in driving progress and stability. At European level for instance, the LIFE funding programme has a central role in supporting conservation efforts (Euronatur, 2024). In addition, public *financing* – lending and investment by public banks and other publicly-owned organisations, which must be repaid – plays a relevant role in freshwater ecosystem restoration by providing access to additional capital (EIB, 2020; Gitz et al., 2020; Zu Ermgassen & Löfqvist, 2024). At European level, the European Investment Bank, via its Natural Capital Financing Facility, provided loans, equity investments, and guarantees between 2015 and 2022 to projects expected to have a positive impact on biodiversity and/or adaptation to the impacts of climate change. A non-exhaustive overview of different EU public funding and finance sources and their expenditure is provided in Table 3.

The efficacy of many EU funding sources is viewed more critically as they often fail to fully align with environmental objectives (Rouillard et al., 2018; Blackstock et al., 2023). According to the World Wide Fund for Nature, EU member states allocate approximately EUR 34-48 billion annually to subsidies that are detrimental to biodiversity and often contradict EU environmental goals as set out in the EU Biodiversity Strategy 2030 and the Nature Restoration Law (WWF, 2024). These are especially prevalent in sectors like agriculture, forestry, fisheries, transport, and water infrastructure. For instance, about 58-60% of Common Agricultural Policy funds are considered harmful to biodiversity, as they incentivize large-scale unsustainable farming or forestry practices (WWF, 2024).

A survey was carried out with the MERLIN CS to collect information on the public sources they usually rely on to fund restoration. Cases referred most frequently to government ministries, statutory agencies responsible for delivering environmental policy, and EU institutions. International (extra-European) funders such as the World Bank and United Nations (UN) agencies (e.g. the United Nations Development Programme and United Nations Environment Programme) are also mentioned by the MERLIN CS teams. The instrument most used by the MERLIN teams are grants. Public programmes that they have commonly tapped from to fund their restoration work include European funds like the EU Research and Development programmes (Horizon 2020, Horizon Europe, European Innovation Partnerships), the EU funding programmes for nature protection (i.e. LIFE) and regional funds (e.g. Interreg), as well as subsidies provided under the EU Common Agricultural Policy (including LEADER) and the European Just Transition Fund. Some national-level public funds referred to include the Blue Deal[8] in Flanders, the Peatland ACTION fund[9] in Scotland, and the REPower project[10] in Finland, as well as several funds provided by the Norwegian government.

[8] https://bluedeal.integraalwaterbeleid.be/about-blue-deal

[9] https://www.nature.scot/climate-change/nature-based-solutions/peatland-action

[10] https://ym.fi/-/ratkaisuja-puhtaan-energian-murrokseen-uusi-tutkimushanke-vauhdittaa-fossiilisista-polttoaineista-irtautumista?languageId=en_US

Table 3. Example sources of EU public funding and financing sources (non-exhaustive)

Name	Objectives	Beneficiaries	Planned expenditure
LIFE programme	EU's main funding instrument for environmental and climate projects; funding 76% of the projects and accounting for 48% of total restoration funding	EU-registered public or private legal entities, third countries associated with the LIFE programme, or legal entities established under Union law or any international organization	EUR 5.43 billion (for 2021-2027 period)
Cohesion Fund and European Regional Development Fund	Reduce regional disparities and promote economic, social, and territorial cohesion within the EU	Regions and EU member states, particularly less developed regions	EUR 392 billion (for 2021-2027 period)
European Agricultural Fund for Rural Development	Improve competitiveness of agriculture, ensure sustainable management of natural resources, and promote balanced territorial development of rural communities	Farmers, rural businesses, local communities, and public authorities in EU member states	EUR 95.5 billion (for 2021-2027 period)
European Agricultural Guarantee Fund	Ensure stable income for farmers and support market stability	Farmers in EU member states	EUR 291.1 billion (for 2021-2027 period)
Horizon Europe	EU's main funding programme for research and innovation	Public or private legal entities, including international organisations, established in one of the eligible countries: EU member states, eligible non-EU countries and EEA countries, and associated countries	EUR 95.5 billion (for 2021-2027 period)
Interreg	Strengthen cooperation between EU regions and countries; promoting regional development, cohesion, and reducing economic disparities	Regional and local authorities, NGOs, educational institutions, and other public or private organisations	EUR 8.05 billion (for 2021-2027 period)
Just Transition Fund	Alleviate socio-economic impacts of the green transition by supporting economic diversification and job transitions	Carbon-intensive regions, workers, and businesses needing green adaptation	EUR 19.32 billion (for 2021-2027 period)
EU Investment Bank	Support the economic, social, and environmental objectives of the European Union	Public and private entities, including companies and local authorities	varies
European Maritime and Fisheries Fund	Support actions for the management, restoration and monitoring of NATURA 2000 sites, and the rehabilitation of inland waters per the 'EU Water Framework Directive'	Fishers, aquaculture operators, seafood processors, and coastal communities	EUR 6.1 billion (for 2021-2027 period)
InvestEU Fund	Stimulate investments aligned with EU goals for sustainability, innovation, and job creation	Natural or legal persons in EU or eligible third countries, including public, private, and mixed entities, and non-profit organizations	More than EUR 372 billion of public and private investment through an EU budget guarantee of EUR 26.2 billion

3.2 Private sources

In broad terms, these refer to contributions from – and collaborations with – the *private sector*, i.e. organisations and businesses who are not owned or operated by a public sector actor (Merriam-Webster, n.d. as cited in Abe et al., 2019), including both nonprofit and for-profit entities (Spicker, 2012; Islam and Ryan, 2016) from all sectors of the economy (e.g. primary producers, manufacturers, and service providers). These can help to support, fund, finance, and/or deliver restoration actions, and the possible setups are wide-ranging. As illustrated in Figure 4, the private sector can be divided into three broad groups: 1) those that trade in financial products and services (e.g. banks and insurance companies), 2) those that trade in non-financial goods and services (e.g. farmers, private energy utilities, peat producers, river shipping companies, private water utilities), and 3) those that are engaged in the social and solidarity economy (e.g. associations, cooperatives, foundations, social enterprises).

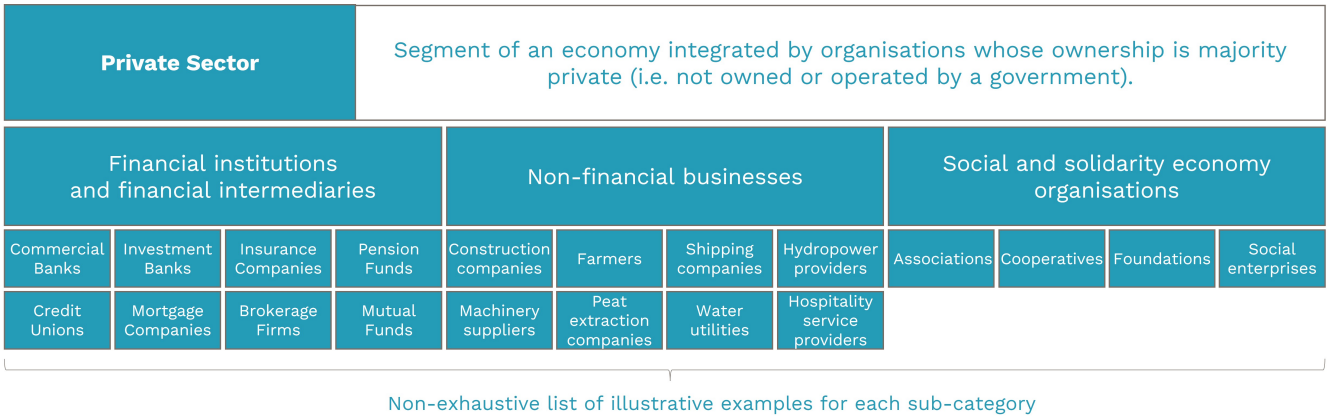


Figure 4 Working definition and breakdown of the Private Sector for the context of MERLIN
Source: own elaboration based on definitions from Merriam-Webster (n.d.), Abe et al. (2019), Spicker (2012), Islam and Ryan (2016), EC (2021), ILO (2022), and OECD (2022)

The large and diverse number of actors that integrate the private sector makes for a broad range of possible partnership arrangements and instruments from which to draw private contributions to ecosystem restoration. Generally, most private organisations will be driven by profit goals, and will therefore be primarily interested in activities that allow them to reduce costs and acquire financial returns. Nevertheless, with the growing importance of Corporate Social Responsibility commitments and Environmental, Social and Governance standards[11], private organisations may also want to improve on the sustainability metrics that they use. Alternatively, other private organisations, such as foundations and social enterprises, are specifically set up to prioritise social and environmental objectives over capital gains and so are likely to engage in initiatives that meet the collective needs (i.e. that of their members or users) or the general interest (i.e. that of society at large).

Table 4 presents the range of private funding and financing instruments, differentiating between funding, financial, and revenue generating instruments. As regards to funding instruments to support freshwater restoration, private sector actors may use private grants, donations and in-kind contributions to provide funds without expecting a financial return on their contributions. In the MERLIN cases, corporate grants and philanthropic donations are the most frequent form of private sector involvement with four cases having used these instruments before the start of the project. For instance, since 2007, Coca Cola partnered with WWF to support floodplain and wetland restoration along the Danube, while in Israel, the Rothschild foundation donated 30 million EUR within four years for the restoration of the Tzipori river basin.

Another group of instruments are revenue generating mechanisms. These include the sale of sustainably produced commodities (e.g. food and timber) through conventional markets, the development of new services (e.g. eco-tourism), the participation in environmental markets (e.g. carbon credits, or biodiversity offsets), or engagement in schemes that reward the delivery of ESS (e.g. payment for preserving good quality water). The revenue generated can be used to cover budgetary needs of ongoing conservation and restoration efforts in the area or to repay an investor.

Debt and equity are financial instruments involving investors (in form of e.g. a commercial bank or other businesses) that can bring upfront cash that can be useful for large capital expenditures associated with e.g.

[11] For more information on the EU framework on these standards, see: https://single-market-economy.ec.europa.eu/industry/sustainability/corporate-sustainability-and-responsibility_en

the acquisition of land, construction permits and equipment. In recent years, green bonds have increased in popularity, with expenditures on biodiversity growing from €33 million in 2014 to €280 million in 2019 (IEEP, 2023). Restoration projects using such financial instruments will, however, also need revenue generating instruments to repay investors over time. Compared to public schemes (e.g. loan from a development bank), interest rates may be less favourable. However, the advantage of using private debt or equity is in accessing a potentially much larger community of investors and additional resources that can facilitate restoration upscaling.

Table 4. Examples of private funding and financing instruments (non-exhaustive)

Instrument Type	Description	Example
In-kind contributions	Non-monetary aids that reduce project costs and foster community engagement and sense of ownership of restoration efforts. Can be difficult to secure as a regular, long-term resource, and quality of the contributions may vary.	Machinery, materials, and labour donations from local businesses.
Donations	Gifts handed out for charitable purposes, often with fewer conditions than grants. They may include money, goods, or services and can be raised through direct applications to philanthropic entities, open/rolling processes, crowdfunding campaigns or other mechanisms.	Crowdfunding campaigns designed and executed to raise funds for projects with particular characteristics considered attractive to specific target groups.
Grants	Non-repayable funds that often come with strict conditions on usage, resulting in administrative burden during the application and execution phases. Renewal is uncertain, and non-compliance with agreed requirements can result in penalties (e.g. repayment obligations).	Funds handed out by corporate organisations to fulfil their Corporate Social Responsibility commitments or achieve Environmental and Social Governance targets.
Commercialisation of conventional goods	Production and sale of goods derived from restoration activities, often linked to primary sectors. Given the conventional nature of the goods, they can be sold in established markets and are thus an accessible option for investors or for direct users. Normally the volumes and thus the magnitude of the revenues generated will be limited in comparison to intensive modes of exploitation, and sometimes they will be one-off. Commodification can face resistance from local communities, especially if it is linked to unsustainable practices.	Sale of extracted clay, sand, gravel, timber gained during clearing and excavation procedures.
Commercialisation of conventional services	Provision of services that are enabled by- or benefit from the restoration actions. Without restoring the ecosystem, the offer would not be possible, or it would be of lower quality/value. Given the conventional nature of the services, they can be traded in established markets, and some can be turned into a steady source of revenues, making them attractive for investors. They can, however, be associated with sizable initial investment (e.g. on infrastructure) and permitting. If the exploitation of these services interferes with the own use and enjoyment of the local community, or tends to grow beyond ecological limits, resistance could emerge.	Ecotourism initiatives offering property rentals and other facilities adjacent to restored ecosystems as well as recreational activities to experience nature in the restored area.
Commercialisation of credits in environmental markets	Generating credits for environmental benefits associated to the restored ecosystems and selling them in local, national or trans-national markets to companies needing to offset their environmental impacts. Is helping to integrate environmental benefits into market mechanisms. Limited maturity	Carbon markets and biodiversity offset trading.

Instrument Type	Description	Example
	of these markets makes them volatile and issues with monitoring, verification and integrity shape confidence and engagement of actors. Offsetting approach criticised as it does not deter but rather compensates for unsustainable practices.	
Payments for ecosystem services	Agreements where beneficiaries of ecosystem services fund actions to secure or enhance their supply. Create direct financial incentives for conservation and restoration activities and can involve a wide range of stakeholders, including local communities, businesses, and governments. Efforts associated to the setup, coordination, and enforcement of agreements may be substantial.	Payments to farmers to reduce pollution of waters affecting uses downstream.
Loans	Money from a bank or other financial intermediary that is repaid by the borrower over time, usually with interest. The interest margin and potential level of security (also called collateral) required depend on factors such as the type of capital expenditure ('project riskiness'), tenor (length of loan) and the financial strength of the borrower.	A bank loan taken to fund the remeandering of a river or the construction of ponds, to be repaid by charges onto users of the restored area.
Equity	Ownership in a company, providing shareholders with a claim on its assets and profits. The value of equity is determined at time of investment and fluctuates based on the company's performance and market conditions.	Participation in a limited company restoring wetlands in exchange for ownership and a share of future profits from ecotourism activities or sustainable fishing.

The ability to articulate and communicate the multiple benefits of restoration is essential for securing private-sector commitment (Iftekhar et al., 2017; Jellinek et al., 2018). In this regard, it is essential to describe and frame restoration in a way that relates to their interests and business-related decision-making processes and needs. This may be quite different compared to public sector actors providing grants. For instance, when assessing a potential investment option, an investor will assess the potential Return On Investment, e.g. in the form of reliable revenue streams, before committing to financing the project. Hence, carrying out a detailed assessment of the potential revenue streams that a restoration project can generate, including the risk for revenues not to materialise as expected, will ultimately be required to secure private investments. In other words, restoration projects would need to become 'bankable', i.e. they must satisfy the needs of investors. This includes criteria such as cash flow generating activities, sufficient collateral, success probability of the project, proof of concept, and proven track record, among other things (WWF, 2020). This is further explored in Chapter 4.

3.3 Combining public and private sources of funding and financing

Recent years have put more emphasis on better integrating public and private sources of funding as no single authority or funder appears to have sufficient resources to independently drive restoration efforts (Wiley et al., 2013; Samans, 2016). *Blended finance* is the strategic use of public and philanthropic funds to attract private finance to projects (Samans, 2016; OECD, 2021). Public actors can de-risk projects and incentivize private sector participation by leveraging through public budgets, creating robust regulatory frameworks and market conditions, and offering complementary mechanisms such as co-funding and guarantees on debt (den Heijer & Coppens, 2023). Private actors bring capital and scalability (Brathwaite et al., 2022; Löfqvist et al., 2023). In recent years, this approach has received increased attention to help address the funding gap for restoring ecosystems (den Heijer & Coppens, 2023). However, as described in the previous section, involving financiers can be challenging due to the risks posed in investing in restoration projects (see *Textbox 2*).

As private sector involvement in nature restoration grows, the range of models and strategies for incorporating private sources of funding and financing is expanding (den Heijer & Coppens, 2023). This provides opportunities for learning, thus multiplying and improving the quality of connections between new partners and ultimately strengthening the role of private sector actors in restoration activities. Drawing on the experience of 20

European CS, mostly from the MERLIN project, the next Chapter 4 explores in more depth the factors that are helping and hindering restoration teams in diversifying restoration funding towards the private sector.

Textbox 2. Working with private lenders and investors: the challenge of risk and scale of restoration projects

Although private finance increasingly incorporates sustainability metrics to guide investment decisions, these decisions continue to be primarily driven by traditional factors such as financial return, market demand, risk and uncertainty. Restoration projects often struggle to meet these criteria. For instance, they often involve a high degree of uncertainty concerning the level and timing of expected financial returns, as benefits are not easily estimated and tend to materialise only over longer time periods (Löfqvist et al., 2023). Compared to conventional investments (and with some notable exceptions), river restoration projects to date have frequently been small scale and localized, limiting their potential to generate large financial returns (Roper et al., 1997; Christian-Smith and Merenlender, 2010). Furthermore, due diligence, monitoring, and enforcement are often disproportionately costly relative to the project's size, and small projects frequently lack the streamlined processes of larger investment opportunities (Palmer et al., 2007; Garda et al., 2017).

The issue of scale is particularly relevant, as upscaling could theoretically provide economies of scale to attract private finance (Löfqvist et al., 2023). However, a key challenge lies in determining who is responsible for bundling smaller projects together. The absence of broker institutions or intermediaries capable of strategically consolidating and coordinating projects across scales hinders the ability to achieve the substantial economic and ecological efficiencies that coordinated, large-scale efforts can deliver (Neeson et al., 2015).

Additionally, the heterogeneity of restoration projects, varying in scale, ecosystem type, objectives and measures, make it challenging for investors to apply standardized evaluation frameworks (Evju et al., 2020). This occurs in a context where private investors are not yet fully familiar with restoration projects. Altogether this creates a perception of disproportionate complexity, risk, and uncertainty, directing investments elsewhere. In summary, without systemic changes the sustainable finance trend reaches its limits, and achieving substantial private sector engagement in restoration remains a challenge.

4 Learning from 20 European cases

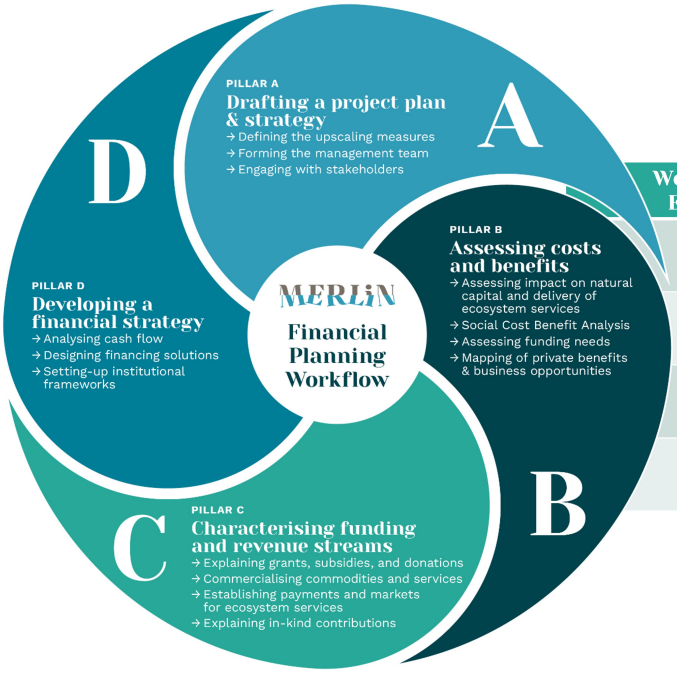
This chapter presents experiences of restoration managers in their attempt to diversify and scale up funding for restoration. It draws on observations made in 20 European CS during the MERLIN project through different activities including surveys, workshops, interviews, and tailored activities with individual cases (as detailed in the methodology Section 1.3). The aim is to draw lessons on challenges or limiting factors in diversifying funding sources, as well as factors enabling this diversification.

Much of the thinking and exchanges with CS was organised around the MERLIN Financial Planning Workflow (see Annex 3[1]), which aims to support restoration managers with the financial planning of their upscaling initiatives. The workflow places special focus on how to enhance private sector involvement as a way to diversify the funding and financing of restoration actions. It illustrates broadly the key issues that restoration managers should consider when designing restoration upscaling projects and lays them out as a series of building blocks or "pillars".

The Workflow consists of four pillars:

- **Pillar A** is about laying the managerial foundations of the restoration upscaling project. It entails the definition of a first set of restoration measures and the formation of a team holding the full range of competences necessary to ensure a sound planning and effective execution of the project. It also points to the relevance of stakeholder engagement.
- **Pillar B** is about defining whether it is worth investing in the proposed project from a societal perspective, and to give initial signals on opportunities that businesses could invest on. It consists of assessments (hydrological, socio-economic, budgetary) that are considered essential in informing the financial strategy of the project later on.
- **Pillar C** lays out funding sources and revenue streams to establish an outlook of potential project income and to enable diversification. Each will pose different requirements and conditions, and it is important for restoration managers to take this into account early on.
- **Pillar D** is about mapping budgetary needs along the project's lifetime, plan timely cash inputs using suitable financing mechanisms, and establish the financial structure necessary to execute the strategy.

Using this heuristic framework, Figure 5 presents an overview of limiting and enabling factors. They are further detailed in the next sections.



Workflow Element	Related Enablers	Barriers addressed
Pillar A	Building/sourcing capacity, raising awareness, breaking preconceptions, building trust, aligning goals	Limited skills, reserve, scepticism, low expectations, reputational risk, complex stakeholder dynamics
Pillar B	Leveraging advanced tools and methodologies, conducting qualitative appraisals, building/sourcing capacity	Complexity of ESS quantification, low data capacity, low access to accurate cost estimates
Pillar C	Identifying beneficiaries of restoration outcomes, spotting concrete needs, partnering with entrepreneurs & experts	Limited financial incentives, lack of conviction, concerns on integrity of environmental markets
Pillar D	Building/sourcing capacity, gaining understanding of business logic and practice	Specialised language and terminology, limited understanding of financial instruments

Figure 5. The MERLIN Financial Planning Workflow and its relation to some enablers and barriers identified in this report
Source: own elaboration.

4.1 Shifting mindsets

4.1.1 Challenges

Exchange with restoration teams throughout the project showed that they generally take a cautious position when considering engagements with private businesses to fund restoration, for various reasons. Firstly, the funding provided through MERLIN for restoration activities to be implemented during the four years of the project may have reduced the priority given to fundraising issues in the short-term. CS teams may have been more focused on dealing with the administrative and social dimensions during the implementation of restoration measures in MERLIN.

Secondly, there is a common presumption across stakeholder groups that the public sector is and should continue to be a core source of funding for restoration, in part as ecosystem restoration is linked to public goods and services. This is also illustrated in the MERLIN reports by Carmen and Nyírő (2023) and Ibrahim and Nyírő (2023). Linked to this is the view that public institutions are the most appropriate entity to organise funding, particularly for restoration projects covering large spatial scales and/or designed at the landscape level. For example, the CS7a Danube (AT) restoration efforts demonstrated that the large scale and high costs of such strategic initiatives often necessitate public financing, with private funding serving as a complementary source to cover specific expenditures.

Thirdly, there was concern that increasing the level of private sector funding may eventually lead to disengagement of governments, and ultimately a reduction in public sector funding for restoration, also detailed in MERLIN Deliverable D4.2 by Schulz et al. (2024)[12]. In addition, experiences in the cases showed that private finance is not always perceived as more reliable than public finance, as demonstrated by CS19 (see Case Study Insights 1). Thus, diversification of funding was seen as increasing the vulnerability of future restoration projects, not as a route to help increase their viability and the resilience of the restoration sector.

A fourth factor was a scepticism that private sector actors, particularly those driven by profit-making interests, would step forward to fund restoration efforts. This is reflected in cases where efforts to engage with the private sector yielded limited outcomes with only a minority of private sector actors willing to discuss this topic. An example of this is also a project funded by NatureScot – a partner in CS17 – in collaboration with the Scottish Government and the National Lottery Heritage Fund, which faced challenges in encouraging private sector participation in green finance initiatives. Despite targeted efforts, including outreach to 65 organizations, only 10 responded, reflecting the broader hesitation within the private sector (see also Hughes, 2024).

Some restoration teams consider many business objectives as incompatible with environmental objectives. This suggests, in some cases, a lack of awareness or conviction that social benefits and business opportunities can jointly arise through ecosystem restoration, for example in relation to the bioeconomy. In other cases, the low expectations may be an effect of complex local stakeholder dynamics, as exemplified in CS2 which was hindered by conflicting values and interests within the local population, as also explained in MERLIN D2.1 by Buijse et al. (2022)[13].

Finally, some CS were outright reticent, as they recognised large challenges and risks in terms of establishing a partnership with private sector actors, as discussed in Section 4.5.

4.1.2 Enabling factors

During the MERLIN project, several activities (see Section 1.3) tested the awareness and level of interest of CS teams regarding diversification. During these activities, it was observed that CS showed a gradient of engagement ranging from initial *awareness*, to *interest* in the topic, to *willingness* to experiment, to *commitment* to diversify their funding options. In their final RSP, 15 CS teams recognised a need to diversify their sources of funding to help upscale restoration measures. The main reason indicated was the limited and uncertain availability of public funding. For example, the RSP of CS5 stated: "*Kampinos National Park finances wetland restoration in its area through project grants from external funds. Unfortunately, such funding is not stable and will not be available in the long term. Therefore, mechanisms need to be developed to make nature conservation and wetland ecosystem restoration economically viable.*"

Private sector funding emerged as a promising complement to public funding. For instance, CS10 emphasized the advantages of private sector involvement, noting that: *"Private sector financing offers significant potential to*

[12] https://project-merlin.eu/deliverables/articles/deliverable-d4-2.html
[13] https://project-merlin.eu/deliverables/articles/deliverable-d2-2.html

complement public funding and upscale restoration more rapidly. Private actors, being more agile and less bound by regulatory restrictions, can advance restoration efforts more efficiently."

In other instances, this view was shaped by direct experience of fluctuations in public sector funding sources associated with shifts in policy priorities both within and across administrations, e.g. when an emergency occurs as observed in CS19 (see **Fehler! Verweisquelle konnte nicht gefunden werden.**), or when a new administration with an opposed political perspective comes into power. In this view, commitment of public funds for restoration is thus not perceived as necessarily guaranteed.

Furthermore, some CS recognized the economic potential of collaborating with private actors and the opportunity to create mutually beneficial outcomes. CS4, for example, emphasized their interest to *"develop synergy with private funding, e.g. sand and clay mining businesses"*, highlighting how restoration efforts can be aligned with business interests.

The vast majority of MERLIN CS showed interest in learning about the opportunities offered by the private sector. However, fewer (eight) engaged in more in-depth exploration of options with project partners through one-to-one support and the 'Zero Risk Programme'. Only a handful of cases (i.e. CS7b, CS8, CS9, and CS17) revealed a strong commitment to actively reach out and consolidate a partnership with the private sector to diversify their funding or financing, as exemplified by their actions during the project and further discussed in the coming sections.

Case Study Insights 1. Scoping private sector funding options in the Biosphere Reserve Mittelelbe, Germany (CS19)

The UNESCO Biosphere Reserve Mittelelbe ("reserve"), Germany's largest terrestrial nature reserve, stretches 300 kilometres along the Elbe River, encompassing a blend of ecosystems and cultural landscapes.

The public administration managing the reserve carries out restoration projects supported by both public and private funding, with the former making up the largest proportion. Public grants acquired by the reserve's administration generally provide funding for 1-3 years, while the timeframe for implementation and maintenance of restoration projects will run for 5-20 years. Additionally, securing sustainable and long-term public funding for restoration projects comes with challenges. Administrative changes at federal and state levels and unforeseen budget reallocations, for instance following flood disasters, can disrupt funding continuity and lead to project delays or cancellations, sometimes at critical stages. Responding to such developments demands a great amount of resources and capacities.

To address this challenge, the reserve´s administration tries to operate an adaptive "funding-ready" approach. This involves maintaining a portfolio of project drafts covering a range of topics, ecosystems, and measure types in different financial dimensions. This approach enables the administration to rapidly adapt proposals to match emerging funding opportunities from both public and private sources. This flexible ad-hoc approach has been advantageous for securing diverse funding streams. Yet, it is resource-intensive and likely not feasible for smaller conservation NGOs that lack the staff capacity for proactive project development. Nevertheless, the administration also seeks to cooperate with NGOs that might be able to apply for different financial resources and shares previous project plans and relevant data. The administration has direct experience with two multinational corporations who funded (1) a pond de-sludging and restoration project, and (2) a grassland re-wetting project, respectively. The latter involves a periodic flooding and the compensation for a local farmer, where water levels in the project area can be raised, as long as compensation can be paid.

Both companies selected low-risk projects that have a quick turnaround in terms of impact and thereby contribute to their sustainability targets (e.g., CO_2 sequestration and natural water retention).

The reserve's administration faced several challenges during the negotiation phase. Firstly, public administrative offices in Germany are not allowed to receive private funding. Further, companies may have limited knowledge of and experiences with EU, federal, and state regulations governing data and public funding. On the other hand, the reserve's administration lacks experiences with the private sector workflows too. Overall, this can result in significant time and effort spent during setup phases, even in cases where the grant is relatively small.

An additional obstacle occurs if adverse market conditions shift business priorities and hence the available funds, that may result in a shortened project commitment. The experience was made at the reserve that a funding agreement originally negotiated to last ten years, to align well with restoration needs, was shortened to a one-year commitment. This now creates pressure to raise the necessary funds to achieve the desired state of the ecosystem in the upcoming years.

Another significant challenge involved the reporting and monitoring requirements of the corporations. Both companies requested comprehensive and costly long-term monitoring, including modelling of water retention and carbon sequestration levels.

Despite all administrative challenges, the administration stated that the communication was very positive, friendly, and proactive, as well as constructive. Evaluating the process, and putting the efforts against the final project output, the balance of accounts is still positive for the reserve so far.

The reserve's administration deemed both partnerships as positive experiences and continues to be open for future partnerships with private sector actors, given alignment with its priorities and available projects is secured.

Picture 1.1: (a) project site with extensive grassland, (b) weir regulating the periodic flooding and re-wetting of the grassland (Source: Marie-Isabell Lenz, BfG, July 2024).

Picture 1.2: Private sector funded pond de-sludging project (Source: Marie-Isabell Lenz, BfG, July 2024).

4.2 Expanding skills of restoration teams

4.2.1 Challenges

Understanding financial processes and terminology is important for developing and delivering diversification strategies. Yet, restoration teams often lack the formal training or experience in finance and commercial project management - skills that are particularly useful to scope new sources of funding from the private sector, and especially to assert the suitability and relevance of different financial instruments. In MERLIN, restoration managers who participated in the funding and financing workshops included mostly people with backgrounds in ecology and related natural science disciplines. There was generally a lack of certain skills and expertise with business relations, socio-economic assessment and financial planning.

The MERLIN restoration teams showed some experience with private donors and foundations and thus some understanding about how to apply for grants from private sources, but they had limited understanding of the deployment of market- and debt-based instruments. Success in fundraising utilizing these instruments hinges largely on effectively communicating the core features and expected outcomes of the initiative, to grab the potential funders' or financiers' attention and secure commitment. The skills and expertise necessary for this may exist within an organisational silo (e.g. the executive board or the finance department), but the need to include them may often have been overlooked. Moreover, internal practices and structures often hinder the effective utilization of these skills, as staff are frequently fully deployed in their existing responsibilities and may lack the motivation, capacity, or opportunity to take on additional tasks. For example, despite efforts, our MERLIN contact points in CS5 and CS17 did not manage to engage staff from their finance department in discussions and learning about funding diversification.

4.2.2 Enabling factors

To successfully diversify funding and financing sources, restoration teams must expand the scope of their available expertise beyond ecology, hydromorphology and related natural sciences. This involves sourcing, or building competencies in socio-economic analysis, business development and private sector relationships. If a more widespread involvement of the private sector is to materialise, understanding business logic and practice, sector priorities and terminology, and having a good grasp of different financial instruments will become just as crucial as ecological expertise, as this knowledge can directly impact the ability to identify, acquire, manage, and diversify funds.

Within MERLIN, the Financial Planning Workflow (see Annex 3[1]) was used to accompany restoration teams in exploring alternative funding options with the primary intention of informing the preparation of their RSPs. Activities included mapping of impacts of proposed restoration measures – including ESS delivered –, identification of beneficiaries, and outlining business or investment opportunities. The more willing restoration teams then signed up for a tailored training programme – the Zero Risk Nature Acceleration Programme (see Annex 9[1]) – which supported them over several months to build their understanding of private investor needs and how to address them. In-depth guidance on a range of alternative funding and financing instruments is available in the MERLIN Academy (see *Textbox 3*).

Textbox 3. Resources available on funding and financing instruments in the MERLIN Academy

> With the MERLIN project, a suite of Off-the-Shelf Instruments (OTSIs) that represent a carefully curated selection of established funding and financial mechanisms, specifically adapted for freshwater-related restoration activities. Drawing from real-world experiences and successful CS, the MERLIN OTSIs provide restoration managers with practical insights on setting up, managing and utilising diverse types of funding and financing instruments to pay for their restoration activities. Instruments covered in the OTSIs include grants, corporate donations and branding, crowdfunding campaigns, debt instruments, and climate bonds, among others. Each instrument is accompanied by detailed, accessible, and hands-on guidance. All OTSIs are available for download on the MERLIN project website.[14]

Some CS benefited from governmental programmes providing capacity building and scoping activities. For instance, the Facility for Investment Ready Nature in Scotland (FIRNS)[15] supports activities that "shape and grow the use of private investment and market-based mechanisms to finance the restoration of Scotland's nature". Funds are available for activities required for approaching private sector actors and securing resources for restoration. The Forth Rivers Trust (FRT) in Scotland obtained a grant during the MERLIN project to explore

[14] https://project-merlin.eu/outcomes/off-the-shelf-instruments.html
[15] https://www.nature.scot/funding-and-projects/firns-facility-investment-ready-nature-scotland

the potential for landscape-scale business partnerships (see *Case Study Insights 2*). In CS20, a (non-MERLIN) Scottish case, restoration managers received a similar grant to explore new sources of finance to deliver natural flood management.

Some CS reported working with consultants to cover for the lack of technical expertise within their organisation. For instance, CS11 contracted a team of researchers and consultants to assess the economic viability and bankability of extensive meadow maintenance. In CS6, a consultancy carried out a feasibility study on the potential to use carbon credits to fund restoration measures. Both Scottish initiatives mentioned above, i.e. CS17 and CS20, also relied heavily on external consultants, though in the case of the FRT in CS17 a mentoring approach was used to build internal expertise through experiential learning.

A variety of consultants now provide services ranging from exploring opportunities to enhance ESS in landscapes and exploiting nature markets (e.g. biodiversity and carbon offset markets) to establishing sustainable value chains and setting up bankable projects. Conservation groups like The Nature Conservancy and WWF also provide support through dedicated programmes like the Nature for Water Facility[16] and the NatureWise NbS Incubator[17], respectively.

No MERLIN CS hired permanent specialist staff to consolidate the socio-economic or business expertise of their restoration team in the long run. However, some of them, such as CS17, highlighted that they have now a greater focus on recruiting for social science related expertise.

Networks can also be a helpful source of learning for restoration teams. For instance, the Scottish Nature Finance Pioneers[18] network brings together a wide range of actors contributing knowledge and expertise on different facets of nature finance. Similarly, the Ecosystem Knowledge Network in the United-Kingdom[19] provides practical knowledge and collective learning opportunities for restoration teams across the United Kingdom interested in diversifying their funding sources. Other initiatives such as the Green Finance Institute Hive[20] provide several open access toolkits, including one for investment readiness. These provide opportunities for collectively exploring challenges and new ideas and can inspire teams to try out new alternatives.

[16] https://nature4water.org/
[17] https://wwf.panda.org/discover/our_focus/freshwater_practice/naturewise_nbs_incubator/
[18] https://finance.naturalcapitalscotland.com/
[19] https://ecosystemsknowledge.net/
[20] https://hive.greenfinanceinstitute.com/gfihive/

Case Study Insights 2. Enabling finance and engaging with business in Forth Rivers, Scotland (CS17)

The Scottish Government has expressed a strong desire to drive more private sector resources into land and nature management, but also to avoid unintended consequences for nature and society. This is reflected in the key principles for responsible investment in natural capital[21] for a values-led, high-integrity, market-based private investment in natural capital involving communities, investors, landowners, public bodies and other stakeholders. The Scottish Government has matched these visions and principles with specific pilots and resources to understand and encourage the potential of nature markets.

In 2022, an Investment Ready Nature in Scotland grant scheme was launched, followed by two rounds of opportunities provided by the FIRNS scheme in 2023. FIRNS is itself a joint venture between the Scottish Government, NatureScot (the agency charged with delivering biodiversity-related policies), and the National Lottery Heritage Fund (a non-departmental public body broadly concerned with supporting the heritage of the United Kingdom and society's engagement with it). FIRNS pays for the costs of development of business and governance models for nature-based projects seeking to attract buyers and investors.

The FRT responded to the opportunity created by FIRNS. They applied for and received funding to develop a Landscape Scale Enterprise Network (LENs)[22] within the catchment area that surrounds the Loch Leven, in Perth and Kinross. LENs helps identify specific private sector actors who may be motivated to pay for aspects of ecosystem restoration, and broker agreements with them. It provides a structured process to understand private sector needs at landscape scale and to jointly identify and enhance ESS that cover operational needs of businesses. In other words, it matches business needs (demand-side focus on specific restoration measures) with potential suppliers (landowners being paid to undertake specific measures or land management practices).

Implementation of the LENs involved contracting 3Keel, a consultancy with expertise on developing a LENs approach and working closely with state nature agencies. A scoping phase involved mapping private actors and identifying one or two companies with strong links to the local landscape to establish transactions with suppliers and attract other buyers. This snowballing approach has been used successfully in other contexts such as the Bristol Avon Catchment Market[23] in the United Kingdom.

The CS17 team's experience, including the mentoring of 3Keel, has helped them develop what they call 'demand-side thinking', enabling them to better understand businesses perspectives, interests and approaches within a wider market-orientated framing. Furthermore, within MERLIN, discussions with the FRT also explored the potential to use the 4Returns Framework[24], which provides a process to bring together multiple stakeholders to holistically plan landscape-scale restoration, with a focus on creating (or bringing back) hope and inspiration, social returns, natural returns and financial returns. The FRT team highlighted how this framework could be used as an overarching framework within which the LENs process could sit, to sharpen the focus on support from- and benefits for private sectors within a landscape.

[21] https://www.gov.scot/publications/interim-principles-for-responsible-investment-in-natural-capital/
[22] https://www.3keel.com/landscape-innovation/
[23] https://www.bristolavoncatchmentmarket.uk/
[24] https://commonland.com/4-returns-framework/

4.3 Improving the understanding of restoration benefits

4.3.1 Challenges

While the RSPs broadly identified benefits (as outlined in *Table 2*), they do not present a quantitative, ex-ante evaluation of expected benefits – which would have required some form of socio-economic assessment, especially if the aim was to attract funders or financiers. In our exchanges with CS, restoration teams typically reported little experience in carrying out socio-economic assessments such as CBA. Such analyses are relevant in the context of efforts to diversify funding and financing sources, as they provide a structured approach to not only showing the overall value of a restoration project, but also help map and assess the costs (including but not limited to expenditures, see Section 2.2) and benefits attached to a particular project. By quantifying potential returns and co-benefits, these assessments can help demonstrate the value of restoration projects to investors, addressing concerns about risk, uncertainty, and long payback periods.

CS mentioned specific reasons for not undertaking CBA. Commonly mentioned challenges were a lack of expertise and feeling uncomfortable with CBA as an instrument – particularly given its limited capacity to account for biodiversity value and non-market ESS like cultural services (also see Section 2.3). Other challenges revolve around knowledge, data, and tools. With respect to data, a notable issue lies in accessing secondary datasets that are relevant, timely, and of sufficient granularity. For example, while most EU member states have some data, they can be difficult to access and use at specific site resolution. Particular challenges regarding conducting CBA include a) limited understanding of key hydrological impacts, such as droughts and floods, due to insufficient use of advanced dynamic hydrological modelling (for example, the modelling needed to estimate impacts of beaver reintroduction in CS3); and b) difficulties in quantifying ESS, as seen in CS7b and CS9. More broadly, difficulties were also reported in obtaining accurate cost estimates, including management and maintenance costs after implementation, as seen in CS7a and CS8.

Although mandated CBA have commonly been applied to inform publicly-funded initiatives, particularly for evaluating the worth of large-scale public projects and infrastructure investments, many restoration projects are small scale and therefore fall outside the scope of mandated CBA. In addition, mandated CBA have traditionally had a narrow scope, and this can represent a major barrier for their use in freshwater restoration and promotion of NbS. For example, CBA used in Germany to guide federal infrastructure and transportation planning have traditionally not accounted for the full range of ESS that NbS could offer as alternative to grey infrastructure (see *Case Study Insights 3*). According to interviews, there are multiple factors behind this. The scope of CBA may be constrained by regulatory guidance or by limited mandates, making it difficult to justify the analysis of effects beyond primary effects. Constraints on CBA scope may also be related to budget limitations. For instance, CS19 indicated lacking the capacity and resources to quantify benefits of projects beyond what mandates require.

The failure to account for co-benefits leads decision-makers to prioritise more traditional and easily quantified options, despite restoration and NbS projects offering greater overall benefits. For example, work in the CS4 (Kok et al., 2025) expanded an existing CBA (Ecorys, 2023) for the 'Integrated river management project' in the Netherlands, which explored different strategies targeting floodplain discharge capacity and sediment management. The official CBA for the project quantified ESS such as flood risk mitigation, navigation, and freshwater supply benefits. When the assessment was extended to include regulating services (e.g. nutrient retention) and cultural ESS, the preferred strategy shifted towards more nature-based alternatives.

Case Study Insights 3. Adapting the CBA federally managed waterways in Germany (CS10)

Germany's federally managed waterways, spanning a 7,000-kilometer primary and 2,800-kilometer secondary network, play a vital role in transportation and navigation. Overseen by the Federal Waterways and Shipping Administration under the Federal Ministry for Digital and Transport, these waterways are maintained and developed in line with the EU Water Framework Directive, which sets ecological and chemical standards for water bodies.

Infrastructure planning for federal waterways involves addressing complex trade-offs between transportation efficiency, ecological conservation, flood protection, and socio-economic development. Traditional assessment methods often fall short in capturing these multidimensional priorities, particularly when evaluating projects with overlapping environmental and societal impacts.

Germany's ongoing update to its federal infrastructure masterplan, which shapes project prioritisation and budgeting for waterways, highways, and trains, presents a pivotal opportunity to integrate ESS into planning and budgetary decision-making. The strategy requires a CBA for infrastructure projects, guided by the federal transportation investment masterplan. This analysis evaluates 13 components, including four environmental factors, e.g. CO_2-emissions. However, the standardized values used are outdated, failing to account for most environmental damages, climate costs, or the monetary value of ESS. Incorporating ESS values into CBAs would provide a more accurate reflection of a project's societal, economic, and environmental impacts. Evaluating more comprehensive cost-benefit ratios would support the prioritisation of projects with minimal negative impacts and trade-offs while maximizing environmental, economic, and social benefits. If successful, this approach would mark the first federal policy to include ESS and socio-economic considerations in CBAs, setting a precedent for evidence-based policymaking in Germany.

Despite this progress, there is no standardized framework for evaluating ESS or integrating them into decision-making. Existing studies are fragmented and limited, reflecting significant data and knowledge gaps. To address this, the Federal Institute of Hydrology, as part of the research project "AMBERS"[25], is developing a decision-making tool that integrates navigational, biodiversity, and socio-economic ESS indicators to guide infrastructure planning along inland waterways. Economic valuation and its integration into federal and state-level planning processes is considered a key tool to advance the integration of restoration and NbS in infrastructure development.

Picture 2: Restored riverbanks along Germany´s federal waterways (Source: BfG).

[25] https://www.bafg.de/SharedDocs/Projekte/Importer/AMBERS_M39600001215.html

4.3.2 Enabling factors

As previously stated, outlining the full range of impacts and benefits of restoration adequately and communicating them effectively can be key for success in fundraising. In MERLIN, the 18 CS outlined the ESS and benefits from the measures in their RSPs on a qualitative basis. In addition, all cases monitored the impact of the measures they implemented during the project, as described in MERLIN D1.2 by Carvalho et al. (2022)[26]. The ESS most frequently reported in MERLIN CS include flood risk mitigation, nutrient retention, biodiversity improvement, wood/biomass production, carbon sequestration, and recreation/landscape quality. Identified beneficiaries of the restoration largely included those benefiting from flood risk reduction, water quality, and biodiversity improvements, and sectors related to recreation and tourism. Conversely, those negatively affected included mostly farmers or other landowners who may experience reduced productivity or loss of land as a result of the measures.

These qualitative appraisals were initially favoured by many MERLIN CS over quantitative assessments, in part due to concerns that the latter might inadequately account for non-market ESS. In fact, traditional straightforward assessment methods typically focus on immediate, tangible benefits, often underestimating or overlooking the broader ecological and social value of restoration initiatives. Nevertheless, a subset of five CS conducted quantified CBA to assess the value of the ESS unlocked by their interventions.

To fully capture the broad spectrum of benefits, it is essential to leverage advanced tools and methodologies available. For instance, recent advancements in computational power and new tools have significantly improved the ability to assess hydrological and ecological impacts. One example is the integration of SWAT+ with EU-wide data demonstrated in MERLIN cases, highlighting how local hydrological models can be coupled with economic valuation methods to quantify ESS more effectively (see

Textbox 4). The MERLIN Hydrological-Economic Modelling framework provides guidance on conducting a CBA that integrates Natural Capital Accounting for freshwater ecosystem restoration at hydrological scales. This is part of a broader regulatory push, including the European Regulation on Environmental Economic Accounting, which goes beyond Natural Capital Accounting to require comprehensive ESS accounting by European member states[27]. Starting in 2024, this mandate will ensure annual, national accounting of specific ESS, mainly provisioning services (e.g. crop provision).

Textbox 4. The MERLIN Hydrological-Economic Modelling Tool

MERLIN is developing a hydrological–economic modelling tool that aims to estimate economic benefits of freshwater ecosystem restoration (upcoming Deliverable D3.3). The tool allows to model most common restoration measures (rewetting, floodplain reconnection, channel re-meandering) for peatlands, small streams and large rivers and to assess the economic benefits of restoration in terms of water purification (nutrient retention), flood risk mitigation and carbon sequestration. The tool relies by default on data inputs available in all EU countries and is therefore applicable in any river basin of the EU, but local data can also be used. Tests on MERLIN CS show that model outputs with EU and local data can differ significatively. Therefore, it is advisable to use the MERLIN tool with default EU data to support a quick scan CBA at initial stages of restoration planning, whereas a fully developed CBA should rely on local data when available.

Beyond making a compelling case for funding or financing and broader stakeholder buy-in, quantitative assessments also enable a more comprehensive understanding of the synergies and trade-offs involved and can guide decision-making for further project development and upscaling. For example, in CS4, a quick-scan CBA conducted in the project's initial stages provided valuable insights, steering designs toward improved outcomes. Particularly, the analysis revealed that riparian reforestation in the Rhine branches' floodplains could potentially increase flood risks, outweighing the benefits of dike relocation. However, by refining spatial designs to select appropriate reforestation sites and employing advanced modelling, the project demonstrated how better-informed designs could avoid negative outcomes and achieve desired objectives (*Case Study Insights 4*).

In CS2, dam removal highlighted a significant trade-off between cultural landscape values and ecological restoration benefits. The dams, which held historical and cultural significance, were removed to restore a more

[26] https://project-merlin.eu/deliverables/articles/deliverable-d1-2.html

[27] See Regulation (EU) No 691/2011 sets up a European Union (EU) legal framework for compiling harmonised European environmental economic accounts.

natural, free-flowing river system. This intervention enhanced ESS but also meant a loss of the cultural and aesthetic features associated with the presence of the dams. This underscores the importance of systematically evaluating and carefully considering trade-offs between various outcomes and stakeholder interests in restoration projects. Achieving such a balance is essential to ensure that efforts are both effective and broadly supported.

Case Study Insights 4. Quantitative ecosystem services analysis for the Room for the Rhine, The Netherlands (CS4)

An example of inherent trade-offs in river-floodplain management is evident in CS4. Here, the quantitative analysis of Ecosystem Services (ESS) revealed that integrated, multifunctional river floodplain management strategies – featuring rehabilitated floodplains – generally offer a higher overall supply of ESS compared to strongly regulated, mono-functional approaches. In particular, the analysis focused on four strategies: conventional (Strategy 1), hybrid (Strategy 2), and two NbS strategies (Strategies 3 and 4). Each strategy was assessed against key issues such as riverbed elevation to mitigate low discharges, increasing system discharge capacity to reduce flood risks, and enhancing the ecological quality of floodplains. Measures included land use changes, vegetation management, and physical interventions like floodplain reconnection and riverbed elevation. ESS were quantified using national models and existing data, using 13 selected ESS indicators accounting for provisioning, regulating, and cultural functions. The results suggest that conventional river management (i.e., Strategy 1) provided lower ESS supply than the NbS approaches (i.e. Strategies 3 and 4). The NbS approaches were shown to increase ESS supply across all domains –i.e. provisioning, regulating, and cultural– except for crop and fodder production. This example illustrates the importance of assessing a broader scope of impacts to fully understand the benefits and trade-offs between conventional, single-purpose river management approaches and more nature-based, multifunctional strategies.

The related CBA further emphasized the importance of a comprehensive ESS assessment. While investment costs exceeded benefits across all strategies, the scope of benefits assessment was shown to affect the net present value and benefit-cost ratio. Particularly, conventional strategies were shown to rank highest when only direct benefits were considered, but including all benefits made NbS approaches the preferred choice. In that context, cultural ESS such as recreation and visual amenities play a key role; despite their higher upfront costs, they were pivotal in altering the benefit-cost ratio and thus, the preferred strategy (Kok et al., 2025).

4.4 Generating revenues from restoration

4.4.1 Challenges

Restoration teams aiming to draw on private funds do not necessarily have to include revenue-generating activities in their plans: they can seek private donations or grants. However, doing so adequately increases the attractiveness of upscaling initiatives, especially if it demonstrates a potential for financial returns alongside environmental and social benefits which is key when approaching lenders and investors (particularly profit-driven ones) (see Chapter 3).

During workshops and training events with MERLIN CS, restoration teams participated in brainstorming activities on revenue-generating activities in restoration. As a result, they increasingly recognised potential business opportunities emerging from their plans, with some acknowledging the potential in their final RSPs. Yet, most cases did not incorporate them and, when present, descriptions often remained unclear and unelaborated, lacking the specificity and structure to engage potential partners effectively. Various factors seem to limit restoration teams in grasping these opportunities and committing to further develop their potential. A major challenge relates to the “free-rider” problem. As discussed in Section 2.3, many ESS delivered by restoration are non-rivalrous (benefits can be shared by multiple users without depletion) and non-excludable (benefits cannot easily be restricted to paying users). This creates a fundamental challenge for market mechanisms, as individuals and businesses can benefit without contributing financially. Consequently, there is little financial incentive for individuals and businesses to invest directly in restoration projects.

There was also general lack of conviction amongst CS partners that measures planned can unlock viable business cases. For example, CS7a illustrates that while partnerships with hydropower companies and water utilities have been explored, they remain limited in scale and profitability due to the complexity of monetising shared ESS. Another example relates to the limited potential to establish competitive and sustainable economic activities on restored sites. In CS14, stakeholders voiced scepticism towards the economic benefits of paludiculture (a form of agricultural and forestry production compatible with rewetted peatland) compared to conventional agriculture on drained peatland. The scale and evidence of current empirical examples were deemed too small or anecdotal, failing to provide convincing evidence that paludiculture can be a financially viable and competitive activity compared to conventional agriculture. This exemplifies the wider challenges of establishing competitive economic activities on restored sites, when the market does not reward the wider co-benefits of sustainably produced goods or services.

According to our interviews and feedback during workshops, restoration managers remain sceptical about the environmental benefits of existing environmental markets. Voluntary carbon markets, for instance, face credibility issues and restoration managers express concerns over the narrow focus on carbon sequestration. In their view, this limits the effectiveness of carbon markets to address broader causes of ecosystem degradation and biodiversity decline.

Three CS - namely CS6, CS14, and CS17 - nevertheless expressed interest in exploring existing environmental markets, in particular carbon credit markets. However, experience during the MERLIN project shows that participation in these markets presents high entry barriers and, to this date, remains out of reach for these cases due to challenges such as complex certification processes, rigorous monitoring requirements, and market fluctuations. In CS6, the restoration team struggled to move forward after contracting feasibility studies on generating carbon credits from restoration measures. Limited local expertise, complex regulatory environments, and unsuitable policy frameworks blocked further progress. Similar barriers were identified in CS14, highlighting scepticism from the peat extraction sector toward new market mechanisms like carbon crediting. Restoration teams noted that short-term financial priorities in the sector conflicted with the longer timelines and complex requirements of ecosystem markets.

From the observations of the MERLIN CS, another critical issue is the lack of advisory services to support restoration efforts in operating as sustainable businesses. This gap includes a need for practical knowledge in business management, identifying and reaching out to potential business partners, and fostering partnerships that matches restoration objectives and market demands.

Overall, while exploring opportunities to set up revenue-generating activities is increasingly necessary, it is important to acknowledge that exploiting them face major challenges such as the limited capacities and expertise of restoration teams, regulatory and administrative hurdles, or the lack of adequate markets to make activities viable compared to more competitive, less sustainable alternatives. This is exemplified by the challenges faced by CS5 (see *Case Study Insights 5*).

Case Study Insights 5. The Kampinos National Park: Efforts to diversify funding for land use management (CS5)

Restoration managers of CS5, the Kampinos National Park (KNP) in Poland, have relatively consistent access to public grants due to its status as a National Park and Biosphere Reserve. In 2023, the total budget of the KPN was approximately EUR 10.5 million, with the majority sourced from EU and national funds. These grants provide essential financial support, covering salaries and basic operational needs while enabling key restoration and conservation projects. However, they acknowledge this funding source to be restrictive, offering little flexibility for broader needs such as land acquisition or innovative conservation strategies.

To supplement these grants and increase financial resilience, KNP has developed its own small revenue generating streams, which contributed around one-fifth of the park's budget in 2023. These include the sale of felled timber, a byproduct of forest management actions aimed at restoring native biodiversity through selective removal of non-native or planted species. Additionally, the park generates income by leasing land to farmers for grazing and mowing, practices that are carefully managed to protect open habitats and support associated species. Farmers benefit economically through hay sales and agro-environmental subsidies, creating a mutually supportive relationship. The park also collects fees from tourism permits, such as access to campfire sites and other specific facilities, providing another small but steady source of revenue.

While these efforts have helped diversify funding, the park's restoration team recognizes the need to explore private sector funding as a means to address persistent financial gaps. In this context, the Unit Grid programme[28], which connects private sector resources to nature conservation projects, has proven valuable to KPN. Acting as an intermediary, Unit Grid facilitates private funding, offering a relatively accessible and less administratively burdensome process. For instance, KNP has leveraged Unit Grid to fund smaller-scale habitat protection actions. However, they indicated that securing private funding on a larger scale requires dedicated personnel and strategic outreach, a capacity they are currently lacking within their organization.

Another major challenge to their restoration efforts reported by KPN is land ownership, as many areas are privately owned and many private landowners resist wetland restoration due to concerns over agricultural disruptions or urbanization pressures. The restoration team attempted to address this through land purchase programme, but limited funding and slow bureaucratic processes hindered progress. Revenue-generating activities like paludiculture or selling credits in carbon markets were also discussed as potential solutions, though their implementation faces hurdles like high initial costs, farmer resistance, and the absence of baseline data for carbon sequestration metrics.

KNP actively employs volunteers and smaller-scale collaborations to address pressing conservation needs, such as invasive species removal and localised restoration. However, larger-scale ambitions, like systemic land acquisition or significant funding diversification, remain constrained by structural and administrative factors. Ultimately, while KNP sees value in exploring private sector funds, the availability of public grants, paired with administrative capacity gaps, makes it challenging to fully explore and capitalise on the opportunities.

Picture 3: Landscape in the Kampinos National Park (source: Maciej Szajowski, Kampinos National Park)

[28] https://re.generacja.org/

4.4.2 Enabling factors

Concrete and illustrative examples of successful revenue-generating activities in restored sites are important to meet the expectations of private funders and financiers as well as regulators and policy makers. A list of 75 revenue-generating activities was created during MERLIN to test with CS (see Annex 7[1]). This resulted in the scoping of various business opportunities identified by the MERLIN CS during workshop activities, as presented in *Table 5*.

Table 5. Potential opportunities for revenue generation identified in MERLIN CS
Note: CS18 did not participate in the relevant workshop.

Case study	Opportunities
CS1 Kvorning (DK)	Harvested biomass to be used for biogas production, i.e. green/renewable energy
CS2 Deba (ES)	More natural and sustainable tourism
CS3 Beaver re-introduction (SE)	Tourism such as beaver safaris and sustainable beaver hunting
CS4 Rhine branches (NL)	Cooperation with mining companies, i.e., commercialisation of extracted materials (sand and clay) from restoration
CS5 Kampinos wetlands (PL)	Felled timber from the management of forests Tourism permits from using campfire facilities Renting of land to farmers Protected areas are especially connected to tourism Local green markets (selling local products, certification)
CS6 Hutovo Blato (BH)	Green infrastructures and sustainable technologies, carbon credits
CS 7a Danube (AT)	Tourism (e.g. fishing) Stones from riprap and groynes
CS7b Danube (HU)	Tourism (e.g. fishing, kayaking, canoeing, weekend activities, bird watching)
CS8 Danube (RO)	Eco-tourism Sustainable aquaculture using fish ponds
CS9 Tisza (HU)	Eco-tourism Diversify farming system to more short supply chains and local processing
CS10 Blue Belt (DE)	Aquaculture opportunities Beneficial use of sediment
CS11 Emscher (DE)	Valorisation of flowering meadow cuttings in biogas production; sludge co-fermentation in wastewater treatment plants; composting; grass paper- and cardboard production; animal feed production Establishment of short supply chains and local processing Citizen science project (monitoring data streams collected via the Naturgucker and CrowdWater apps - guided tours in collaboration with nature conservation associations)
CS12 Lima (PT)	Expansion of existing (eco)tourism activities Native cattle breeding Honey production
CS13 Sorraia (PT)	Renewable energy generation (solar) Eco-tourism activities (e.g., canoeing, education/awareness programmes, wildlife tours) Sustainable forestry and carbon offsets Selling biomass from water hyacinth
CS14 Komppasuo/ Oulujoki-Iijoki (FI)	Alternative after-use to mining like renewables, forestry or peatland restoration, including carbon offsets Nature tourism and mushroom harvesting
CS15 Tzipori (IR)	Tourism managed by community (e.g. establishing trail systems - national, regional and local, multi-day recreation) Environmentally-friendly agriculture Ecological monitoring, research projects, international collaborations and citizen science initiatives to support restoration efforts and knowledge sharing
CS16 Scheldt (BE)	Use the grass-flower strip cuttings for biogas production to generate energy Leisure/tourism activities (hiking, cycling)
CS17 Forth (UK)	Engaging in Biodiversity Net Gain (BNG) obligation Carbon credits

The restoration teams identified a variety of options for potential revenue-generating activities, ranging from energy generation and eco-tourism to agriculture and broader green growth avenues, such as the sale of extracted resources or other products from restored sites. As discussed previously, these revenue-generating opportunities can play a direct role in funding restoration, can be used to repay financing from public or private actors, and can generally support restoration by offering new economic development opportunities for the local community.

As displayed in *Table 5*, eco-tourism emerges as one of the most commonly identified opportunities for generating revenues across the MERLIN CS. In an interview, CS9 highlighted the potential of integrating eco-tourism with restoration efforts. They noted the possibility of local high-quality products and small-scale tourism to generate revenue in restored areas, pointing out the economic opportunities of this approach for the local communities. For example, in conjunction with eco-tourism efforts, they introduced a label for products from that region with the intention to encourage local economic development by supporting farmers who adopt sustainable floodplain farming methods. Until now, the "Living Tisza" label has been implemented in two pilot sites and while efforts are still small in scale, they do produce benefits for the local farmers, offering recognition and potential market advantages for environmentally friendly products. In CS8, restoration efforts have also demonstrated the economic potential of combining restoration with eco-tourism (see *Case Study Insights 7*).

Another recurrent theme across MERLIN CS is their interest in carbon credit schemes. While barriers were mostly highlighted by CS partners, there are initiatives such as the carbon woodland credits and the Peatland Code in the United Kingdom which showcase how private investments can drive restoration by issuing carbon credits tied to land use changes. Highlands Rewilding[29], also in Scotland, uses carbon crediting and eco-tourism to achieve long-term financial sustainability. Biodiversity offsets are also considered a viable tool, although they must be supported by robust, mandatory frameworks (see *Textbox 5*).

Textbox 5. Biodiversity offsets in the United Kingdom

The English Biodiversity Net Gain (BNG) policy demonstrates how mandatory requirements can drive the development of functional biodiversity markets. The BNG policy aims at ensuring that "habitats for wildlife are left in a measurably better state than they were before the development"[30], legally requiring developers to achieve a net gain of at least 10%. This legal framework creates an enforceable structure that fosters investment in biodiversity markets. To further facilitate trade of biodiversity offsets, organisations, such as the Environment Bank in England, work with landowners to restore habitats, creating biodiversity credits that developers can purchase to fulfil their legal obligations under the BNG policy.

Nevertheless, making biodiversity markets work effectively in practice is not without challenges. Most importantly, biodiversity offsets are unlikely to gain significant traction without a legal framework compelling corporate or private investment in biodiversity net gains. Voluntary initiatives struggle to attract significant funds, as seen in Scotland (interview with CS20). Other challenges include ensuring of equivalence between biodiversity losses and gains, a task that is inherently complex and makes standardisation difficult due to the unique nature of ecosystems. Furthermore, biodiversity offset projects often require long-term commitments – spanning 30 to 80 years – which can be a significant barrier for landowners who are hesitant to tie up their land for such lengthy periods.

Establishing new revenue streams and sustainable value chains linked to upscaling initiatives requires dealing with different transactions and costs, as well as navigating regulatory hurdles. These tasks typically require skills beyond those of traditional restoration planning and thus often necessitate significant effort from staff, the involvement of experts or intermediaries who specialise in developing business models, and long-term partnership with the private sector (as also discussed in Section 4.2). Amongst MERLIN cases, one previous success in establishing a revenue stream from restoration with the private sector is the CS4 cooperation with mining companies who commercialise the extracted materials from restoration. In addition, the National Park Authority in CS5 generates revenues from felled timber, rents, and tourism permits (see *Case Study Insights 5*). CS11 is testing the viability of using meadow grass cuttings, based on a wider, long-term partnership with the private sector (see *Case Study Insights 6*).

[29] https://www.highlandsrewilding.co.uk

[30] https://www.gov.uk/guidance/understanding-biodiversity-net-gain

Case Study Insights 6. The Emscher River: Over 100 years of partnerships for catchment management (CS11)

In MERLIN, CS11 on the Emscher River in Germany illustrates the benefits of the cooperative model and the multiple partnerships that the Emschergenossenschaft (EG), Germany's oldest water board[31], has entered over the years. To work in close coordination with the water board of the neighbouring Lippe River, the Lippe Verband (LV), the Emscher Genossenschaft-Lippe Verband (EGLV) was established as a partnership that brings both legal entities together and, with them, hundreds of public and private members settled in the joint catchment area. This facilitates coordinated actions for watershed management, including water services provision and large-scale ecological restoration.

The renaturation of the Emscher River, starting off as a 30-year mega project to modernise wastewater management infrastructure, restore biodiversity, and reduce flooding, has used a combination of public grants and private investments, in particular green bonds. Bonds are used by large entities (e.g. governments, municipalities, corporations) to raise large sums of capital from multiple lenders simultaneously (Fernando et al., 2022). Proceeds from a green bond issued by the state bank of North-Rhine Westphalia (NRW.BANK) were used to finance the Emscher restoration. Triodos Bank, an impact investment bank headquartered in the Netherlands, through its Triodos Euro Bond Impact Fund, invested in the green bond of NRW.BANK, contributing to raise the necessary capital for funding the Emscher restoration. This collaboration shows how public and private finance institutions can work together to support large-scale environmental projects[32].

During the course of MERLIN a new legal entity, the Allmende Emscher-Lippe e.G.[33], has been established as an initiative to drive community engagement in the protection and regeneration of green areas in the Emscher and Lippe catchments. Since its founding in 2023 it has started to provide a common platform for producers of local products and other local stakeholders to engage. As part of the restoration work in CS11, the Allmende is actively contributing to the exploration of possible options to valorise the biomass generated from the switch to extensive meadow maintenance. Depending on the results of ongoing work in MERLIN, the Allmende could be well positioned to act as a "Special Purpose Vehicle"[34] that manages revenue-generating activities stemming from the restoration measures planned in MERLIN, similar to the one used in the Wyre Catchment Natural Flood Management Project in the UK[35].

[31] https://www.eglv.de/en/emschergenossenschaft/
[32] https://www.triodos-im.com/articles/2021/case-study-ieb---nrw-bank
[33] https://www.allmende-emscherlippe.de/
[34] https://corporatefinanceinstitute.com/resources/management/special-purpose-vehicle-spv/
[35] https://www.greenfinanceinstitute.com/casestudies/the-wyre-catchment-natural-flood-management-project/

4.5 Partnering with the private sector

4.5.1 Challenges

As discussed in Chapter 3, MERLIN CS show a history of raising funds from the public sector. Six of the 18 CS restoration teams showed prior experience raising funds from the private sector, mostly through private grants and donations. The CS emphasised there was a strong tendency to stick with what 'we do best', in many cases with well justified reasons. Expanding the use of financing instruments for restoration and NbS is seen by restoration teams as a significant change in current practice, requiring much outreach and relationship-building to engage potential lenders, develop trust, and demonstrate the financial viability of restoration projects.

As documented by Ibrahim et al. (2025), the MERLIN cases are well versed in stakeholder engagement. The implementation of restoration measures within MERLIN and the preparation of the RSPs involved using stakeholder mapping and engagement tools. These tools aimed to scope potential stakeholders and plan how, why, and when it is necessary to connect and involve each group within the process of designing and delivering restoration. However, a review of the final RSPs showed these tools were used only in few cases to characterise private sector understanding and needs, and to assess corporate interest in supporting the restoration activities. Three RSPs mention opportunities to work with tourism operators (e.g. CS3, CS4, and CS6). In most cases nevertheless, stakeholder mapping and engagement focused largely on authorities and stakeholders particularly concerned or affected by restoration, such as citizen organisations, farmers, foresters, and landowners.

Beyond characterising potential partners, there is a need to pitch ideas effectively and discuss opportunities with private sector actors. This process can vary from that of securing public sector funds, which often involves filling standard forms and preparing written reports. As highlighted in CS17, the process with private sector actors may be more dialogue-orientated to develop mutual understanding of each other's goals and the different measures that could be deployed. Engagement with the private sector requires resources to build relationships and trust. However, some CS saw this as a financial risk, as such exploratory efforts may yield little immediate returns but still need staff time, skills, and resources to build a solid foundation.

Lastly, and linked to the above, CS expressed concerns with preserving reputation. They highlighted the importance of due diligence processes before entering into formal agreements with the private sector. These can keep restoration teams from being inadvertently coopted into greenwashing situations or being seen to be complicit in indirectly supporting business activities that do not align with shared sustainability values of the team. However, teams often lack due diligence protocols to inform their decision-making and identify suitable private sector actors. Although no learning was possible on how to manage reputational risks in the 20 cases examined, some good practice is available (see *Textbox 6*).

Textbox 6. Addressing reputational risks

Thorough due diligence is crucial to identify and assess potential risks and opportunities in restoration partnerships, particularly regarding the environmental, social, and governance aspects of both funding sources and upscaling plans. Developing clear frameworks and tools for assessing private sector contributions and managing reputational risks can strengthen future partnerships.

New regulations, such as the Corporate Sustainability Reporting Directive and the Task Force on Nature-Related Financial Disclosures[36], are increasingly influencing reputational risk management and aligning actions of large corporations with investor expectations. Understanding these regulatory frameworks can help restoration teams meet impact investors' standards and address reputational concerns more effectively. For instance, the outcomes of the Task Force on Nature-Related Financial Disclosures assessment process (LEAP - Locate, Evaluate, Assess, and Prepare[37]) are publicly available and thus could provide a starting point for developing partnerships in the future, helping to reduce a range of reputational- and environment-related risks.

In the absence of government guidance, organisations can develop their own principles and standards, which may also help them consider due diligence before entering any formal partnership. This can in itself become an enabling factor, as clear principles will foster trust and help the private sector understand the multiple links to their business interests and to different corporate targets (e.g. aspects of their corporate social responsibility and sustainability reporting requirements).

Proactive and transparent stakeholder engagement further supports a positive public image. By openly involving stakeholders and addressing concerns early on, restoration teams and private partners can build long-term credibility and maintain strong reputations.

[36] https://tnfd.global/

[37] https://tnfd.global/publication/additional-guidance-on-assessment-of-nature-related-issues-the-leap-approach/

4.5.2 Enabling factors

Despite these preconceptions, MERLIN CS report having a good overview of companies that could support upscaling in their area, and some even indicated having well-established partnerships with the private sector.

The partnerships observed in the MERLIN CS were in several cases initially created on single projects or issues. For instance, in CS4, a partnership was set up with a mining industry to reduce the costs of floodplain reprofiling in the 'Room for the River' programme. Another example is CS7a, which gained financial support from the recreational fishers' association to restore fish passage and enact habitat improvements. In CS11, public-private partnerships regrouping municipalities, local industries, and other stakeholders have grown over decades, leading to long-term investments into a large range of restorative measures (see Case Study Insights 6).

The examples above underline the importance of stepping outside the common dichotomy between freshwater restoration and private sector interests, and instead seeking arrangements for mutual support and synergy. It may also mean reaching out to potential allies amongst sectors not directly affected by the restoration measures but benefiting from the measures' impacts. These commonly include economic sectors like tourism, insurance, drinking water supply, and sub-sectors which promote sustainable values and practice (e.g. organic farming). Interviews with CS showed a 'demand-oriented' thinking is helpful, as it points the restoration team's attention towards the needs and interests of potential partners. This helps to open scope within upscaling plans to accommodate legitimate private sector needs into the design of restoration activities. By aligning restoration goals with such needs, a collaborative environment can be fostered where businesses are shown tangible benefits of their involvement.

This is further illustrated with the experience of the "Panorama Gelderse Rivieren" strategy in the Netherlands (including CS4). The strategy integrates economic development with nature-based values, providing a policy framework that encourages the private sector to participate in restoration projects. Such landscape-scale partnerships whereby business interests are mapped are also the basis of the LENs methodology, implemented in CS17 (see Case Study Insights 2).

According to our observations on CS, restoration teams take two different (yet not antagonistic) approaches to upscaling. The first is a proactive, relationship-building approach characterised by strategic, long-term engagement with private sector actors to align mutual interests. That is, some CS invest significant resources in building new relationships with private sector actors, actively reaching out and listening to understand the perceptions, needs, and interests of their counterpart to identify how private sector interests could align with restoration goals (and vice-versa). This approach is taken e.g. by WWF in CS7b and CS8 with its long-standing partnership with Coca Cola in the Living Danube Partnership (see Case Study Insights 7). Based on this history, the organisation is investing significant resources to create a wider, long-lasting coalition of willing businesses, focusing particularly on the financial sector.

The second strategy is a more reactive, opportunistic approach that seizes short-term opportunities as they arise, relying on flexibility and rapid mobilization to secure partnerships and funding. In these cases, partnerships are more ad-hoc and built reacting on short notice to specific opportunities. For instance, CS17 was able to take advantage of a short-term funding and partnership opportunity as they had a portfolio of scoped out projects to present that outlined the types of measures, expected benefits and (importantly) projected costs. Similarly, the strategy of CS19 applied an opportunistic, donor-driven approach by having "ready-made" project proposals available that could be tailored to the interests and objectives of specific funders (see Case Study Insights 1).

Neither of the two approaches to upscaling is inherently better or worse; their effectiveness depends on the specific context and goals of the restoration project. The choice of approach often depends on factors such as the availability of resources, the urgency of funding needs, and the specific dynamics of the private sector in the region. Some MERLIN CS also illustrate how restoration teams can expand the range of private sources they draw upon progressively. The most compelling one is WWF's effort in the Danube in CS7b and CS8 (see *Case Study Insights 7*), examples which highlight the importance of thinking beyond traditional boundaries, seeking synergies and integrating private sector needs into project designs.

Case Study Insights 7. The Danube WWF programme: from Coca Cola grants to bankable projects (CS7b and CS8)

The Living Danube Partnership, a collaboration between WWF-CEE, The Coca-Cola Foundation, and various stakeholders, aims to enhance the health of the Danube basin while strengthening climate resilience and benefiting local communities and nature. Since its launch in 2014, the partnership has implemented over nine restoration projects across six countries –Austria, Bulgaria, Croatia, Hungary, Serbia, and Romania– restoring 53 km^2 of wetland habitat and increasing river capacity by 12 million m^3. To illustrate, this corresponds to an area equivalent to 7,422 football pitches and a water volume matching that of 4,800 Olympic-sized swimming pools. Backed by a grant of EUR 3.73 million (USD 4.4 million) from The Coca-Cola Foundation, the partnership has successfully leveraged nearly EUR 20 million in additional funding from other partners and initiatives, including various EU programmes, significantly amplifying its impact.

In Hungary, WWF partnered with the Hungarian Central Bank to complete three restoration projects, converting arable lands into grasslands or forests in protected areas, featured in the bank's sustainability reports. Additionally, they have collaborated with corporations, including food retailer, commercial bank and energy company. Overall, there are currently seven projects that are either already ongoing or just about to start. WWF Hungary's restoration work is primarily focused on Hungary's protected areas and Natura 2000 zones, leveraging partnerships with National Park directorates to execute these projects effectively. The "Living Tisza" label helps placing products from that region to the market. While these efforts are still small scale, they do produce benefits for the local farmers. This trademark and the development of an economic vertical for floodplain management still need considerable development, but could offer significant economic potential for nature-based farming.

In Romania, WWF's restoration efforts demonstrated that restoration can deliver economic and environmental benefits simultaneously. In Mahmudia, a commune in Tulcea County at the Lower Danube, the rewetting of land led to a noticeable increase in tourism and related revenue through new accommodation and tourist spending. As a result, efforts to restore water bodies have garnered support from local communities, as they are seen to unlock new income streams that can directly benefit local livelihoods. Additionally, restoration efforts in the region have yielded practical economic advantages by reducing transportation costs through improved waterway navigation. A new and promising development is that the European Investment Bank and WWF have partnered to promote climate adaptation in Europe through NbS that address the challenges of the climate and biodiversity crises. The partnership includes the creation of an incubation facility by WWF to prepare NbS projects for investment, with the EIB providing expertise on securing public and private funding.

5 Discussion and conclusion

As the impacts of climate change have become tangible and the threats of accelerated ecosystem degradation and biodiversity decline reach the agenda of private sector actors, a “nature positive economy” is becoming recognised as both essential and desirable (EC, 2022b). In this context, ecological restoration and NbS are opening up as possible routes for private organisations to engage and contribute directly to addressing these challenges. This is a positive development, as there is an urgent need to accelerate the pace and scale of restoration. Yet, many countries are facing budgetary pressures, often resulting in insufficient funding set aside for nature restoration efforts (Cortina-Segarra et al., 2021).

While it is difficult to draw up confident estimations of the funding gap to achieve the EU’s nature restoration targets, available approximations make it sufficiently clear that turning policy response into action on the ground will require tapping from multiple sources, including those beyond the public budget. Public funds will remain a key resource to cover the costs of most nature restoration strategies in the foreseeable future, yet a shift in the approach to how restoration projects are funded is necessary, particularly through the establishment of a diverse mix of sources (Holl and Howarth, 2000). Continuing to rely on one or few types of public sector funding options risks undermining the resilience and upscaling of existing initiatives, as well as the initiation of new efforts. Therefore, the mobilisation of both public and private actors, employing a combination of conventional funding schemes and innovative financing instruments, is essential.

The MERLIN project and related case studies shed light on the way restoration teams approach the idea of collaborating with private donors, lenders or investors, and the challenges and enabling factors that they may face in their efforts to diversify sources. Several stages in a "diversification journey" of restoration teams were observed:

1. **Awareness:** recognising a funding gap that would hinder the deployment of their upscaling plan;
2. **Interest / curiosity:** reading into the topic of private sector funding and finance, watching a webinar, asking network partners about this, without any further commitment;
3. **Willingness:** asking for punctual support and getting directly involved in activities on the topic, signing up and participating in a training, and other actions primarily taken to explore possible options [note that this does not yet necessarily imply the ability to effectively engage with private sector actors or secure funding];
4. **Commitment:** taking executive action beyond initial exploration, e.g. by establishing a partnership or collaboration with a private entity, recruiting entrepreneurial profiles to bring in the business mindset and spirit into the organisation, or setting up a new legal entity to handle commercial transactions and carry liability.

This typology – which could be of interest for future research, e.g. to explore how it relates to the diffusion of innovation model (Call and Herber, 2022)– emerged from reflecting on the multiple exchanges with restoration teams over the first three years of MERLIN and, as this report was being finalised, became useful to illustrate transitions and to contextualise descriptions of the limiting and enabling factors observed.

As has been described in detail in the previous Chapter 4, the main limiting factors that MERLIN CSs are facing along their diversification journey include:

- **A marked cautiousness in exploring private sources of funding to support restoration activities**
  While there is awareness of the potential benefits of private sector funding across restoration teams, the availability and familiarity of public funding programmes often diminishes a sense of urgency to pursue alternatives. In other words, while there is awareness of a funding gap for *upscaling* at EU-level, restoration managers often operate at the project level, which seems to foster a perception that the gap is less immediate or pressing. This is compounded by the immediate demands of day-to-day restoration work, leaving managers with limited time to build new skills or establish the networks needed to explore private funding and financing sources. Moreover, public sector funding is widely seen as more suited for restoration efforts, as it typically supports the delivery of public goods and is generally perceived to be better equipped to support large-scale operations, even if available data may contradict this perception. Concerns also arise about the potential consequences of increased private funding, such as allowing the gradual reductions in government commitment to restoration efforts. Lastly, scepticism exists about the private sector’s willingness to fund restoration and the alignment between business objectives and environmental goals. These perceptions seem to lead, at least in part, to a cautious engagement with the topic of private finance and to a slow-paced transit through the stages of the diversification journey.

- **Limited skills and capacity to form partnerships with the private sector**
  Restoration teams often lack formal training in economics, business and finance, which can be key for

screening and evaluating alternatives, and for understanding and using financial instruments. Familiarity with private donors and grants exists, but knowledge of market-based and debt financing tools remains limited. Engaging with private sector actors requires tailored, dialogue-driven approaches that differ from public funding processes, demanding additional resources, skills, and time to build relationships and trust. Moreover, concerns about financial and reputational risks further generate reserve towards engaging with the private sector, as restoration teams aim to avoid greenwashing or supporting unsustainable practices.

- **Challenges in quantifying the benefits of restoration efforts**
  Many project evaluations lack comprehensive socio-economic assessments, such as Cost-Effectiveness Analysis and Cost-Benefit Analysis (CBA). Reasons for this are limited capacities, expertise, relevant data at appropriate scales, and tools needed to conduct reliable analyses. Additionally, there is scepticism and discomfort surrounding the use of available tools, as traditional CBA methods often fail to capture the wider social and environmental benefits provided by restoration interventions. While Cost-Effectiveness Analysis and CBA are demanding methods whose outputs go beyond what is currently necessary to draft a business plan, integrated planning at landscape scale requires such wider scope analyses.

- **Barriers to revenue generation**
  Revenue-generating activities unlocked by restoration can enhance the financial viability of upscaling initiatives and attract business partners and investors. However, these are limited compared to conventional investments, as the proportion of restoration benefits that are public goods will generally be larger than those than can be privately appropriated. This creates a “free-rider” problem that reduces financial incentives. Many restoration teams consider participating in environmental markets but are concerned about their integrity and future performance. The relatively more mature ones have a narrow focus on carbon sequestration, which curbs their relevance. Complex certification processes, regulatory challenges, and insufficient familiarity with finance further pose significant entry barriers.

- **Difficulties in engaging with the private sector**
  As they tend to rely on public sector funding, restoration teams have limited experience with private sector engagement. As described above, relationship-building, aligning of goals, exploring opportunities, and demonstrating financial viability requires significant effort and outreach, which is not part of the current practice for many teams. Although stakeholder engagement tools were effectively utilised during the project, they were rarely applied to understand private sector needs or gauge corporate interest, limiting opportunities for collaboration with private actors. Moreover, a concern of restoration teams is maintaining their reputations and avoiding situations where they might inadvertently support greenwashing or unsustainable business activities. At the same time, despite some isolated examples of good practices, many teams lack due diligence protocols to guide decision-making and there is little established guidance or shared learning on managing these reputational risks.

Despite these challenges, several enabling factors were also observed in the MERLIN project that may offer pathways for restoration teams to successfully diversify funding sources in the future:

- **Recognizing the importance of funding diversification**
  Restoration teams recognize the instability and uncertainty of public funding and see private sector funding as a promising complement to public funding, offering agility and fewer regulatory constraints to upscale restoration measures effectively. There is also acknowledgement of the potential for mutually beneficial collaborations with private actors, such as aligning restoration goals with business interests (e.g., partnerships with industries like mining), and interest in exploring these opportunities. Across MERLIN CS, teams displayed varying levels of engagement with the concept of diversification, from initial awareness to active exploration and commitment to working with private sector partners.

- **Accessing or building expertise to broaden specialised knowledge**
  This is fundamental to effectively implement the necessary steps as outlined in the enabling factors. This involves integrating socio-economic analysis, business development, and private sector relationship skills alongside traditional ecological knowledge. Restoration teams can achieve this by building and sharing expertise internally, hiring skilled individuals, or collaborating with external consultants (e.g. providing guidance to set up a financing scheme) and researchers (e.g. conducting a CBA or estimating carbon emission reductions).

- **Effective consideration of the full range of restoration impacts and benefits**
  Effectively capturing and communicating the full range of restoration impacts and benefits requires the use of advanced computational and modelling tools that enable detailed assessments of ecosystem services (ESS), from tangible benefits like flood risk mitigation and carbon sequestration to non-market values such as biodiversity and recreation. These assessments not only help to build a solid case for fundraising and stakeholder acceptance but also enhance the understanding of synergies and trade-offs between ecological, social, and economic outcomes and thus, guide better decisions.

- **Assessing opportunities for revenue generating activities and business models early on**
  Identifying viable business models that can be integrated into upscaling plans at the design phase. Yet, while such revenue streams can help to attract partners and funders, their role in the frame of an ecosystem restoration or NbS initiative is to complement, not replace or dilute, the environmental and social objectives that such initiatives carry as priority. Ensuring coherence will necessarily mean that revenue-generating activities considered will be sustainable from an environmental perspective, and that they thus cannot be compared with conventional activities solely on the basis of scale, revenue and profit metrics.

- **Building partnerships with the private sector**
  Restoration teams should aim to foster mutual benefits and aligning economic incentives with restoration goals. Restoration can appeal to diverse sectors, e.g., tourism, insurance, water service providers, or organic farming, expanding the pool of potential partners. Adopting a demand-focused approach and incorporating that into the upscaling design helps to address private sector interests effectively. Restoration teams can pursue proactive strategies, focusing on long-term relationships and coalitions of engaged businesses, or reactive strategies, leveraging short-term opportunities with flexible, ready-to-go proposals.

The policy and regulatory framework in the EU will continue to strongly influence the trajectory of ecological restoration and NbS in the coming years, shaping their development and determining their appeal to various stakeholders. The large efforts spent on driving the sustainable finance trend through the EU Taxonomy for Sustainable Activities[38], the Corporate Sustainability Reporting Directive[39], and the Sustainable Finance Disclosure Regulation[40] have opened the door for a more direct engagement of the private sector in dealing with the large societal challenges of ecosystem degradation and biodiversity decline. However, there is still substantial ground to be covered in terms of upskilling both on the side of private donors, lenders, and investors as on that of restoration teams. The technical concepts and language that these communities employ are far from being accessible and universal, and this creates a large barrier that further underpins many of the limiting factors observed and discussed in this report. This lack of capacity to communicate effectively feeds prejudice and lack of transparency, which need to be addressed before interests and priorities can even start to be aligned.

Creating incentives for the private sector to engage in restoration initiatives will continue to be fundamental, as business cases for 'natural assets' alone continue to be unclear, and conventional investments remain more attractive despite the advances in sustainable finance. At the same time, concerns about misuse, speculation, and negative social impacts must be given serious consideration. Financial models and collaboration arrangements that can align private sector interests with social and environmental objectives in practice could thus be explored through support programmes like FIRNS and LENs, by e.g. setting up pilots of restoration backed by sustainable revenue-generating activities; enabling the practical use of economic assessment tools that account for the full range of benefits provided by restoration; testing economic policy instruments that can help profit-driven entities expand the set of metrics they employ for making investment decisions; and others that might emerge influenced and inspired by the particular conditions found in the diverse landscapes of Europe. Conventional, targeted measures such as tax incentives or subsidies for investments in restoration efforts might be useful under certain circumstances. Particularly when signalling strong government

[38] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance). ELI URL: http://data.europa.eu/eli/reg/2020/852/oj.

[39] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting (Text with EEA relevance). ELI URL: http://data.europa.eu/eli/dir/2022/2464/oj.

[40] Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (Text with EEA relevance). ELI URL: http://data.europa.eu/eli/reg/2019/2088/oj.

commitment to long-term environmental goals, they can help to leverage a substantial flow of finance from the private sector.

Additionally, adequately designed mechanisms to mitigate financial risks can play a pivotal role in driving engagement. A possible approach is a phased transition model, where public and private actors initially share responsibilities (in a public-private partnership), and over time, the public actor gradually withdraws while the private sector takes on an increasingly larger role. The transition could be structured around predetermined timelines or specific milestones, such as when an expected benefit materialises (and an associated good or service can be commercialised) or when the project is mature enough that risk and uncertainty levels have diminished, ensuring the private sector can confidently proceed. Separate legal entities, e.g. Special Purpose Vehicles, could be established to manage and hold liability for commercial activities. By making such transitions predictable and manageable, these arrangements could provide a clear pathway for private actors to engage without facing overwhelming risk.

Policymakers should continue to support the responsible exploration of innovative financial instruments in practice. Green bonds, environmental impact bonds, and blended finance models specifically tailored to upscaling initiatives could be piloted with the primary objective of driving experiential learning on both the side of the restoration team and that of the lender or investor. This should aim to gather experience on monitoring and evaluation aspects like setting baselines and selecting indicators, and to generate data on transaction costs, efficiency levels, outcomes, and impacts on social, environmental, and economic dimensions. This will build knowledge on how opportunities can be exploited responsibly, making it easier for stakeholders to engage and benefit in the future.

The mounting pressures on freshwater resources from climate change, pollution, and overuse demand immediate and decisive action. Addressing this challenge requires a diversified approach to funding, with shared responsibility across stakeholders. Restoration teams must take the lead in initiating efforts, private sector actors should collaborate as active and responsible partners, and policymakers must provide the frameworks and incentives needed to drive progress. Prioritising restoration not only enhances ecosystem health and resilience but also safeguards the livelihoods, economies, and well-being of both current and future generations. Further delays will amplify risks and escalate costs, which underscores the urgent need for action now.

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