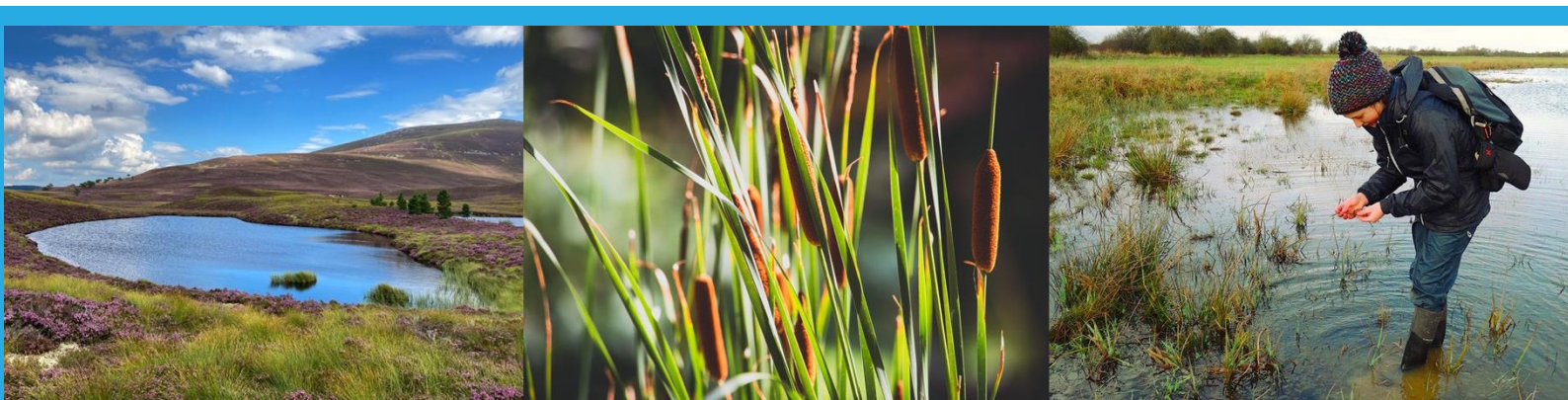




Ponderful

PONDS FOR CLIMATE



Synthesis report on sustainable financing of the establishment of ponds and pondscapes

Pond Ecosystems for Resilient Future Landscapes in a Changing Climate



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Table of contents

1.	INTRODUCTION	1
2.	PONDS AND PONDSCAPES AS NATURE-BASED SOLUTIONS	2
2.1	<i>What are ponds and pondscales?</i>	2
2.2	<i>What benefits do pondscales provide?</i>	3
2.3	<i>Understanding pondscales as nature-based solutions</i>	6
2.4	<i>What does it cost to implement pondscales as NbS?</i>	8
2.5	<i>Synthesis</i>	9
3	AN INTRODUCTION TO FINANCING NATURE-BASED SOLUTIONS	10
3.1	<i>Financing nature-based solutions</i>	10
3.2	<i>PONDERFUL Sustainable Finance Inventory</i>	15
4	DISCUSSION	29
5	CONCLUSION	33
6	REFERENCES	35
7	ANNEX A: PONDSCAPE BENEFITS CONCEPTUALISED AS ECOSYSTEM SERVICES AND NATURES CONTRIBUTIONS TO PEOPLE	44
8	ANNEX B: PONDSCAPE SUSTAINABLE FINANCE INVENTORY	50
9	ANNEX C STAKEHOLDER CO-CREATION: WORKING WITH THE PONDSCAPE DEMOSITES	124

Executive Summary

Ponds and pondscapes (a complex of multiple ponds) are Nature-based Solutions (NbS) that can address numerous societal challenges, including the need for climate adaptation, biodiversity enhancement, and water management. Financing has been identified as a key barrier that limits the upscaling of NbS, including pondscapes. This report aims to address this challenge by supporting pondscape developers to answer a simple question: ***how can I pay for my pondscape project?***

This report introduces the PONDERFUL Sustainable Finance Inventory, which consists of a total of 24 financing instruments for nature-based solutions, each matched by at least one concrete example of the financing instrument in action. The Inventory aims to support pondscape developers understand financing options and identify the finance instruments best suited to their pondscape NbS project. Alongside this report's evaluation of the NbS financing literature, the PONDERFUL Sustainable Finance Inventory supports ongoing practical work and testing in the eight PONDERFUL DEMO-sites.

Pondscapes address societal challenges including biodiversity enhancement and climate adaptation

Ponds can generate the biggest benefits, especially for biodiversity, when in the form of a pondscape containing multiple ponds with varied features. A variety of benefits are documented in the literature (see Figure 1). Pondscapes are effective nature-based solutions useful to tackling several societal challenges simultaneously, including biodiversity enhancement and climate adaptation.

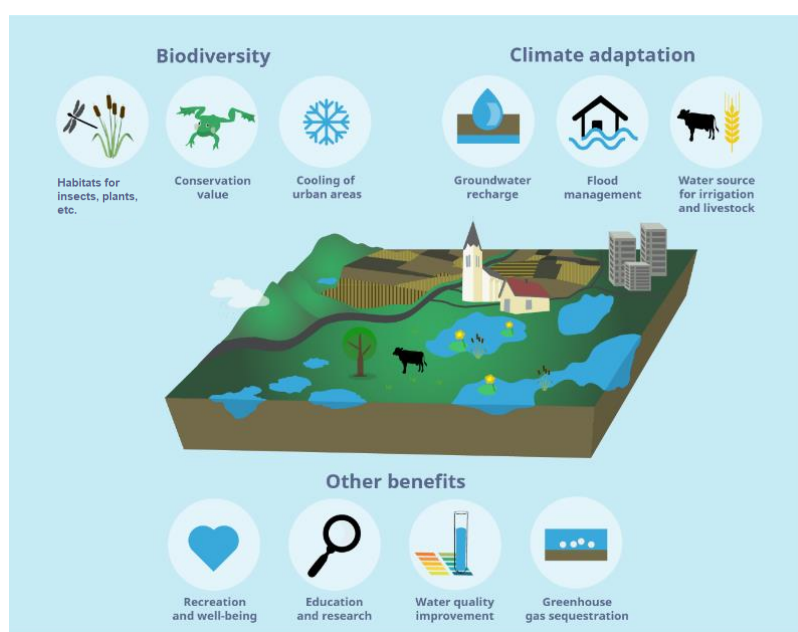


Figure 1 Benefits generated by pondscapes

What costs are involved in implementing pondscape nature-based solutions?

Implementing pondscapes as nature-based solutions can consist of a combination of pond creation, restoration or management of existing ponds, and pondscape-scale land use and management actions to maximise the benefits of the site. These actions generate financial costs. These include one-off costs, including upfront planning and construction and development costs, as well as ongoing costs, such as maintenance and operation costs.

As with any NbS (or grey infrastructure) project, pondscape NbS costs must be covered by financing. A lack of sufficient financing has been identified by the literature as a key barrier for NbS uptake. The term financing is defined differently by different sectors; we define financing generically as catch-all category encapsulating all sources of money necessary to cover costs associated with NbS creation, restoration, or management, including all money loaned, invested, granted, donated, earned, or levied specifically for NbS.

Financing nature-based solutions: Lessons for financing pondscales

While there is little experience or literature on financing pondscales, lessons can be drawn from the wider nature-based solution literature. While globally there is already significant expenditure on NbS - estimated at €145 billion in 2020 - this is currently insufficient to meet global biodiversity objectives. Financing can come from public, private or mixed sources. Public financing refers to funding and financing sourced from public budgets. Private financing refers to financing and funding from private bodies, such as private banks, investment funds, and private companies, organisations or individuals (e.g. philanthropists, NGOs, business angels, venture capitalists, etc.). Often but not always, private financing is commercial and demands a financial return (commonly based on current market interest rates (e.g. commercial loans), while public financing is often offered at comparatively lower rates (e.g. soft loans) or without expectation of returns (e.g. grants). Mixed sources can come from public or private investors, and consist of commercial or non-commercial finance, or a mixture of all. NbS are primarily funded with public resources. Public sources provide approximately 83% of funding, with for-profit financing the source of only 12% of private finance (i.e. 2% of total NbS financing) (UNEP, 2022).

What challenges do pondscales pose for private financing?

Drawing on experience from other NbS and the unique attributes of pondscales in particular, a number of challenges with financing pondscales can be identified:

- **Undervaluing public goods** -> Many of the benefits of pondscales are '**public goods**,' with **no market price**, e.g. *groundwater recharge, flood management, water quality improvement, habitat provision, conservation value*.
- **Coordination challenges** -> Pondscales deliver **multiple benefits that benefit multiple beneficiaries**, and multiple spatial scales, requiring their coordination and collaboration: e.g. *recreation benefits, aesthetic benefits, habitat for pollinating insects, water source for irrigation/livestock, plus public goods*.
- **Measurement issues** -> Pondscales are diverse and the benefits they deliver depend on local social and ecological context, making measurement challenging. The high number of non-market benefits of some ponds makes **monetisation and valuation challenging**.
- **Finance-specific challenges** -> Individual pondscape projects are often too **small in scale** to be considered for finance.
- **Few examples** -> Limited existing examples/experience of private finance involvement.

Introducing the PONDERFUL Sustainable Finance Inventory

To support pondscape developers (and other NbS project developers), the PONDERFUL Sustainable Finance Inventory introduces 24 financing instruments, divided into eight categories that can be used to pay for pondscape projects. The Inventory was constructed based on a desk-based literature review of academic and grey literature, collected through a consistent template. Examples were gathered from the literature as well as from PONDERFUL DEMO-sites. Financing instruments differ considerably, sourcing financing from different sources, imposing different obligations and requirements, among other attributes. These differences mean that each instrument has different strengths and weaknesses, making it suitable for different project contexts. Each financing instrument is succinctly described using a consistent structure to allow readers to compare different instruments, and are supported by practical examples.

Table 1 PONDERFUL Sustainable Finance Inventory - Categories and instrument structure

Main category	Category definitions	Instruments	Examples
1. Income instruments	Instruments for raising revenue that can then be used to finance NbS. Some can be used by landowners (1.1, 1.4, and 1.5); others can only be levied by government-sanctioned associations (1.2 and 1.3) or governments (1.6).	1.1 User fees	Altnabrocky River
		1.2 Business improvement districts	Vauxhall Missing Link
		1.3 Betterment levies	Wimbledon and Putney Commons
		1.4 Development rights and leases	SANPark concessions for tourism
		1.5 Sale of market goods	Carp Ponds in Bavaria, Germany
		1.6 Other revenue raising measures	UK Network Rail Port Townsend water utility fee
2. Contracting approach (cost reduction/restructure)	Legal agreements that reduce or restructure the costs of financing NbS, either by providing assets or use of assets at below market rates (2.1) or by shifting financing of upfront costs in return for ongoing payments (2.2).	2.1 Community asset transfer	Chapman's Pond Community Company
		2.2 Public private partnership	Valley State Parks Camping Concession
3. Voluntary contributions/donations	Voluntary payments made of own free-will, whether a direct beneficiary of the NbS (3.2) or simply to contribute (3.1, 3.3)	3.1 Philanthropic contributions	The Living Danube Partnership
		3.2 Voluntary beneficiary contributions	Wild Haweswater - contribution
		3.3 Crowdfunding	Treflach Wetland UK – crowdfunding
4. Tradable rights/permits and payment for ecosystem services	Financing is raised by selling the 'rights' to ecosystem services generated by the NbS. This payment can be relatively informal (4.1) or through structured markets for climate mitigation (4.2), for offsetting damage to biodiversity elsewhere (4.3), or for reducing water pollutants (4.4).	4.1 Payment for ecosystem services	Vittel (Nestlé Waters) PES
		4.2 Transfer-based instruments: voluntary carbon markets	MoorFutures
		4.3 Transfer-based instruments: Biodiversity offsets and habitat banking	Eco-Accounts biodiversity offset Great Crested Newts 'District Licensing'
		4.4 Transfer-based instruments: Water quality trading systems	Pennsylvania nutrient credit trading
5. Subsidies	Subsidies are a financial contribution from the government to a person, company or organisation to promote socially beneficial outcomes. They can be ongoing payments (or tax breaks) linked to outcome or production (5.1, 5.2)	5.1 Environmental subsidies	Ecofarm Petra Marada – CAP subsidies
		5.2 Tax concessions	Western Australia Conservation Covenant
6. Grants	Direct contribution from government (local, national, or EU) to a recipient in return for undertaking a specific activity. Grants are generally one-off payments (though they may be paid in instalments), and often competitive (6.1).	6.1 Grants	Hunte-Leda-Moorniederung
7. Debt instruments	Transfer of capital in return for a promise to repay that capital over time, generally with interest. This can involve direct lending from a lender to a borrower (7.1) or be mediated through debt markets (7.2).	7.1 Loans and green loans	Linnunsuo – Rewilding Europe Capital loan CWS Revolving Fund – Winona Wetlands
		7.2 Bonds and green bonds	DC Water Environmental Impact Bond The Conservation Fund's Green Bond
8. Equity finance	Financing raised by selling an ownership share of the NbS, potentially with a claim to some of its profits. This can be motivated by a desire to have impact (8.1) or be purely commercial (8.2)	8.1 Impact investing	Sumatra Merang Peatland Restoration Project
		8.2 Commercial investing	Mill Creek Mitigation Bank

Key lessons learned

- **Pondscapes are NbS that deliver multiple benefits.** While they generate multiple economic and societal benefits and can be good value for money in tackling pressing societal challenges, they do generate financial costs, and financing is required.
- **Financing is a key barrier for NbS and this also applies to pondscape implementation.** This is due to a number of challenges, including pondscape generation of undervalued public goods, the difficulty of coordinating multiple actors who enjoy ‘scattered’ benefits, the challenge of measuring and valuing those benefits, and the lack of experience with NbS (as with other unconventional types of investments) within the finance sector.
- **The PONDERFUL Sustainable Finance Inventory provides an overview of financing instruments that pondscape developers can use to pay for pondscape NbS.** It covers eight categories of financing instruments, including income instruments, contracting approaches, debt instruments, tradable rights/permits, subsidies, grants, voluntary contributions, and ownership models. By summarising instruments in one-page templates and providing real-world examples, it helps pondscape (and other NbS) developers understand the strengths and barriers posed by different instruments, and their appropriateness for different types of pondscape projects.
- **Upscaling NbS requires that NbS are profitable, with income exceeding costs.** This will depend on either the development of markets for pond products (including environmental goods such as biodiversity benefits) or through additional public funding. Our research suggests that debt/equity finance will not come before profitability – “unlocking” private finance of NbS requires documentation of NbS projects where their effects are clear and their potential income exceeds cost.

Next Steps

Identification and increased understanding of financing options for pondscape developers will pave the way for their potential implementation as NbS to address several societal challenges, most importantly climate change adaptation and biodiversity conservation, while delivering simultaneously further co-benefits. The PONDERFUL project continues to explore this topic by developing financing plans to investigate and support the long term financial viability of the project’s DEMO-site pondscapes. Financing plans will include an assessment of the financing gap in each DEMO-site pondscape by understanding costs and potential revenue sources. Based on the characteristics of each demo pondscape and the financing options available in the Inventory, the financing plan will recommend a suite of suitable financing options for each site.

1. Introduction

The creation, management and restoration of ponds and pondscapes – a complex of multiple ponds – are Nature-based Solutions (NbS) that can address numerous societal challenges, including the need for climate adaptation, biodiversity enhancement, and water management. Solutions based on nature deliver multiple public and private benefits and are seen as a key approach to meet European Green Deal objectives, including addressing the biodiversity crisis, mitigating and adapting to climate change, and delivering social and economic benefits (Naumann & Davis 2020; EU Commission 2021).

Financing has been identified as a key barrier that limits the upscaling of NbS (Faivre et al, 2017; Mayor et al. 2021). This report aims to address this challenge by supporting pondscape¹ developers to answer a simple question: **how can I pay for my pondscape project?** Except where specifically stated, we use the term “financing” generically throughout the report to encapsulate all the different ways pondscape developers can cover the costs of creating, restoring, and managing pondscape NbS, including money loaned, invested, granted, donated, earned or levied.

The central contribution of this report is the development of the PONDERFUL Sustainable Finance Inventory (Annex B). The Sustainable Finance Inventory consists of 24 financing instruments for nature-based solutions, each matched by at least one concrete example of the financing instrument in action. The Inventory aims to support pondscape developers understand financing options and identify the finance instruments best suited to their pondscape NbS project. Financing instruments differ considerably, providing financing from different sources, imposing different obligations and requirements, among other attributes. Each financing instrument is succinctly described using a consistent structure to allow readers to compare different instruments. It will also be useful to developers seeking to pay for other types of NbS.

The remainder of the report documents the development of the PONDERFUL Sustainable Finance Inventory. To understand the financing needs and wants of “pondscape developers” (i.e. individuals or organisations managing, creating, or restoring ponds or pondscapes), chapter 2 aims to understand how ponds and pondscapes operate as nature-based solutions. In section 2.1, we draw on the literature to define what ponds and pondscapes are. In section 2.2., we identify the potential benefits that pondscapes can deliver to society and individuals. Section 2.3 contextualises pondscapes as nature-based solutions and identifies different types of pondscape NbS actions, specifically pond creation, pond restoration, pond infrastructure and management actions, and pondscape-scale land-use management actions, through which pondscapes can address societal challenges. Section 2.4 describes the one-off and ongoing costs associated with implementing these pondscape NbS. Annex A provides a more detailed overview of pondscape benefits conceptualised as ecosystem-services and nature’s contributions to people.

Chapter 3 focuses on financing pondscapes. Given the lack of pondscape-specific financing information, section 3.1 summarises key insights from the literature on financing NbS, considering current NbS financing levels, needs, and sources, and NbS financing challenges identified by the literature. Section 3.2 introduces the PONDERFUL Sustainable Finance Inventory, a catalogue of financing instruments for pondscapes, which can also be applied by other NbS. Throughout chapter 3, we relate the existing literature on financing NbS to the specific context of pondscapes. The Sustainable Finance Inventory is provided in Annex B.

Chapter 4 reflects on the lessons learned through developing the Inventory and identifies

¹ Unless otherwise noted, we use pondscapes as a generic term throughout the report to refer to ponds or pondscapes (i.e. individual ponds or groups of ponds in a landscape).

open questions. Key reflections include the limited existing literature on financing NbS, especially in the specific context of ponds. We also discuss the importance of income streams for upscaling pondscape NbS: we will only see an expansion of private financing of NbSs when their expected income exceeds their expected costs. Chapter 5 provides conclusions. Annex C summarises the ongoing co-creation work with the PONDERFUL DEMO-sites.²

2. Ponds and ponds as Nature-based Solutions

To be able to identify effective financing instruments for ponds and ponds, we need to understand how ponds function as NbS. This chapter provides the necessary background by defining ponds and ponds, understanding the benefits they provide, contextualising them as NbS, and understanding the costs involved in implementing, restoring, or managing pondscape NbS. This context enables us to evaluate different financing options for implementing ponds as NbS in the following chapter.

2.1 What are ponds and ponds?

Ponds

There is no universal evidence-based definition of what exactly a pond is (Richardson et al., 2022). The Freshwater Habitats Trust defines a pond “as a body of water (normally fresh water, but occasionally brackish), which can vary in size between 1 square meter and 2 hectares³, and which holds water for four months of the year or more”. The International Ramsar Convention on Wetlands holds that ponds are water bodies that have a surface area of less than 8 hectares (UNESCO, 1994). The European Pond Conservation Network aptly summarises in their ‘Pond Manifesto’ that the term ‘pond’ covers a wide variety of standing water bodies: ponds can vary in surface area from about one metre squared to a few hectares; be several metres deep or only few centimetres; they can hold water all year round, or go through cycles of wetting and drying; and they can either be man-made or natural in origin.

In addition to the features mentioned in these definitions, a range of other characteristics can be used to classify ponds, for example the bioclimatic region they are located in (e.g. tropical, temperate continental, Mediterranean, Alpine or tundra), the surrounding land-use (e.g. urban, agriculture, mountain, woodland, heathland, coastal or floodplain), their biota, their chemistry, or the extent to which they are impacted by human activity. Yet another way of classifying ponds is to consider the benefits they provide to society: ponds may control floods, be used for swimming or other forms of recreation, act as water filters to capture pollutants from agriculture or industry, or store rain and run-off water for irrigation, among other benefits (see Table 2). All ponds also support biodiversity,

Ponds and wetlands: is there any difference?

Wetlands are defined by the Ramsar Convention on Wetlands as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters”. The Ramsar Convention includes 42 types of wetlands, grouped into inland wetlands, marine/ coastal wetlands and human-made wetlands (UNESCO 1994). Ponds are part of the category inland and human-made wetlands (which are principally fresh water). To conclude, ponds can be included in the family of wetland types.

² There are eight PONDERFUL demosites in seven countries across Europe, plus Uruguay. Each consists of multiple ponds and features a stakeholder group who meet multiple times to discuss the implementation of pondscape NbS in the demosite and support project research. For more information, see <https://ponderful.eu/demo-sites/>

³ Equivalent in area to approximately 2.5 football pitches.

meaning that they provide multiple benefits at once (Oertli, 2018; Oertli & Parris, 2019; Zamora-Marín et al., 2021). Ponds can be developed or managed to deliver more of particular types of benefits, i.e. we can build or manage ponds in such a way that they best support certain species, or to provide flood protection, or to simultaneously provide a relaxation space for urban dwellers (Oertli, 2018; Oertli & Parris, 2019; Zamora-Marín et al., 2021).

In summary, ponds are varied. Bathing ponds may be located in urban areas as well as in woodlands; water purification ponds may be located both on farms and in cities; and ponds for nature conservation may be found in floodplains as well as in heathlands. The benefits provided by ponds may also change over time, for example industrial ponds could be adopted by fishing clubs or farm ponds turned into biodiversity conservation areas (Hassall, 2014). Similarly, the landscape surrounding ponds may change, for example as agricultural areas becoming urbanised. All this makes categorising ponds or generalising benefits across different ponds challenging. Instead, to understand its benefits, each pond must be considered in its specific context.

Pondscapes

The PONDERFUL project focusses not only on individual ponds, but on pondscapes. Networks of spatially coherent ponds and surrounding terrestrial habitats make up a 'pondscape' (Hill et al., 2018; Oertli, 2018; Oertli & Parris, 2019). In the PONDERFUL project we define a pondscape as "a landscape including a congregation of ponds with spatial proximity ("connectedness")", whose boundaries may be determined by physical, or ecological, societal or political criteria and whose total surface area may strongly vary (Blicharska, 2021)⁴. The advantage of managing ponds at the pondscape scale, rather than focussing on individual ponds, is that the various features and functions of different individual ponds can be considered alongside each other. A pondscape made up of a variety of ponds – of different sizes, depths, origins, etc. – can provide additional benefits to society.

Pond conservation strategies provide the greatest potential benefit to aquatic biodiversity when they result in the creation of a pondscape containing multiple ponds with varied features (Hill et al., 2016, 2018; Sayer et al., 2012). In their study of agricultural ponds, Swartz and Miller (2019) found that "maximizing both agricultural function and habitat conservation in a single pond is unnecessary, and likely impossible", but that both goals could be achieved by maintaining a pondscape with different types of ponds representing varied habitats. Pondscape-scale management also decreases the need to micro-manage individual ponds: as the number of ponds at landscape scale increases, species can move between ponds to adapt to changing conditions, provided there is good habitat connectivity between the individual ponds (Million Ponds Project, n.d.).

2.2 What benefits do pondscapes provide?

Pondscapes generate numerous benefits for society: Figure 2 and Table 2 offer an overview of the variety of benefits provided by ponds and pondscapes described in the literature (Cuenca-Cambronero et al. 2023). This summary is based on a review of the literature on the benefits and functions of both natural and artificial ponds and pondscapes. Due to the lack of clarity on how to define "ponds" and "pondscapes", relevant literature on "wetlands", "small-water bodies" and "inland freshwater" were also considered on a case-by-case basis.

⁴ Full definition from the PONDERFUL project: "A pondscape is a landscape including a congregation of ponds with spatial proximity ("connectedness") that potentially influences local species persistence and community structure (see Boothby 1997). Regular or sporadic exchange of species from one pond to another in the pondscape can increase local diversity, buffer for species extinction due to chance or local disturbances, and thus influence community structure. The boundaries of a pondscape may vary and may be determined by physical or ecological settings (a valley, a catchment, a set of ponds in a nature reserve) or even determined by societal or political criteria (urban ponds, provincial or national boundaries). Connectedness in a given pondscape is a function of ecological differences among ponds, the terrestrial matrix (facilitating or impeding dispersal) and dispersal capacity of the organisms, and thus also depends on the taxonomic group considered. The total surface area covered by a pondscape can strongly vary."

Annex A: Pondscape benefits provides more information on these benefits and references, contextualising them in the ecosystem services (ES)⁵ and Nature's Contributions to People (NCP)⁶ frameworks, and benefit indicators used in the literature.

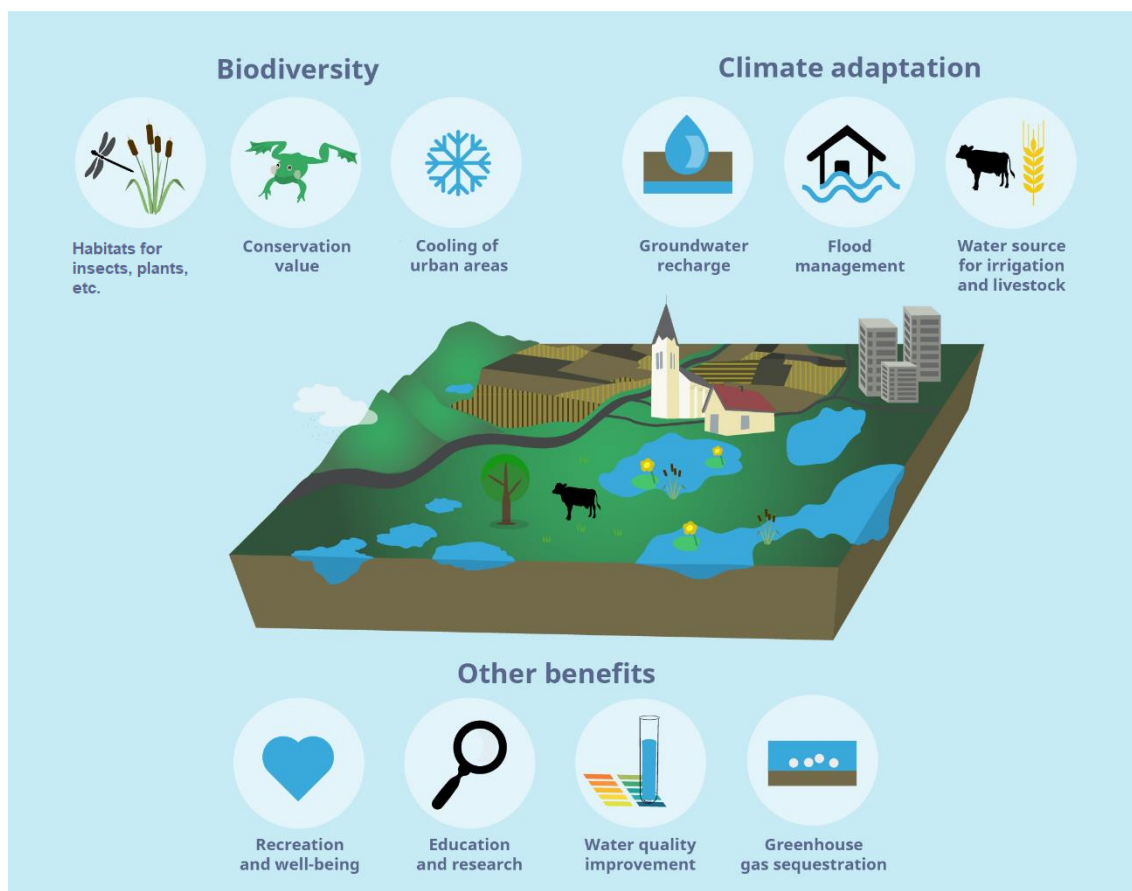


Figure 2 Benefits of ponds.

Table 2 should be interpreted with some caution. It includes an overview of the range of benefits of ponds and pondsapes mentioned in the literature, but it neither indicates how widespread or significant the provision of these benefits is, nor what the level of evidence is. While there is a high level of confidence on the provision of some benefits (e.g. provision of habitats, recreation), the level of certainty is lower in other cases (e.g. carbon sequestration, cooling).⁷ In addition, the table does not distinguish between benefits provided by different types of ponds and pondsapes, though due to the varied nature of ponds, it is difficult to generalise their benefits. Despite these limitations, Table 2 provides a general overview of the range of potential benefits offered by pondsapes to society.

Many pondscape benefits are public goods that lack private reward. That is, they are non-excludable and non-rivalrous, meaning that the benefit is available to all people and does not dwindle in supply as people benefit from it. For example, a pondscape located on private farmland in close proximity to a river might intercept agricultural pollutants and thus

⁵ Ecosystem services (ES) are the contributions that ecosystems (i.e. living systems) make to human well-being. When considered in a cascade model, ES are on the one side connected to underlying ecosystem functions, processes and structures that generate them; and on the other side give rise to goods and benefits. We follow the CICES 5.1 classification of ES (Haines-Young & Potschin, 2018).

⁶ The concept of Nature's Contributions to People (NCP) proposed by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) builds on the concept of ecosystem services (ES), but differs from it in some respects. The NCP approach highlights the role that cultural values play in defining links between nature and people, as well as the role of indigenous and local knowledge (Díaz et al., 2018).

⁷ Better understanding the benefits of ponds and pondsapes is one of the main objectives of the PONDERFUL project. See www.ponderful.eu for more information.

contributes to improved water quality of the river. Anyone can go swimming in this river without “using up” the benefits provided by the pondscape. Benefits of pondscales sometimes accrue at different scales and geographical locations to the ponds themselves. Using the same example, the water quality improvement benefits not only those near the pondscape, but also everybody located downstream. The benefit of water quality, as well as most other benefits of pondscales, are also public goods that are not commonly valued in monetary terms or traded on markets. Even though the example pondscape is located on private land and the owner has to bear the cost for maintaining the ponds, they will uncommonly be financially rewarded for the improvement in water quality in the neighbouring river. Due to this public good nature of many of the benefits provided by pondscales, their creation, restoration and management can be challenging to finance.

Table 2 The variety of potential benefits provided by pondscales – see Annex A for detail and references

Benefit	Details of potential benefits
Water quality improvement	<ul style="list-style-type: none"> • Reduction of point and non-point source pollution through sedimentation, flotation, infiltration, adsorption, biological uptake, biological conversion, or pollutant degradation • Interception of agricultural runoff, thereby mitigating nitrate, phosphorus and pesticide pollution • Treatment of industrial, mining, sewage and municipal wastewaters in waste stabilisation ponds • Pond-wetland complexes as preliminary processors of drinking water
Water source	<ul style="list-style-type: none"> • Storage of water for agricultural irrigation, providing an alternative to aquifer exploitation and reducing energy use of irrigation • Drinking water source for livestock and wildlife • Natural or artificial fire retention ponds as reservoirs for extinguishing water
Flood management	<ul style="list-style-type: none"> • Postponement and decrease of flood peaks due to ponds located in floodplains • Stormwater detention and retention ponds as part of urban drainage systems, which can also manage water quality of runoff
Groundwater recharge	<ul style="list-style-type: none"> • Recharge of aquifers through from ponds through permeable sand and rocks to an aquifer located below • Artificial groundwater recharge through man-made infiltration ponds
Habitat provision	<ul style="list-style-type: none"> • Habitat for fauna and flora • Habitat for pollinating insects, thus increasing the quantity and quality of pollinator-dependent crops • Stepping-stone habitats, which enhance habitat connectivity • Biodiversity hotspots in often ecologically poor areas such as cities or agricultural land
Cooling	<ul style="list-style-type: none"> • Mitigation of urban heat island effect (<i>more evidence needed</i>) • Improved thermal comfort in urban areas due to trees and natural ventilation
Greenhouse gas sequestration	<ul style="list-style-type: none"> • Sequestration and storage of carbon, though potentially offset by release of carbon dioxide, nitrous oxide and methane (<i>more evidence needed</i>)
Erosion control	<ul style="list-style-type: none"> • Mitigation of erosion through trapping of sediments from run-off water
Recreation and well-being	<ul style="list-style-type: none"> • Walking, jogging, boating, fishing, hiking, swimming, relaxation and other recreational pursuits • Support to physical and mental health in nearby residents and visitors • Aesthetic scenery
Education and research	<ul style="list-style-type: none"> • Opportunities for research and environmental education
Food and materials	<ul style="list-style-type: none"> • Food (e.g. fish, water cress) and materials (e.g. reeds) • Aquaculture production of fish, crustaceans, and algae
Conservation value	<ul style="list-style-type: none"> • Opportunity for future generations to know and experience ponds as they are now

While pondscales offer a range of benefits, or services, to society, they can also provide ‘disservices’, that is, they have negative impacts on human society.⁸ Examples of disservices

⁸ Whether something is a service or a disservice depends upon perspective; the disservices mentioned in this paragraph are only direct disservices to humans. For example, while mosquitos bite humans and may

are the provision of breeding habitats to biting insects such as mosquitos, which can act as vectors for human diseases (Díaz, O’Geen, and Dahlgren 2012); an abundance of toxin-producing algae, which cause sickness in humans or pets, or as homes to large populations of noisy waterfowl or amphibians (Oertli & Parris, 2019); or a source of greenhouse gas emissions (Bergen et al., 2019; Peacock et al., 2019). These disservices are more difficult to manage where pondscapes and humans are in close proximity, especially in urban areas, pointing to the importance of social considerations for pond management and of understanding ponds as socio-ecological networks (Oertli & Parris, 2019). Examples of ecosystem disservices are not included in Table 2 The variety of potential benefits provided by pondscapes – see Annex A for detail and references but are important to consider when evaluating the implementation of pondscapes as nature-based solutions to ensure that these deliver net benefits to society.⁹

2.3 Understanding pondscapes as nature-based solutions

The PONDERFUL project focuses on the role of ponds and pondscapes as Nature-Based Solutions for climate mitigation and adaptation, and biodiversity conservation. The International Union for the Conservation of Nature (IUCN) defines NbS as “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits” (IUCN, 2016). A recent study (Reise et al. 2022) surveys additional definitions of nature-based solutions and identifies the following elements as defining characteristics of nature-based solutions:

- Aligned with natural ecosystem processes,
- Benefit to biodiversity,
- Support adaptability and resilience,
- Locally appropriate,
- Multi-functional,
- Address societal challenges and enhance human well-being.

Central to these definitions is a focus on addressing societal challenges (European Commission, 2021). Pondscapes as Nature-based Solutions go beyond simple conservation objectives: they are specific actions to take advantage of the benefits of pondscapes to achieve societal objectives, benefitting both humans and nature. A second key element of this definition is that NbS are multi-functional, i.e. delivering multiple benefits. This means, that regardless of the specific societal challenge(s) the pondscape aims to address, it will at the same time generate additional benefits (co-benefits), including biodiversity and climate adaptation. Thirdly, this definition makes it clear that NbS must be adjusted to the specific local context, including local ecological and social circumstances.

In this section we identify the different specific actions that can be taken to implement pondscapes as NbS. Table 3 gives an overview, sorted into four main categories: 1) pond creation, 2) pond

Societal challenges for NbS

The European Commission (2021) identify 12 societal challenge areas that can be addressed by Nature-based Solutions:

1. Climate Resilience
2. Water Management
3. Natural and Climate Hazards
4. Green Space Management
5. Biodiversity Enhancement
6. Air Quality
7. Place Regeneration
8. Knowledge and Social Capacity Building for Sustainable Urban Transformation
9. Participatory Planning and Governance
10. Social Justice and Social Cohesion
11. Health and Wellbeing
12. New Economic Opportunities and Green Jobs

transmit diseases, they and their larvae are a source of food for other species and as such contribute to biodiversity. Maintenance of biodiversity actually benefits humans, meaning that indirectly mosquitos do provide a service to society. The Ecosystem services (ES) and Nature’s Contributions to Peoples (NCPs) frameworks that we draw on in this section are anthropocentric, meaning that they assess the value of nature from the standpoint of human society.

⁹ Ecosystem disservices can also be characterised as an economic cost; see discussion in section 2.4.

restoration, 3) pond management, and 4) pondscape-scale land use and management actions.

Table 3 Categorisation of pond and pondscape NbS actions¹⁰

NBS: broad type and description
<p>1. Pond creation</p> <ul style="list-style-type: none"> • Creating a pond in a site where there was formerly no waterbody
<p>2. Pond restoration</p> <ul style="list-style-type: none"> • Creating or restoring a pond in a site where formerly a pond was existing, e.g. excavating a pond that had been filled in • Significant alterations to existing pond, e.g. depth, morphometry, slopes, shoreline, flora or fauna
<p>3. Pond management</p> <p><i>These refer to those on-site infrastructure and management actions that are needed to ensure the appropriate functioning of an individual pond.</i></p> <p>On-site infrastructure measures (acting on areas immediately surrounding pond):</p> <ul style="list-style-type: none"> • Access restrictions, e.g. fencing to prevent access by livestock, dogs, or visitors – or removing fencing to allow livestock access • Development of trails or wildlife observatories • Management of riparian vegetation and wetland plants • Removing invasive alien plant species • Implementing (or enlarging) the buffer area immediately surrounding the pond • Creation of terrestrial habitats in the vicinity of the pond (e.g. for reptiles or amphibians) • Removing hard infrastructure (e.g. concrete edge) • ... <p>Pond management measures (actions within pond):</p> <ul style="list-style-type: none"> • Removing invasive alien plant and animal species • Removing of all fish • Reintroducing or protecting threatened plant and animal species • Pond water management, e.g. manage input, output (e.g. sluice repair or adjustments, lining), drying rate • Routine management measures in relation with the pond design and depth (e.g. slight re-profiling of banks, removal of sediments, creation or removal of an island, scraping edges to maintain populations of pioneer species) • Mowing and removal of submerged, floating or emergent plants • Regular monitoring of physical, chemical or biological indicators • Planting or introducing structured vegetation into ponds (e.g. planted coil rolls) • Shade management (e.g. a few trees or large % of cover) • Part-desilt, ...
<p>4. Pondscape-scale land use and management actions</p> <p><i>These refer to those on-site land-use actions that are needed to ensure the appropriate functioning of a pondscape (ponds and surrounding landscape)</i></p> <ul style="list-style-type: none"> • Placing the pondscape (or a part of the pondscape) under protective status (e.g. protected areas) • Changing land use in the pondscape and in the area surrounding the pondscape (e.g. convert arable land or intensive livestock grazing area to extensive grassland; decrease impervious surfaces e.g. asphalt in neighbouring areas). • Enhancing the connectivity between ponds or pondscales. This involves the creation of terrestrial or aquatic corridors, removing obstacles, or active transport of propagules. • Specific pondscape management measures, depending on landscape (within and surrounding the pondscape): <ul style="list-style-type: none"> ○ In agricultural land, other pondscape related management measures: 1) Soil Management (e.g. Allow field drainage systems to deteriorate or reinstate/increase infiltration to decrease sediment load), 2) Livestock Management (e.g. Reduce the length of the grazing day or grazing season), 3) Fertiliser Management (e.g. Reduce fertiliser application rates), 4) Manure Management (e.g. change from slurry to a solid manure handling system) and 5) Farm infrastructure (e.g. Fence off pondscape from livestock), among other actions ○ In urban land: 1) Manage water quality (e.g. inputs of nutrient, salt, other pollutants); 2) Increase good quality terrestrial habitats in neighbouring areas (e.g. other green/blue spaces); 3) Promote natural hydroperiods, 4) Encourage water harvesting from buildings (rainwater), among other actions

Each of the described NbS actions either creates or increases the ability of the pondscales to address a specific societal challenge, for example increasing the pondscape's ability to help society adapt to climate change. When considering which NbS action to implement, it is

¹⁰ This list of pond(scape) NbS actions is the same as the one presented in PONDERFUL WP4 Protocol.

important to take into account how effectively it addresses the societal objective, as well as the co-benefits it can generate. To this end, trade-offs must also be considered: for example, ponds used as a water source for livestock (i.e. to address the societal objective of climate resilience) often have a lower biodiversity value than ponds designed specifically to enhance local biodiversity (European Commission, 2021; Zamora-Marín et al., 2021). In addition, it is crucial to consider this within the local context – there is no one-size-fits-all solution when it comes to NbS, and the optimal pondscape NbS action will differ in different settings. In summary, when implementing pondscales as NbS, the local context and the total societal net benefit the NbS delivers should be considered, not just the specific societal challenge (Cuenca-Cambronero et al. 2023).

2.4 What does it cost to implement pondscales as NbS?

When deciding what pondscape NbS actions to implement, in addition to the benefits generated, it is important to consider the costs i.e. how much time, money, other resources are required to implement the NbS action. The scale and types of costs will depend on the pond NbS action and the local context. Table 4 gives an overview of the types of costs for implementing pondscape NbS such as pond creation, pond restoration, pond infrastructure and management actions.

In this section we focus on financial costs. Financial costs are all expenses that must be paid by the pond developer to implement and maintain the NbS action (i.e. all costs that are captured by markets). These are crucial, as pondscape NbS will only be financially sustainable where the project at a minimum can cover the financial costs.

Pondscape developers face numerous costs. There are two types of financial costs for implementing pondscape NbS: one-off costs and ongoing costs. One-off costs are all those that a developer faces only once when realising a project. They include all costs associated with developing, planning, and the capital investment costs of implementing the NbS. As shown by Figure 3, capital investment costs are often large for NbS projects. Mayor et al. (2021) identify that NbS also face significant ongoing operational costs. These costs include standard operating costs such as ongoing maintenance, staff, and depreciation. Some of these operational costs will be variable, i.e. will increase or decrease depending on how the pondscape develops in the future (e.g. how many people visit). They will also depend on the success of the pond creation and on other factors such as external pressures on the ponds (e.g. neighbouring agricultural intensification); operational costs can only be estimated with some uncertainty prior to NbS implementation.

Financial costs differ from economic costs, which capture the full social costs of implementing the pondscape NbS. The economic costs include all financial costs as well as the non-market costs. This includes ecosystem disservices, i.e. the negative impacts that a pondscape NbS action has on society, such as providing a breeding ground for mosquitos or producing greenhouse gases. The economic cost also includes the opportunity costs of implementing the pondscape NbS. Here, it is important to remember that pondscales may not

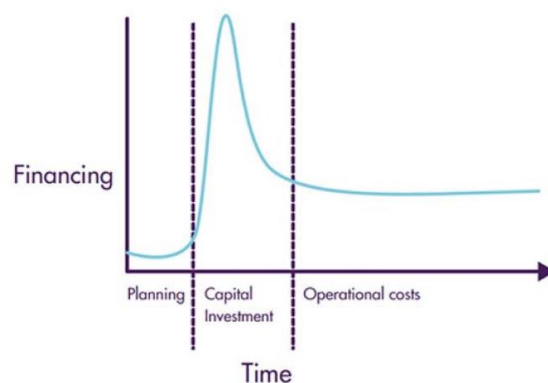


Figure 3 Financial costs for NbS over time (Mayor et al. 2021)

be the only or best way to achieve the societal objective (e.g. climate adaptation, mitigation, or biodiversity conservation); other NbS (such as parks or forest) or even grey infrastructure (e.g. dams) may deliver a greater net benefit to society (i.e. more benefits relative to the costs, considering all societal costs and benefits). Decision-makers must consider the opportunity cost of taking a pond NbS action, i.e. the potential benefits that could arise if the

same resources were invested in a different way. This issue of economic costs will be considered in detail in later PONDERFUL reports; in this report we focus on financial costs.

Table 4 Proposed cost typology for implementing pondscape NbS

Type of cost	Description	Examples
One-off costs (€/ha)		
Design and planning	Costs associated with initiating the project	<ul style="list-style-type: none"> • Pondscape design (e.g. determining the ideal site, water source, shape, or depth) • Pondscape planning process (e.g. pre-site checks on existing habitats and species, archaeological interest or underground pipes and cables, as well as project risk management or obtaining planning permission)
Land acquisition costs	Costs for buying or leasing the land	<ul style="list-style-type: none"> • Money paid to gain the title of the land
Legal and regulatory fees	Legal fees and regulatory costs for contracting and negotiating during planning and construction	<ul style="list-style-type: none"> • One-off taxes associated with the acquisition of land. • One-off payments for permits and licences • Environmental Impact Assessment or other regulatory evaluations, if required
One-off equipment purchases	Upfront capital investments in equipment and gear	<ul style="list-style-type: none"> • Excavation machinery • Dump trucks • Protective gear
Construction and development	Costs for building and infrastructure (materials and services)	<ul style="list-style-type: none"> • Building materials (e.g. fence posts, liners and underlay) • Building services (e.g. construction work, operation of heavy machinery, transportation of spoil, vegetation planting) • Equipment hire, if not purchased.
Other types of one-off costs		<ul style="list-style-type: none"> • Any other one-off cost
Ongoing costs (€/ha/year)		
Maintenance and operation costs	Standard annual costs for running and operating the NbS, which may include any direct costs, staff costs, insurance fees, transport costs, general maintenance and operating costs of equipment, monitoring costs, etc.	<ul style="list-style-type: none"> • Pond management staff • Insurance fees • Pond maintenance (e.g. planting or clearing vegetation, dredging, removal of invasive species) • Pond monitoring (e.g. of water levels, pollution, biodiversity) • Livestock management • Visitor management • Education and information materials
Regulatory costs	Annual fees for licenses and permits, as well as costs of interacting with regulators and other parties to negotiate licences and permits and comply with existing regulations	<ul style="list-style-type: none"> • Annual fees for licenses and pollution control measures • Costs of interacting with environmental protection agency • Required monitoring and data gathering to comply with regulations
Depreciation	Annual decrease in the value of assets, such as a decrease in the value of equipment due to wear and tear	<ul style="list-style-type: none"> • Decrease in value of capital equipment (e.g. excavation gear)
Other types of on-going costs		<ul style="list-style-type: none"> • Training costs for pondscape staff

2.5 Synthesis

This chapter has identified the characteristics and numerous benefits of ponds and pondsapes. These diverse benefits mean pondsapes can in many contexts be effective nature-based solutions for many societal challenges, including climate adaptation,

biodiversity enhancement, and many more. Implementing NbS in practice can mean taking a variety of actions, such as creating, restoring and managing ponds and pondscape and their surroundings to maximise desired benefits. When planning a pondscape NbS, it is important to consider that ponds and pondscape are highly diverse ecosystems and that the benefits they provide cannot be generalised across different contexts. Depending on the characteristics of the pondscape and the surrounding land-use, as well as on the needs of local society, pond creation, restoration and management generate different benefits come at different costs. In the following sections, we build on this background to identify appropriate financing options for financing pondscape NbS.

3 An introduction to financing nature-based solutions

The literature has identified that a lack of financing is a significant barrier for NbS uptake (Faivre et al, 2017; Mayor et al. 2021; UNEP 2022).^{11,12} In this chapter, we review the existing literature on financing NbS to understand the current status of NbS finance, and the challenges that NbS pose for financing (section 3.1). In section 3.2, we introduce potential financing instruments that can be used to finance NbS in the form of an Inventory.

While there is little relevant experience or literature related to the specific context of pondscape, pondscape pose many of the same challenges for financing as other types of NbS. This chapter provides NbS financing context and background and by doing so helps pondscape developers to understand the strengths and weaknesses of different financing instruments for their ponds(cape) projects. The aim is to support ponds(cape) developers identify which financing approaches are most appropriate to cover the costs of their pondscape restoration, creation, or management project.

3.1 Financing nature-based solutions

3.1.1 Current status and challenges

Alongside growing recognition into the potential of NbS to solve societal challenges including biodiversity enhancement and climate resilience, there has also been increasing research into the challenges of financing nature-based solutions (UNEP, 2021). In this section we summarise the status of NbS financing, describe public and private financing sources, as well as key challenges identified by the literature.

Defining NbS financing

The term “NbS financing” is used inconsistently in the literature. In this report, we define the term as the answer to the central question driving this report: *how can a pondscape developer pay for their project?* That is, we use the term financing generically as catch-all category encapsulating all sources of money necessary to cover costs associated with NbS creation, restoration, and/or management. This including all money loaned, invested, granted, donated, earned, or levied, as long as that money is earmarked for NbS.

Our broad use of the term financing mirrors the OECD’s definition (for “biodiversity financing”), which refers to “expenditure that contributes – or intends to contribute – to the conservation, sustainable use and restoration of biodiversity” (OECD 2020). A recent report for the EU Commission on biodiversity financing uses the terms “financing” and “funding”

¹¹ A lack of financing is not the only barrier to NbS implementation: Kabisch et al. (2016) also identify uncertainty/lack of knowledge over NbS effectiveness, short-term versus long-term priorities, and sectoral and policy silos, among others.

¹² Note, in lieu of financing, NbS can be implemented by volunteers who donate their time and effort. Santangeli et al. (2016) review the literature on the related issue of voluntary non-monetary approaches for implementing conservation and conclude that feasibility and low cost are key success factors. Accordingly, such approaches may be appropriate for small-scale pondscape but may be difficult to scale.

interchangeably to describe a similar set of expenditure items (Nesbit & Whiteoak et al. 2022).¹³ A related definition has been used by UNEP (2021), who define “NbS investment” as a financial flow that contributes positively to financing nature-related activities or assets.

The finance sector defines financing more narrowly as “the process of providing funds for business activities, making purchases, or investing” (Investopedia 2022). This narrow focus on upfront money to cover initial costs is reflected in the infrastructure literature, e.g. IBRD & World Bank (2017) define financing as “money required at project outset to begin implementation, primarily for asset construction.” They differentiate this from the term funding, “money required to meet repayment obligations and remunerate the project financiers, namely debt and equity holders” (IBRD & World Bank 2017). This separation makes clear that narrowly defined financing, especially from private sources (i.e., loans, equity investment), is often contingent on the prospect of future funding, i.e. income, whether that is from future revenue, grants, levies or donations, which can then be used to cover the costs of financing, e.g. debt capital repayment plus interest or coupon payments, or financial returns for equity investors.¹⁴ We come back to this issue in section 0 but throughout this report use the more generic definition of financing, as defined at the beginning of this section.

Differences and overlap in definitions are also apparent in the terms of NbS financing, biodiversity financing, and conservation finance, each of which are used relatively synonymously in recent global assessments in this area. UNEP (2022) explicitly calculates the value of investments in nature-based solutions, which is also the focus of this report. Other recent surveys, such as Deutz et al. (2020) assess investment in “biodiversity financing” or “conservation finance,” terms that closely overlap with investment in nature-based solutions. Further, Deutz et al. (2020) define conservation finance as financial resources invested toward conservation, restoration, and sustainable use of biodiversity as well as investments into the biophysical systems supporting biodiversity”. UNDP (2018) considers biodiversity finance as including “private and public financial resources used to conserve and restore biodiversity, investments in commercial activities that produce positive biodiversity outcomes, and the value of the transactions in biodiversity-related markets such as habitat banking”. We draw on each of these global surveys in the following sections, though the slight differences in definitions make it challenging to confidently compare the different results.

The current status of NbS financing

In 2020, the world invested around €145 billion annually in NbS (UNEP, 2022). This value is similar to other recent studies on current investment in biodiversity conservation worldwide, such as Deutz et al. (2020), which found that this amounted to €110-126 billion annually (corresponding to approximately 0.13% of global GDP).¹⁵ These estimates are relatively uncertain due to a lack of consistent data: there are no existing global datasets that explicitly label NbS, and data and reporting differ considerably across sectors and countries (UNEP, 2021). Given the uncertain availability of data and differences in definitions and methodologies for estimating expenditure on biodiversity conservation, it is difficult to track the development of annual expenditure over time: while estimates have increased from €46 billion in 2012 (Parker et al. 2012), to an annual average of €68-80 billion in the years 2015-2017 (OECD 2020), to an estimated €145 billion in 2022 (UNEP, 2022), it is not clear whether

¹³ Their evaluation of biodiversity funding covers common EU-public expenditure through the Multi-annual Financial Framework, Member State expenditure on biodiversity, and “private financing” for biodiversity (including e.g. NGO funding, philanthropic funding, sustainable commodities, biodiversity offsets, payment for ecosystem services and “private sector-mobilised funding”).

¹⁴ Indeed, IBRD & World Bank (2017) argue that rather than a financing gap (for public infrastructure), a more appropriate term is funding gap.

¹⁵ See previous section for discussion about differences in definitions between these recent global assessments in this area. These differences mean that direct comparisons between the different reports are not possible; we report all results to illustrate the range of related estimates.

this is due to increased data availability, changing methods, or increased expenditure.¹⁶

While NbS can help address the societal challenge of biodiversity enhancement, the current level of investment in NbS is considerably less than will be needed to meet global biodiversity objectives. In 2014, the Convention of Biological Diversity High-Level Panel concluded that meeting the 2011-2020 Aichi Biodiversity Targets would require annual investment of €131-387 billion (CBD High-Level Panel, 2014). Deutz et al. (2020) estimate that meeting the more ambitious post-2020 global biodiversity objectives – including adequate financing for protected areas, investment in sustainable management of productive land and sea, and conservation in urban environments – will require annual financing by 2030 of €635-850 billion, which is six to eight times current levels of investment in NbS.¹⁷

The EU Sustainable Finance Taxonomy

To promote private investment in sustainable projects, the EU has created an official list of activities classified as environmentally sustainable activities: The EU Taxonomy (Regulation (EU) 852/2020). For activities to qualify as sustainable, they must make a substantial contribution to at least one of the EU's environmental objectives, whilst doing no significant harm to other objectives. This is assessed using scientifically defined criteria for each activity related to six environmental objectives: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems. The EU Taxonomy aims to clarify what is and is not sustainable, increase transparency, and by doing so increase confidence, help companies become more sustainable, and redirect investment away from non-sustainable activities towards those activities that are helping Europe transition to a green economy.

A number of global processes support increased financing for nature-based solutions: the 2022 Kunming-Montreal Global Biodiversity Framework (KM-GBF) includes a target to “[s]ubstantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources [...] (CBD 2022); the UNDP BIOFIN Biodiversity Finance Initiative supports 41 countries to increase investments in nature (UNDP, 2021); the 2019 UN Climate Action Summit included a call for increased public and private funding for nature-based solutions as part of its Nature-Based Solutions for Climate Manifesto (Nature-based Solutions Coalition, 2019), the 2022 Conference of the Parties to the Framework Convention on Climate Change, “[u]rges developed country Parties to fully deliver on the USD 100 billion per year goal [on climate finance]” (UNFCCC 2022), among others.

The EU is also aiming to increase financing of nbS within Europe. UNEP (2021) estimate that in 2019, European countries spent approximately €24 billion on NbS. There is considerable overlap with EU expenditure on biodiversity and natural capital.^{18, 19} The EU

¹⁶ The OECD identifies that expenditure on biodiversity conservation remains considerably less than public subsidies for activities that harm biodiversity, such as support for fossil fuels, water use, environmentally harmful agricultural production, and fisheries; global fossil fuel subsidies alone in 2015 summed to more than 350 billion Euro (OECD, 2019).

¹⁷ It is worth reiterating that NbS financing is not identical to expenditure on conservation; NbS are explicitly targeted at addressing numerous societal challenges. While by definition NbS will have positive impacts on biodiversity, this may be a co-benefit, rather than the main (and presumably more substantial) impact. We nevertheless include these reported numbers on biodiversity financing needs, as they illustrate that even with the incompatibility of definitions, that even if all NbS investment targeted biodiversity enhancement, there exists a significant financing gap to meet conservation objectives.

¹⁸As discussed in section 2.3, by definition, all NbS deliver biodiversity benefits (alongside other benefits); however, this does not mean that all biodiversity expenditure is equivalent to NbS expenditure. Given the lack of consistent data on NbS and the overlap between the categories of biodiversity and NbS (and other related terms), we nevertheless include references to biodiversity expenditure in this section.

¹⁹ “Natural capital” refers to the stock of renewable and non-renewable natural resources, broadly understood to include living ecosystems (i.e. biodiversity) and non-living assets such as minerals, fossil fuels, and solar energy (EEA, 2015).

Biodiversity Strategy 2030²⁰ commits to unlocking at least €20 billion of biodiversity spending (EU Commission, 2020). This is to be achieved in part by requiring that 10% of EU expenditure in 2026 be dedicated to biodiversity (*ibid.*). This comes alongside the European Council's commitment that 30% of EU expenditure is earmarked for climate action²¹, which if well-directed should also provide funding for nature-based solutions that deliver climate mitigation and adaptation, as well as co-benefits. In addition, the Biodiversity Strategy commits the EU to investing €10 billion in "natural capital" over the next 10 years, which also overlaps considerably with NbS (EU Commission, 2020). The EU has also developed the EU Sustainable Finance Taxonomy to encourage private financing aligned with biodiversity and other environmental objectives (see box text on previous page).

Who finances nature-based solutions?

Broadly speaking, financing for NbS can come from 'public,' 'private,' or mixed sources. Public financing refers to funding and financing sourced from public budgets (Sachs & Schmidt-Traub, 2015), commonly administered by local, regional, national or supranational bodies (e.g. EU), public agencies, or public investment banks. Private financing refers to financing and funding from private bodies, such as private banks, investment funds, and private companies, organisations or individuals (e.g. philanthropists, NGOs, business angels, venture capitalists, accelerators etc.). Often but not always, private financing is commercial and demands a financial return (commonly based on current market interest rates (e.g. commercial loans), while public financing is often offered at comparatively lower rates (e.g. soft loans) or without expectation of returns (e.g. grants). Mixed sources can come from public or private investors, and consist of commercial or non-commercial finance, or a mixture of all (Sachs & Schmidt-Traub, 2015).

The prevalence of public, private and mixed financing often depends on the maturity of the investment project, risk, and expected type and level of returns (Sewell et al. 2016). Public investors such as governments and development banks, and non-commercial private investors such as NGOs and impact investors, often seek social and environmental returns and are therefore willing to take smaller (or non-existent) financial returns (*ibid.*). These providers are also often more willing to invest in new, less tested projects, to incubate new innovations (*ibid.*)²². Conversely, commercial investors seek a financial return. This can make private investors risk-averse, investing only in more proven projects with lower risks (*ibid.*). Alternatively, commercial investors such as venture capitalists or accelerators may be willing to invest in high risk or unproven projects but would expect higher returns. Some private investors such as crowdfunding investors may be willing to accept greater risk and/or lower financial returns, as long as investments are relatively small and/or investments also deliver positive environmental or social impacts (Vismara 2018). Mixed financing can enable private financing by sharing risk and expected returns across different private and public funders (Lehner & Nicholls 2014).

NbS are primarily funded with public resources. UNEP (2022) estimates that, globally, public sources provide 83% of nature-based solutions funding. Most of this funding comes in the form of direct expenditure by governments (on biodiversity conservation, managing renewable resources, water and coastal management, and other environmental policy) (UNEP, 2022)²³. Consistent data for the EU is lacking but similar results are suggested by Almassy et al. (2017), who evaluate a database of 100 NbS projects in European cities and find that 76% of NbS projects are financed from public sources, with the majority coming from local governments, and smaller amounts of funding coming from regional governments,

²⁰ https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en#documents

²¹ https://climate.ec.europa.eu/eu-action/funding-climate-action/supporting-climate-action-through-eu-budget_en

²² Public investment in early-stage innovations can be motivated by the promise of public knowledge spillover effects.

²³ Deutz et al. (2020) emphasize that while there is considerable public funding for NbS, there are larger public financing flows into contradictory activities that negatively impact nature-based solutions, such as harmful fishing, agriculture, and forestry subsidies. They find that public expenditure on harmful subsidies is at least four times as large as the positive expenditure on nature-based solutions.

national governments, and the EU. The source of funding differs depending on the type of NbS project. For example, ecosystem restoration projects receive a considerably higher proportion of EU funding (76%), with national governments providing 15%, and private sources providing only 8% (Almassy et al. 2017).

Private financing for nature-based solutions comes from a number of sources. UNEP (2022) finds that almost a third of private financing flows through supply chain payments from corporations to sustainable suppliers of e.g. wood and food. An equally significant source is biodiversity offset markets and voluntary carbon markets, with an additional 12% of private financing in the form of payments for ecosystem services, informal arrangements where companies or individuals pay others to offset their damage to biodiversity or the climate. NGOs and philanthropists also provide approximately 12% of private financing for NbS, with the same amount of finance provided by impact investors. To meet the rapid growth in NbS financing necessary to address biodiversity, climate, and other societal objectives, there is much hope that private investment in NbS will increase (UNEP 2022).

What challenges limit private financing of NbS?

The literature identifies a number of challenges that limit private financing of NbS. Mayor et al. (2021) find that to receive finance, especially from private sources, NbS projects must be able to create a convincing business case, illustrating how financing will be repaid or rewarded. At a minimum, a business case should describe the (financial and other) value generated by the NbS (the value proposition), how this will be created and delivered, and how the value will be captured.²⁴

However, fundamental attributes of NbS pose a number of challenges for creating convincing business cases, influencing their developers' ability to access finance:

- **Undervaluing of public goods:** Private financial returns of NbS are relatively low because many of the benefits generated by NbS are not adequately valued or rewarded by the market (Wild et al. 2017); that is, the total economic value generated by NbS is often significantly greater than the market value. NbS benefits such as biodiversity conservation and carbon sequestration are “public goods”, that is, non-excludable (i.e. individuals cannot be barred from benefiting, even if they do not pay for the good) and non-rivalrous (i.e. use by one person does not preclude others benefiting from it).²⁵ For this reason, people are incentivised to ‘free-ride’, that is, to enjoy the benefits of the goods without paying for them. As a result, the market value of these goods (and the NbS that produce them) does not match the net social benefit they generate, which leads to an underprovision, a form market failure (UNEP, 2021; Whiteoak et.al forthcoming).²⁶
- **Coordination challenges:** Nature-based solutions deliver multiple benefits to multiple different beneficiaries, over different timescales and in different locations. This ‘scattering’ of benefits across multiple stakeholders means that often requires collaboration between multiple beneficiaries, as only when summed together do individual benefits outweigh the costs of implementing and maintaining NbS (Toxopeus & Polzin 2021; Whiteoak et.al forthcoming). The difficulty and cost of this coordination acts as a significant barrier to investment in NbS, especially from private investors (Sewell et al. 2016).
- **Measurement issues:** It is often difficult to measure the impact of NbS, due to their

²⁴ Different types of financing will demand different types of business cases. In addition to those aspects already listed, NbS business case may need to include assess risk assessments, scalability evaluation, quantitative metrics including financial and social return on investment, etc. For public funding and some forms of private funding (where market returns are not the key motivator), many of these elements will not be required.

²⁵ For example, NbS generate benefits that accrue in different areas to the NbS or at larger scales, e.g. a pondscape may result in cleaner water downstream.

²⁶ Different NbS generate differing degrees of private and public goods; those that generate sufficient private goods and services can avoid this issue. Regulation (such as environmental taxes or payments for public goods) can make private costs and benefits better reflect social costs and benefits and can therefore address this issue.

site-specific nature, multiple benefits, lack of data and agreed-upon methods or indicators, delivery of benefits over long timescales, and capacity barriers (Mayor et al. 2021; Watkins et al. 2019). In addition, because so many of the benefits produced by NbS are non-market benefits, valuing these impacts (i.e. monetisation) is complex and uncertain (McQuaid et al. 2021).

- **Finance-specific challenges:** Even where NbS benefits are valued and can be measured and monetised, financing can be difficult to attain. Not all issues apply to all projects but the literature identifies the following possible finance-specific issues:
 - There is a **lack of experience** and awareness with NbS within the finance sector (Mayor et al. 2021).
 - NbS are often **perceived as riskier** than traditional engineering solutions, regardless of their actual risk profile (Watkins et al. 2019).
 - **Upfront and ongoing finance needs:** In addition to upfront investments and long investment timelines, NbS often require ongoing maintenance financing (McQuaid et al. 2021); this can be challenging to meet through some financing instruments (such as public grants).
 - **Scale:** In addition, the relatively small scale of NbS projects (often requiring investments of less than €500,000) can be too small for large private investors (Mayor et al. 2021). While this may not be a barrier to smaller private investors, such as angel investors or crowdfunding, the high transaction costs relative to smaller investment scale can be prohibitive (UNEP, 2021).

3.1.2 Pondscape-specific financing challenges

We found no specific guides that focus on financing pondscales. However, as established in section 2.2, pondscales feature many of the same characteristics as other NbS, and we therefore expect pondscales to pose many of the same challenges as other NbS. Table 5 identifies how the NbS financing challenges identified in the previous section are also likely to apply to pondscales.²⁷

Table 5 Pondscape-specific financing challenges

NbS financing challenge	Pondscape relevance
Undervaluing of public goods	Many of the benefits of pondscales are ‘public goods,’ e.g. groundwater recharge, flood management, water quality improvement, habitat provision, conservation value.
Coordination challenges	Pondscales deliver multiple benefits that benefit multiple beneficiaries: e.g. recreation benefits, aesthetic benefits, habitat for pollinating insects, water source for irrigation/livestock, plus public goods.
Measurement issues	Pondscales are diverse and the benefits they deliver depend on local social and ecological context, making measurement challenging. The high number of non-market benefits of some ponds makes monetisation and valuation challenging.
Finance-specific challenges	Pondscape projects are often small in scale, posing challenges. The prevalence of public good-benefits, multiple benefits, measurement issues, and limited existing examples/experience will pose challenges to finance.

3.2 PONDERFUL Sustainable Finance Inventory

There are numerous options for financing NbS. We use the term financing instruments to describe the different possible models or approaches for transferring money from the

²⁷ These pondscape-specific challenges will be investigated throughout the PONDERFUL project through co-creation with the eight PONDERFUL demo pondscales (i.e. eight case studies across Europe, Turkey and Uruguay).

financing source to the pondscape developer.²⁸ Different instruments provide financing in different forms, come from different sources, impose different obligations, and have differing requirements for who and what types of projects can be recipients, as well as different timelines and levels of complexity.²⁹ This means that different financing instruments have different advantages and disadvantages for pondscape developers. Given the uniqueness of different pondscape NbS projects, there is no specific financing instrument that will be appropriate in all cases – instead, they must be considered on a case-by-case basis.

To support pondscape developers, we have developed an inventory of NbS financing instruments: the PONDERFUL Sustainable Finance Inventory. The Inventory consists of succinct, structured descriptions and examples of all potential NbS financing instruments, to enable pondscape developers to select the best option to pay for their pondscape.

In this section, we describe the development and structure of the Sustainable Finance Inventory, and how pondscape developers can use it. The chapter concludes with an introduction to the overarching categories and specific financing instruments.

3.2.1 PONDERFUL Sustainable Finance Inventory – Methodology

We carried out a desk-based literature review to identify different techniques or models appropriate for financing pondscape NbS. We focused on financing instruments that have previously been used or proposed to finance NbS, biodiversity, or environmental protection-related projects. The majority of references are sourced from grey literature, including European-funded research projects on Nature-based Solutions (e.g. Baroni et al. 2019, de Blas et al. 2017, Toxopeus & Polzin 2017), UN-affiliated publications (e.g. UN-Habitat 2016, UNDP 2018, UNDP 2020), and reports by or funded by global NGOs (e.g. Tobin-de la Puente & Mitchell 2021, Deutz et al. 2020, WWF 2020). Inspiration was also taken from adjacent sectors, including development finance (e.g. König et al. 2020).

We developed a financing instrument review template to gather information about each instrument in a consistent manner that allows for comparisons. The review template describes key characteristics of each financing instrument (see Table 6). The template aims to enable pondscape developers to understand the requirements and conditions of each instrument, so that they can consider whether it is a match for their pondscape NbS project.

The Inventory also includes examples of each financing instrument in use. These were also gathered using a consistent example template. The examples describe how the financing instrument works in a specific NbS example (see Table 7). Wherever possible, the examples focus on pondscape NbS within the EU. However, given the relatively limited literature specific to financing pondscales, many describe other types of NbS projects, while some draw from other sectors (e.g. development finance), and from global examples.

The Sustainable Finance Inventory has been used to support work with the PONDERFUL project DEMO-sites, as detailed in Annex C.

²⁸ The term “financing instrument” is used more narrowly by the financing literature: matching their narrower definition of “financing”, they commonly consider financing instruments to be linked to the provision of upfront financing (e.g. debt or equity finance), or derivatives of these (Investopedia 2022).

²⁹ Here, our definition of financing instrument is analogue to UNDP BIOFIN’s definition of a “financing solution” as “an integrated approach to solve a specific problem or challenge by the context-specific use of finance and economic instruments. It is built on a combination of elements that includes one or more finance instruments, financing sources, lead agents or intermediaries, beneficiaries or principal stakeholders, and the desired finance result” (UNDP, 2018).

Table 6 PONDERFUL Sustainable Finance Inventory – Financing instrument review template

Instrument name:				
Pondscape-specific definition: Definition of financing instrument and relevance for pondscape NbS.				
Category	Category of financing instrument			
Also-known-as	i.e. other names for the same instrument			
Related instruments	i.e. similar instruments			
Appropriate for: Who can use this type of financing instrument? ³⁰	Private ³¹ developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	i.e. from whom is the person getting the money from?			
Payment form: What form is the payment?	e.g. cash, land/assets, certificates, ...			
In return for what? What is the NbS project obliged to deliver in return?	e.g. Capital and interest payments, ecosystem service provision, products or services (other than ecosystem services), shares of ownership, ...			
Recipient requirements: What requirements must recipients meet to receive finance?	e.g. any conditions around recipient type, size, location etc.			
Project requirements: What requirements must the pondscape project meet?	e.g. any conditions around type of project, e.g. types of benefits, involvement of stakeholders, etc.			
Other requirements: What additional requirements are attached to the financing?	i.e. any other conditions			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Description of the timeline, and whether payments are one-off or ongoing.			
NbS type: What types of NbS is the financing for? ³²	Pondscape <u>creation</u>	Pondscape <u>restoration</u>	Pondscape <u>management</u>	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance? ³³	Simple	Medium	Complex	
Exist now in EU?	Yes		No	
References:	References			

³⁰ This categorisation aims to simply capture the main types of actors who implement pond(scape) NbS, grouping them in accordance with different types of financing instruments that are available to them. For example, public bodies can charge taxes and levies to raise funds for pond(scape) NbS projects, unavailable to other parties. As non-profits, NGOs and similar organisations (e.g. voluntary associations) have access to financing options that others are excluded from (e.g. some grants, donations). Private developers refer to any private companies or actors not covered by the other categories.

³¹ A traffic-light system is used to indicate the appropriateness of different recipients for the specific financing instrument.

³² See section 2.3 for discussion of different NbS types

³³ Based on expert judgement we assess the complexity of the application process. Simple: Straightforward application process that a non-expert could complete within a day (e.g. complete a grant application form); Medium: Requires some financing expertise, achievable by a committed pond developer or with a few hours' consultant support; Complex: Complicated financing instrument, requiring significant financing knowledge, expertise, and time, including professional support.

Table 7 PONDERFUL Sustainable Finance Taxonomy - Example template

Instrument:	
Example name:	
Example description: Description of NbS project and the use of the financing instrument	
NbS description	
Location	Location
NbS type	Creation Restoration Management
Ecosystem type	e.g. Pondscape or other e.g. green space, river restoration, forest etc.
NbS benefits	List the main type of benefits (e.g. adaptation, mitigation, biodiversity, cultural ...)
NbS description	Describe NbS in more detail
Scale (size)	Size of NbS project (i.e. in hectares)
NbS performance criteria	How was NbS performance measured? i.e. what quantitative/qualitative indicators were used
NbS performance	Description of NbS performance?
Financing description	
Source of financing	Who provided the funding?
Recipient	Select Private developer or NGOs/non-profits or Local/city/ regional govt. and agencies or National govt. and public agencies. Give name and description of recipient.
Scale (financing)	Monetary scale, giving a specific number if available, or likely category: (Small (<€10k) Medium (€10k-€99k) Large (€100k-€999k) Very large (€1million+))
Timeline	Description of the timeline, and whether payments are one-off or ongoing.
Financing requirements	Describe the conditions were on the finance, i.e. what the NbS project have to deliver in return for financing.
Financing performance³⁴	Report any quantitative measures of the performance of the financing (e.g. Return on investment (ROI), interest rates, default rates etc.)
Transaction costs	Report any costs of receiving or delivering the financing (for recipient or funder)
Reference	Include web link as well as references

3.2.2 PONDERFUL Sustainable Finance Inventory – Structure and use

Structure

The PONDERFUL Sustainable Finance Inventory can be found in Annex B. It consists of 24 financing instruments structured into eight main categories, as summarised and illustrated in Table 8.

³⁴ Note: we have found extremely limited information on financing performance

Table 8 PONDERFUL Sustainable Finance Inventory - Categories and instrument structure

Main category	Category definitions	Instruments
1. Income instruments	Instruments for raising revenue that can then be used to finance NbS. Some can be used by landowners (1.1, 1.4, and 1.5); others can only be levied by government-sanctioned associations (1.2 and 1.3) or governments (1.6).	1.1 User fees
		1.2 Business improvement districts
		1.3 Betterment levies
		1.4 Development rights and leases
		1.5 Sale of market goods
		1.6 Other revenue raising measures
2. Contracting approach (cost reduction/restructure)	Legal agreements that reduce or restructure the costs of financing NbS, either by providing assets or use of assets at below market rates (2.1) or by shifting financing of upfront costs in return for ongoing payments (2.2).	2.1 Community asset transfer
		2.2 Public private partnership
3. Voluntary contributions/donations	Voluntary payments made of own free-will, whether a direct beneficiary of the NbS (3.2) or simply to contribute (3.1, 3.3)	3.1 Philanthropic contributions
		3.2 Voluntary beneficiary contributions
		3.3 Crowdfunding
3. Debt instruments	Financing is raised by selling the 'rights' to ecosystem services generated by the NbS. This payment can be relatively informal (4.1) or through structured markets for climate mitigation (4.2), for offsetting damage to biodiversity elsewhere (4.3), or for reducing water pollutants (4.4).	3.1 Loans and green loans
		3.2 Bonds and green bonds
4. Tradable Rights/permits and payment for ecosystem services	Financing is raised by selling the 'rights' to ecosystem services generated by the NbS. This payment can be to offset damage to biodiversity elsewhere (4.1, 4.2), or for reducing water pollutants (4.3). Subsidies are a financial contribution from the government to a person, company or organisation to promote socially beneficial outcomes. They can be ongoing payments (or tax breaks) linked to outcome or production (5.1, 5.2)	4.1 Payment for ecosystem services
		4.2 Transfer-based instruments: voluntary carbon markets
		4.3 Transfer-based instruments: Biodiversity offsets and habitat banking
		4.4 Transfer-based instruments: Water quality trading systems
5. Subsidies	Direct contribution from government (local, national, or EU) to a recipient in return for undertaking a specific activity. Grants are generally one-off payments (though they may be paid in instalments), and often competitive (6.1). Transfer of capital in return for a promise to repay that capital over time, generally with interest. This can involve direct lending from a lender to a borrower (7.1) or be mediated through debt markets (7.2).	5.1 Environmental subsidies
		5.2 Tax concessions
6. Grants	Direct contribution from government (local, national, or EU) to a recipient in return for undertaking a specific activity. Grants are generally one-off payments (though they may be paid in instalments), and often competitive (6.1).	6.1 Grants
7. Debt instruments	Financing raised by selling an ownership share of the NbS, potentially with a claim to some of its profits. This can be motivated by a desire to have impact (8.1) or be purely commercial (8.2)	7.1 Loans and green loans
		7.2 Bonds and green bonds
8. Ownership models (equity finance)	Instruments for raising revenue that can then be used to finance NbS. Some can be used by landowners (1.1, 1.4, and 1.5); others can only be levied by government-sanctioned associations (1.2 and 1.3) or governments (1.6).	8.1 Impact investing
		8.2 Commercial investing

Using the Inventory

Pondscape NbS vary widely, with different objectives, socio- and ecological-contexts, benefits and costs. Accordingly, there is no one-size-fits-all financing approach. Pondscape NbS projects must evaluate their financing needs and assess the financing options open to them, given their own characteristics and that of their ponds(cape) project. See Annex C for how the Sustainable Finance Inventory is being used with DEMO-sites within the PONDERFUL project.

3.2.3 PONDERFUL Sustainable Finance Inventory – An introduction to categories and instruments

The full PONDERFUL Sustainable Finance Inventory is included in its current form in Annex B: PONDERFUL Sustainable Finance Inventory. In this section, we provide an introduction in the form of definitions for each financing instrument, organized by category. Full descriptions of each instrument are given in the Inventory, along with a detailed example.

1. Income instruments

Category	Income instruments			
<i>Instruments</i>	Instruments 1.1 User fees 1.2 Business improvement districts 1.3 Betterment levies 1.4 Development rights and leases 1.5 Sale of market goods 1.6 Other revenue raising measures		Examples 1.1.1 Altnabrocky River 1.2.1 Vauxhall Missing Link 1.3.1 Wimbledon and Putney Commons 1.4.1 SANPark concessions for tourism 1.5.1 Carp Ponds in Bavaria, Germany 1.6.1 UK Network Rail and 1.6.2 Port Townsend water utility fee	
<i>Appropriate for:</i>	Private developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
<i>In return for:</i>	Revenues raised are used to finance pondscapes			
<i>Scale:</i>	Small (<€10k) - Very large (€1million+)			
<i>Complexity:</i>	High			

This category includes instruments for raising income that can then be used in different ways to finance NbS/Pondscapes. This broad category of instruments features different ways of raising revenue that can be used to pay for pondscape creation, restoration, or management. These instruments can be differentiated in terms of who applies them. Some can be used by landowners (1.1, 1.4 and 1.5); others can only be levied by government-sanctioned associations (1.2) or governments (1.3, 1.4); but the ultimate beneficiary of its application is the pond developer.

Landowners pond developers can directly raise income to pay for pondscapes through (1.1) User fees, (1.4) Development rights and leases, (1.5) Sale of market goods and (1.6) Other revenue raising measures. User fees (1.1) are a compulsory or voluntary entrance fee, usage fee (e.g. guided tours), and/or associated fees (e.g. parking) for accessing ponds or pondscape sites, generally for tourism and recreation. User fees can be for one-off visits or include annual permits (e.g. for fishing). Alternatively, development rights and leases (1.4) can be applied by pond developers to raise finance by selling or leasing the right to commercial development (e.g. restaurants, shops, etc.) within or nearby the pondscape; leasers benefit directly from the NbS (or from people visiting the NbS). Finally, pond developers could directly sell market goods (1.5) produced in the pond or surrounding pondscape, such as wood or fish. Care must be taken to ensure that the production and extraction of market goods does not negatively impact the NbS, e.g. due to planting of non-

native species or over-extraction. Other instruments (1.6) at the disposal of pond developers include the selling or lease of unrelated land or facilities that they own, with the proceeds used to pay for NbS.

Income instruments for pondscape development can also be promoted by other actors, such as non-governmental initiatives: business improvement districts (1.2) consist of a set of stakeholders (business, citizens, organisations) who enter an agreement with local government to contribute an additional levy to finance improvements in a specific geographic area. The business improvement district then establishes an independent management structure and manages the spending of the levy to achieve its pre-agreed goals. The business improvement district must be voted on and approved by the affected businesses (or landowners) in the areas. Once approved, the levy is binding on all landowners in the area. Business improvement districts are time-limited (e.g. in the UK to a maximum of five years). Funded improvements can include implementation of NbS and thus, be used by pond developers to seek further finance.

Local governments have additional income instruments at their disposal to stimulate the implementation of NbS, one example of such instruments is the introduction of betterment levies (1.3) in the form of a compulsory tax or fee on land that has gained in value due to the development of public infrastructure (including NbS such as ponds), paid by landowners. In addition, local governments can deploy other instruments (1.6), such general taxation or other types of levies or fees (such as water pollution taxes) can be applied. These provide dual benefits of incentivizing a reduction in environmentally harmful activities and raising revenue for e.g. NbS. Revenue raised from these measures should be explicitly earmarked to be spent to achieve specific environmental objectives (e.g. realise pond projects).

2. Contracting approach

Category	Contracting approach			
Instruments	Instruments 2.1 Community asset transfer 2.2 Public-private partnership		Examples 2.1.1 Chapman's Pond Community Company 2.2.1 Valley State Parks Camping Concession	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
In return for:	Transfer of assets or commitment to long-term payments from government to private actors.			
Scale:	Small (<€10k) – Very large (€1million+)			
Complexity:	High			

Contracting approaches can be used by governments and public agencies to engage private actors in the provision of services normally provided by the government (such as nature-based solutions). Contracting approaches are often motivated by insufficient public funds, with the belief contracting approaches can decrease (upfront) costs, transfer risk, and even improve service delivery by shifting responsibility from public to private actors (IBRD & World Bank 2017). Contracting approaches typically involve long-term contractual agreements featuring a public commitment to transfer assets to or to pay long-term fees for services in return for private actors delivering services (often in the form of management, restoration, or creation of infrastructure, which could include green infrastructure such as nature-based solutions).

Contracting approaches take many forms. Most relevant for financing pondscape NbS are:

2.1 Community asset transfer Local or national governments can transfer community organisations the ownership or management of public assets (e.g. land) at less than market value (low or no cost) (Locality 2018). The government can require that in return the

community group manages the assets in line with some restrictions or objectives. By doing so, they can transfer the costs of managing that land (and delivering societal objectives, such as implementing and managing pondsapes) to community groups.

2.2 Public-private partnership (PPP) A Public-private partnership (PPP) is a long-term contract between a government entity and a private entity for providing a publicly beneficial service or asset, where the private party bears some risk and responsibility (Merk et al. 2012). PPPs can be attractive for governments as they can transfer upfront costs to private partners, take advantage of external expertise, and open new financing options. However, they can require costly ongoing payments to the private party. PPPs can take many different forms, including concessions (where private entities receive their income according to use of the service/asset, either through tolls or through “shadow tolls” paid by government) or private finance initiatives (where private entities receive public payment for meeting their performance targets).

3. Voluntary contributions

Category	Voluntary Contributions			
Instruments	Instruments 3.1 Philanthropic contributions 3.2 Voluntary Beneficiary Contributions 3.3 Crowdfunding		Examples 3.1.1 The Living Danube Partnership 3.2.1 Wild Haweswater - contribution 3.3.1 Treflach Wetland UK – crowdfunding	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
In return for:	The perception that the contribution enables environmental or societal benefits.			
Scale:	Small (<€10k) - Medium (€10k-€99k)			
Complexity:	Low			

Voluntary contributions by private actors can provide an alternative source to private financing, generating revenues, or public grants. Voluntary contributions can come from a diverse set of sympathetic private actors who provide funding on a voluntary basis without explicitly expecting any goods or services in return. In particular, smaller projects can benefit from voluntary contributions, as they might have difficulties accessing public funding, which can come with greater complexity, or generating any revenues with their project. Medium-large projects may still be attracted to voluntary contributions, as private voluntary contributions might be subject to fewer (or no) conditions, less review processes, and can be less risk-averse than public grants. However, relying on voluntary contributions can be highly uncertain, risky, and competitive.

Depending on the actor, the motivation to provide a voluntary contribution might vary (including public recognition, a sense of civic responsibility, tax rebates, etc.). Typically, however, contributions expect a non-market output and are incentivised by the perception or the narrative of a greater environmental or societal value that would be unlikely without the contribution. Three general types of voluntary contributions are relevant for pondscape NbS:

3.1 Philanthropic contributions might come from private individuals, companies, or other private- or civil society organizations, such as foundations or NGOs (Baroni et al. 2019). Contributions most commonly take the form of cash, although in-kind contributions are also possible, where donors contribute resources such as expertise, or machinery at reduced rates or without charge. Philanthropic contributions can be motivated by a positive visibility for the donor (e.g. by being publicly associated with a sense of social responsibility), but also by tax rebates that apply to contributions towards registered charitable organizations. The donation should be attractive to the donor, for example by delivering outcomes that are socially beneficial or personally important to the donor. It is possible that the recipient faces few other conditions or requirements for a philanthropic contribution.

3.2 Crowdfunding means to raise funds for a pond or pondscape of local public interest through one-off or repeated donations of small amounts from a large number of individuals. Crowdfunding is generally facilitated through online platforms (e.g. Kickstarter) (Baroni et al. 2019). In addition to donation-based crowdfunding, crowdfunding can be based on equity models or loans. Crowdfunding is often based on an all-or-nothing model: if the funding target is reached, the NBS developer gets the money, if not, then it goes back to the donors.

3.3 Voluntary Beneficiary Contributions are negotiated, voluntary payments from beneficiaries (i.e. private companies or individuals who would receive a benefit from the development of the pond) to help cover NBS costs. Generally, these are for benefits that are localised and non-market, or for those that accrue indirectly through e.g. property value increases (Baroni et al. 2019; EY 2016). Payments are donations and can be one-off or ongoing. This is a less formal but closely related approach to the instruments Payment for ecosystem services and Business improvement districts.

4. Tradable rights/permits and payments for ecosystem services

Category	Tradable rights/permits and payments for ecosystem services			
Instruments	Instruments		Examples	
	4.1 Payment for Ecosystem Services 4.2 Voluntary carbon markets 4.3 Biodiversity offsets and habitat banking 4.4 Water quality trading systems		4.1.1 Vittel (Nestlé Waters) PES 4.2.1 MoorFutures 4.3.1 Eco-Accounts biodiversity offset 4.3.2 Great Crested Newts 'District Licensing' 4.4.1 Pennsylvania nutrient credit trading	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
In return for:	Ecosystem service provision and the "right" to those ecosystem-services			
Scale:	Small (<€10k) - Large (€100k-€999k)			
Complexity:	High			

One of the limitations to access financing for NbS is that often markets are not available or simply do not exist for many of the services that may be provided (such as climate change mitigation or biodiversity enhancement). Tradable rights/permits and payments for ecosystem services create an economic value for services provided through the creation of hypothetical markets. The service can then be exchanged by service providers (e.g. pondscape landowner/manager) and beneficiaries under certain rules and conditions, giving a sense of its economic value and therefore, allowing for the possibility of generating a source of income to the service provider from the NbS.

Under this category of financing instruments, pondscape NbS developers are compensated for the ecosystem services that their NbS provide to a service user. These ecosystem services include, for example, water quality improvements, carbon sequestration, air purification, or cultural or spiritual values, among others. These can take many related (and somewhat overlapping forms).

4.1 Payment for ecosystem services (PES) PES are voluntary transactions where a user (e.g. a beneficiary) pays a provider of ecosystem services (e.g. a pondscape landowner or manager) for managing a natural resource (e.g. the pondscape) so that it delivers offsite services (Wunder 2014). Offsite services can be understood as ecosystem services, such as water quality improvements, pollination, cultural or spiritual values, among others. Payments can be input-based (e.g. based on the costs of managing a pondscape) or result-based, i.e. depending on the achieved level of ecosystem service provision (Illes et al., 2017). Payment for ecosystem services can take many different forms, including bilateral agreements between a singular beneficiary and singular provider; collective action PES, where an institution combines resources from multiple beneficiaries (private parties, NGOs,

government bodies) to pay landowners for management actions that deliver ecosystem services. This category does not include paying for goods (e.g. water quantity provision) (these are covered under factsheet 1.5 *Sale of market goods*).

Payments for ecosystem services can also be structured through transfer-based instruments, where a pondscape landowner/manager provides a verified level of an ecosystem service (e.g., carbon sequestration) in return for tradeable certificates, which they can then sell to buyers either bilaterally or through a market specifically created for that purpose. To earn certificates, landowner/managers generally must meet certain prerequisites, such as implementing specific methodologies with strict monitoring, reporting, and verification guidelines, alongside other rules. Markets can be voluntary markets (where buyers voluntarily purchase certificates) or compliance markets (where buyers are obligated to purchase certificates to meet regulatory requirements). Examples of transfer-based instruments potentially relevant for pondscape NbS include:³⁵

4.2 Transfer-based instruments: Voluntary carbon markets, which occur where landowners/managers (or other actors) voluntarily generate carbon credits by implementing a specific action and methodology to mitigate climate change, e.g. by reducing emissions or sequestering carbon through e.g. tree planting, where each carbon credit is equivalent to a tonne of carbon dioxide mitigation (Climate Focus 2021). They then sell these certificates to buyers in the voluntary market, who use these to “offset” their own emissions (TSVCM 2021). Voluntary carbon markets generally establish specific methodologies, which landowners/managers must implement to calculate and earn offset credits (Climate Focus, 2021).

4.3 Transfer-based instruments: biodiversity offsets and habitat banking: Biodiversity offsets are a transfer-based funding system where the person implementing the NbS is paid for providing a measurable ecological gain (i.e., biodiversity improvement) by an external party who are offsetting an ecological loss that occurs on a different site (DEFRA, 2013). Biodiversity offsets are commonly motivated by regulations requiring new developments (e.g., new factory or housing construction) to achieve No Net Loss³⁶ of biodiversity (*Ibid.*). To achieve no net loss, developers then pay others to deliver biodiversity improvements in other areas. Biodiversity offsets can be voluntary (e.g. to achieve corporate social responsibility objectives) but are most often a form of compliance market, with different degrees of government intervention (Koh, Hahn & Boonstra, 2019). Habitat banking is a type of market-based instrument where landowners or managers manage land for conservation in line with streamlined guidelines in return for payment in the form of biodiversity offset credits, which are paid to them by an intermediary (who “banks” the biodiversity offsets) (ICF GHK 2013). The resulting credits can then be sold as biodiversity offsets to buyers required to compensate for ecological damage (as long as the habitat banking biodiversity gains are considered ecologically equivalent). By centralising and streamlining the process, the intermediary aims to lower the cost of generating biodiversity credits (relative to biodiversity offsets) by establishing robust, consistent methods for developing and verifying conservation actions and results and through economies of scale (ICF GHK 2013). Habitat banks are distinct from other biodiversity offsets as the credits are produced before and without links to the biodiversity debits that they will later compensate for and can be stored over time (eftec et al. 2010).

4.4 Market-based instruments: Water quality trading systems are a mandatory transfer-based instrument where a government sets a limit on the total amount of pollution that is allowed to be produced and, to meet this limit, polluters must reduce their own pollution

³⁵ Many other examples of market-based instruments exist; here we focus on those potentially most appropriate for financing pondscape NbS.

³⁶ No Net Loss implies that any negative impacts that human development has on biodiversity must be balanced by at least equivalent biodiversity gains elsewhere. No Net Loss is often implemented through the mitigation hierarchy, which calls for development to avoid, minimize, and restore any biodiversity damage on site, with any remaining damage required to be offset elsewhere.

and/or meet this limit by paying others to reduce their pollution (by purchasing allowances or certificates that allow them to emit a certain amount of pollution) (Faeth 2000). NbS landowners/managers can receive allowances for mitigating pollution, which they can then sell to polluters who can use these allowances to meet the cap. These payments can be based on inputs (e.g. implementation of specific measure, such as building a pond) or on results (e.g. estimated impact of pond management on water quality). Common pollutants targeted include phosphorus or nitrogen, but other examples include temperature, salinity, and temperature (Salzman et al. 2018). In return, landowners/managers receive nutrient trading credits, which can be sold to buyers who are regulatorily obliged to offset their existing or wish to increase their own discharge of pollutants (e.g. sewerage plants or other regulated entities).

5. Subsidies

Category	Subsidies			
Instruments	Instruments 5.1 Environmental subsidies 5.2 Tax concessions		Examples 5.1.1 Ecofarm Petra Marada – CAP subsidies 5.2.1 Western Australia Conservation Covenant	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
In return for:	Implementation of socially beneficial activities/ delivery of socially beneficial outputs.			
Scale:	Small (<€10k) – Medium (€10k-€99k)			
Complexity:	Simple-medium			

Subsidies provide economic incentives (for example through direct payments or reduced tax obligations) for the promotion of public benefits; they can be applied to NbS that deliver e.g. climate change mitigation or adaptation (Tozer and Xie, 2020). NbS financing is still very much dependent on public funds. For example, in the USA, public funds represent 86% of total NbS investment flows (McQuaid et al, 2021). In Europe, it has been estimated that over the period 2007-2013, around EUR 6.6 billion were invested in green infrastructure, with the highest contribution in the form of subsidies and grants from the European Agricultural Fund for Rural Development (Trinomics, 2016).

An **environmental subsidy (5.1)** is a financial contribution from the government to a person, company or organisation to support activities which protect the environment or reduce the use and extraction of natural resources. Ultimately, governments may make use of subsidies as a policy instrument to generate the right incentives for lowering the cost of providing a service or good (or reducing the use/extraction of natural resources). Subsidies should be targeted to increase incentives for goods/services that have public benefits but that are otherwise underproduced, such as many of the benefits provided by NbS. Subsidies generally cover a proportion of costs and can be either related to the production of an NbS (i.e. recipient is rewarded/compensated for a particular production approach or element) or the output (i.e. the NbS, where the level of subsidy depends on how many NbS are produced).

Public subsidies can take many forms, including direct payments, tax concessions, one-off grants (see 6.1 *Grants*), or low-cost loans (see 7.1 *Green loans* and 7.2 *Green bonds*). Under this heading, we focus on direct payments in return for activities/outputs that protect/restore the environment, such as, Common Agricultural Policy direct payments to farmers who implement green practices (e.g. set-aside agricultural land as wildlife corridors or the establishment of buffer strips in farmed riparian areas).

Tax concessions (5.2) aim to incentivise the provision of particular goods or services or use of particular production processes by rewarding recipients in the form of reduced tax obligations; they are an indirect transfer from governments to private organisations or

individuals who are the recipients. The production processes or goods/services should be socially beneficial, such as ecosystem service provision or environmentally friendly production processes (such as NBS implementation). Tax concessions can take different forms: complete exemption, partial exemption (i.e. reduce the tax rate payable), or only taxing a portion of the otherwise taxable assets/income/revenue (i.e. excluding some of the tax base). Tax concessions can be used to incentivise environmentally beneficial actions, such as implementing nature-based solutions, as they reduce recipient costs in an equivalent manner to a subsidy payment.

6. Public grants

Category	Public grants			
Instruments	6.1 Public grants		6.1.1 Hunte-Leda-Moorniederung	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
In return for:	No repayment required. Recipients required to implement a specific activity (such as pondscape implementation).			
Scale:	Small (<€10k) – Very large (€1million+)			
Complexity:	Simple-medium			

In 2022, the public sector remains by far the most significant funder of nature-based solutions, and grants consist of a large proportion of public NbS funding (Tobin-de la Puente & Mitchell, 2021). Public grants are a direct financial contribution from the government (local, national, or EU) to a recipient in return for undertaking a specific activity. The key characteristic of grants is that they do not need to be repaid. Grants are generally one-off payments (though they may be paid in instalments) (Baroni et al. 2019).

Public grants are commonly used to support activities aligned with government objectives that would not otherwise occur (e.g. due to a lack of market incentives, i.e. private benefits are zero or negative) (Tobin-de la Puente & Mitchell 2022), such as implementing NBS. In this way, grants are closely related to subsidies. The key difference is that grants are payments for a specific activity, while subsidies are payments made by the government to lower the costs of purchases or production (and can take the form of direct contributions, tax breaks, tax concessions, among other forms) (Circular City Funding Guide 2022). Another key difference is that all recipients are generally entitled to subsidies upon meeting certain conditions, while grants are often restricted to few recipients, who are often selected through competitive application processes. Grants are also closely related to voluntary contributions, with the difference that funding comes from public rather than private sources.

There are numerous different grant programmes applicable for NbS, operating at different levels of government, and with different objectives. Given the different contexts and aims of these varied grant programmes, different grants have different requirements or target different types of outcomes, with correspondingly different levels of application complexity and appropriateness for different pondscape NbS projects. Grants commonly involve an application process that may be competitive. They may also have co-financing requirements, i.e. the grant will cover some set proportion e.g. 50-85% of project cost.

EU examples of grant programmes relevant to pondscape NbS include research grants such as Horizon Europe, grants for climate and environment projects under the LIFE programme, and large-scale infrastructure grants such as European Structural and Investment Funds. Sector-specific funding programmes, such as the Common Agriculture Policy, can also offer pond-relevant grant funding. National and regional governments are also likely to have grant programmes to support public-good measures, for which pondscape NbS may be applicable.

7. Debt instruments

Category	Debt Instruments			
Instruments	Instruments 7.1 Loans 7.2 Bonds		Examples 7.1.1 Linnunsuo – Rewilding Europe Capital loan 7.1.2 CWS Revolving Fund - Winona Wetlands 7.2.1 DC Water Environmental Impact Bond 7.2.2 The Conservation Fund’s Green Bond	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
In return for:	The promise to repay the debt as well as interest			
Scale:	Small (>€10k) – very large (>€1million)			
Complexity:	Medium - High			

The implementation of an NBS project requires money to cover capital- and operational expenses. While some project developers might possess sufficient resources (e.g. in the form of savings or upfront public grants), others might face an interim shortage of available capital or prefer to sustain a certain level of liquidity by not spending larger portions of their cash right at the project launch. Debt instruments allow pondscape developers to increase the spending power of the project by borrowing upfront cash against an expectation of future revenues.

Debt instruments are based on a contract between one or more lenders and a debtor. The lender provides upfront capital (i.e. cash) to the debtor, who promises to pay back the loaned amount (referred to as the principal) over a set period of time or after a certain time has passed. Because the money has to be paid back, it is not counted as income but instead as a debt obligation (or a liability). Lenders commonly charge interest on the capital (i.e. a price for their service). The interest rate depends on the project (including size and riskiness) and on external factors (e.g. money markets and central bank policy making).

Debt instruments are, therefore, suitable for projects that require upfront cash (e.g. for capital expenses), while expecting reliable and sufficient revenues to pay back the principal and the respective interest. It is likely that most debt-financed projects generate revenues through their own project activities and their outcomes, such as the commercial sale of market goods and services or by receiving payments for ecosystem services. However, projects may also rely on external funds to fulfil their obligations (e.g. the sale of assets held by the project owner, income from activities outside the project, previous windfall revenues, etc.).

Different types of actors loan money, including private individuals, public institutions, commercial banks, financing companies (e.g. impact investors), but also civil society organizations (e.g. foundations or NGOs) or any private commercial company. Different lenders have different objectives, - including profit making, wealth preservation, or facilitating action for the greater societal good – and accordingly will have different requirements attached to lending. Generally, though, lenders require a certain degree of predictability that the debt will be repaid as expected. For this, lenders might assess the risk of bankruptcy, the compliance of the project with laws and regulations, the performances of similar projects, the soundness of the project management plan, or the likelihood that the project cash flow will be sufficient to meet debt obligations, among other things. The Inventory describes two general types of debt instruments, both potentially relevant for pondscape NbS:

7.1 Loans: Loans are an instrument for raising finance from a private or public provider (commonly a bank), where the borrower receives a sum of money (the principal) from the lender in return for a promise to repay it in the future, as well as interest. The debtor then

repays the principal and the interest over time, often in regular instalments. Depending on the purpose, the size of loans can vary greatly, ranging from just a few thousand to several million Euros. Green loans are loans where the finance is used exclusively to finance “green” projects, i.e. those that generate an environmental benefit. Lenders for green loans are commonly public banks (such as the European Investment Bank or KfW) though private banks and others can also offer green loans. What qualifies as “green” may differ depending on the lender. A commonly used reference is the Green Loan Principles (LMA, APLMA & LSTA 2021). Green loans are generally smaller and less complex than green bonds.

7.2 Bonds: Bonds are an instrument for raising finance for large entities (e.g. governments, corporates) through the debt capital market. It is effectively a loan from multiple parties. By issuing bonds, the bond issuer (the debtor) receives a fixed amount of funding (the principal) from multiple investors (creditors). In return, the debtor must repay the creditors the money they received (the principal) upon full maturity of the bond (i.e. after a certain time has passed). Additionally, the debtor pays a yearly interest to the creditor (called “coupons”). Bonds are tradeable, and are sold and bought at varying prices, depending on their supply and demand on bond markets. This means that a creditor can sell his rights of receiving yearly coupon payments and of receiving the full principal upon maturity. Government bonds are generally long-term debts at low interest rates and with a low associated risk of debt failure as governments are not expected to default. Corporate bonds have higher interest rates, which depend on the reputation of the corporate entity. Bonds have higher transaction costs compared to loans, associated with the higher level of complexity and requirements (e.g. credit rating by a credit rating agency). As such, bonds are less accessible to smaller NBS projects. Green bonds are bonds where the principal is used exclusively to finance or re-finance “green” projects i.e. those that generate an environmental benefit. What qualifies as a “green” project has commonly been defined by alignment with the voluntary Green Bond Principles (ICMA, 2021), though the EU Commission has proposed its own voluntary EU Green Bond Standard (Regulation (EU) 0191/2021). There are numerous sub-categories of green bonds including standard green use of proceeds bonds, green revenue bonds, green project bonds, and green securitized bonds, among others. Each has different specific structures and requirements.

8. Equity investment

Category	Equity investment			
Instruments	Instruments 8.1 Impact investing 8.2 Commercial investing		Examples 8.1.1 Sumatra Merang Peatland Restoration Project 8.2.1 Mill Creek Mitigation Bank	
Appropriate for:	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
In return for:	An ownership share of the project and its revenues			
Scale:	large (?) – very large (>€1million)			
Complexity:	High			

Equity is the ownership of assets. Equity finance consists of an investor providing money to a business or project in return for an ownership share. In other words buying a part of the business and taking part in its profits, losses, and sometimes also its management. Equity investors are predominantly motivated by financial returns, which they anticipate either in the form of dividends (i.e. a share of the yearly profits) and/or by re-selling their equity share in the future for a profit (called capital gains) (Banton et.al 2022; Blackrock 2022).

Accordingly, equity investors are principally interested in businesses that convincingly demonstrate a high probability of economic success. Equity financing is therefore most appropriate and realistic for pondscape NbS that can demonstrate that they are so-called “bankable projects”- in other words a profitable investment opportunity with relatively low risk. The WWF (2020) defines bankable NbS as projects that “[c]reate positive environmental

returns leading to positive biodiversity impacts or climate mitigation and/or adaptation” while satisfying the following criteria:

- Cash flow generating activities: Cash flow (movement of cash in and out of an enterprise) is an indicator of short to medium term financial liquidity, which is critical to cover day-to-day expenses, e.g. salaries, rent, and loan repayments (Hayes et.al 2022).
- Sufficient collateral: Collateral are assets that can be seized to compensate a lender, should the project or business fail to fulfil its financial obligation to repay a loan (ECB 2016).
- A high probability of success: Investors are more likely to invest in enterprises they believe will achieve objectives (and realise expected profits). Indicators of likely success include that the enterprise is well-positioned relative to external factors (such as policy developments and market developments; has a clear proof of concept that demonstrates the project is feasible; and that the enterprise and management team have a proven track record, among other criteria.
- A clear exit strategy: Investors prefer the flexibility to sell their equity share when they consider it strategic to do so, e.g. to make capital gains or to exit a poorly performing project with some of the investment, or ahead of newly arising risks (Hayes & Scott 2020).
- An acceptable risk-adjusted rate of return: The risk-adjusted rate of return is the expected rate of return, in other words the investment’s profitability, in relation to the risk associated to the investment. Investors are less interested in projects with low returns or high risk (Chen et.al 2021).

While the above characteristics are essential for all equity investors, different investors have different preferences. The Inventory describes two general types of equity investments, both potentially relevant for pondscape NbS:

8.1 Impact investors Impact investors prefer to invest in projects and businesses that maximise social or environmental benefits, while accepting lower profits or higher risks. These may include so-called angel investors, wealthy private individuals who support projects for which any near-time success or profitability is highly uncertain (e.g. during the initial phases of start-ups). Angel investors only invest amounts that they can tolerate to lose and their primary motivation is to allow interesting ideas to develop further (Cennamo 2022; Ganti et.al 2022). Other non-commercial actors such as foundations can also act as impact investors. Profit-focused investors, such as venture capitalists or investment funds, can be impact investors but are more likely to be commercial investors (see 8.2 Commercial investors). For pondscape developers, accepting impact investment requires giving up some ownership of the project, independence, and some claim on future revenues or profits. In addition to the money gained, NbS projects may also benefit from the involvement of the impact investors, who may have additional skills or contacts.

8.2 Commercial investors: Commercial investors would treat NbS projects like any other investment, requiring convincing evidence that the NbS will deliver profits at acceptable risks. The minimum investment size can be high, meaning this type of financing is most appropriate for large or consolidated projects. Commercial investors include venture capitalists (i.e. professional investment companies focused on capital growth) and institutional investors (i.e. large companies such as banks, insurers or pension funds, who invest the money of their clients, members, or shareholders, to conserve and grow their wealth) (Hayes et.al 2022). For pondscape developers, accepting commercial equity investment will require giving up some ownership of the project, and some claim on future revenues or profits. It may also be associated with high degree of business and legal formality (such as audits).

4 Discussion

As NbS, Pondscapes can address multiple societal challenges, especially the need for climate resilience and biodiversity enhancement. Accordingly, they can generate significant environmental and social benefits. However, the widespread implementation of ponds as NbS poses a financing and funding challenge. To support pondscape developers to understand financing options, in this report we present the PONDERFUL Sustainable Finance Inventory, identifying and reviewing 24 instruments that can be used to pay for ponds. These instruments have different strengths and weaknesses, making them appropriate for different types of NbS ponds(cape) projects, as illustrated by the 26 examples of their implementation. In this discussion section, we reflect on key issues for NbS financing that we have identified developing the Inventory and through working with the Inventory with stakeholders and pondscape developers in the PONDERFUL project's DEMO-sites.

The optimal financing instrument(s) for a pondscape NbS project will depend on the specific context and objectives of the project. The Sustainable Finance Inventory consists of eight categories, comprising 24 financing instruments. Financing instruments can be differentiated along many different axes. Differences include the size and speed of financing, source of financing, the form of financing, what pondscape project developers must provide in return for financing, and information requirements that projects or financing recipients must meet to be eligible for finance. These differences make financing instruments more or less appropriate to different types of pondscape NbS projects. Nevertheless, the main differentiating factors as criteria for their selection are the amount of financing required and the complexity of the financing instrument (i.e. in terms of administrative requirements, financial sophistication): equity-financing options, for example, are less appropriate for developers of small pondscape NbS projects that lack financial expertise. Alternatively, some financing instruments are only available to public developers, who have the right to levy taxes or carry out community asset transfers. Different financing instruments will also be better suited to specific project types (pondscape creation, restoration, or management) and project stages (e.g. establishment or ongoing maintenance). Pondscape NbS developers must consider their financing objectives and project context to identify the most appropriate financing instruments for their project.

Pondscapes, like other NbS, pose significant challenges for financing. Pondscapes are diverse, with their benefits and costs highly dependent on local context and their specific design. Like other NbS, many of the benefits generated by pondscapes are public goods, such as biodiversity enhancement, groundwater recharge, and water quality improvement. Even where ponds generate mixed or private benefits, these can often be difficult to quantify or monetise, e.g. supporting pollinators, water storage or flood risk management, local climate adaptation, or recreational benefits. These benefits are scattered across many different actors, meaning coordination may be necessary to develop a convincing business case for pondscape NbS investment, posing an additional challenge. Financiers appear to lack expertise and experience with the particularities of financing NbS.

Given the predominance of public goods and services provided by pondscapes, their financing is reliant on generating payments for public goods. Tradable rights/permits and payments for ecosystem services generate revenues for those delivering the environmental services. The Inventory and examples show that these instruments require not just the creation of a market for public environmental goods (such as climate mitigation or biodiversity enhancement), but also a degree of pressure for buyers – whether through government regulation (e.g. biodiversity offset requirements) or public pressure and expectation (e.g. voluntary carbon markets). Alternatives to these tradeable market approaches include public grants and subsidies, which similarly reward private actors for implementing NbS, in recognition of the public goods that they generate, compensating them for the positive externalities.³⁷ An example is provided by the UK Water Friendly Farming

³⁷ The Inventory also identified a number of innovative approaches to raising public funds for biodiversity, such as betterment levies. However, these are only available to public pond developers (e.g. regional councils).

demosite: stakeholders pointed to recent successes with biodiversity offset requirements as a model for future pondscape development in the demosite. In the UK, the creation of district licensing schemes to simplify the process of offsetting negative biodiversity impacts of development on an endangered newt species was generating considerable funding for pond creation and restoration. The district licensing requirements (and other biodiversity offset schemes) create a private financial value for the previously public biodiversity benefits, unlocking the increased implementation of ponds as NbS.

Our research found that there is only limited experience with financing NbS, and pondscape NbS in particular. The paucity of pondscape NbS financing examples is illustrated by the examples we gathered for each financing instrument. Our objective was to find pond-specific examples for each financing instrument, but we were only able to identify pond-related examples for nine out of the 26 financing instrument examples we gathered and documented in the annexes of this report; a further nine were fresh-water related. For other financing instrument examples we had to draw on other NbS types. Additionally, the examples that we found infrequently reported important financing information. For example, they often lacked quantitative measures of the impacts of the NbS (e.g. quantitative reporting on ecosystem services or nature's contributions to people). They also all lacked key financial data, e.g. on rates of return, interest rates, and often size of investment. This is indicative of a lack of transparency related to financing, and the challenges of monitoring, reporting, and verifying nature-based solution impacts. Our experience is matched by relatively small literature on financing NbS and financing pondscales in particular. A potential cause is that the majority of European NbS literature focuses on cities, which fails to capture the diverse landscapes and settings where pondscape NbS can be established. While there are similarities between different types of NbS (and the financing opportunities and challenges they face), this lack of pond-specific financing examples makes our Inventory less pond-specific than initially intended. There are some exceptions to this tendency; for example, the example 4.3.2 'District Licensing' for Great Crested Newts is a clear example of a novel financing instrument that has been developed explicitly for pondscape NbS.

A key difference between the types of financing instruments is whether they provide income to the NbS project, either in the form of revenue or public funding. Income refers to money received by the pondscape NbS project in return for providing goods or services. In the pondscape context, the key sources of income are revenue gained from selling goods or services, or from public funding (or to a lesser degree philanthropic donations). These categories are distinct from debt and equity finance instruments, which require the repayment of loans or a share of ownership. Debt/equity finance will generally only be provided if the NbS project can demonstrate sufficient current and/or future funding or revenue streams to ensure that the financing can be repaid or rewarded. Table 9 categorises financing instruments according to whether they mobilise revenue, funding, or debt/equity finance.³⁸ To upscale pondscape NbS through private capital, pondscales must generate income. At a minimum, pondscales should be able to earn income, including through grants and donations, equivalent to their financial costs. Here, it is important that this covers not just upfront establishment costs, but also ongoing pondscape management costs to ensure the long term financial sustainability of the site.

If we want to "unlock" private financing of NbS such as pondscales, as called for by e.g. UNEP (2022), then NbS must be profitable. That is, their expected income must exceed expected costs. Pond developers have some ability to limit costs through their management of the project, as well as feasibly through contractual approaches. Income can principally be

³⁸ We also identify cost avoidance and reduction as a separate category, where asset owners can avoid upfront costs or reduce (upfront) costs, transfer risk, and even improve service delivery by shifting responsibility from public to private actors

increased through revenue or grants.³⁹ For private pond developers, this will likely require increase revenue, pond developers must increase the sale of goods and services, e.g. by selling transfer-based instruments for environmental goods and payments for ecosystem services, applying for more (public) funding, or charging specific fees. Given that pondscape NbS generate primarily public goods with dispersed beneficiaries, with relatively few private market earning options, this means policy makers have relatively few options to support pondscape upscaling: they can either increase public funding (e.g. grants) or they can support, through regulatory conditions, the development of markets for pondscape products, including for example biodiversity offset markets, or a combination of these options. Public pond developers have more options open to them, including betterment levies and contracting approaches, alongside revenue generation. Overall, a key conclusion is that private debt/equity finance is secondary to income generation: debt/equity finance is only likely to arise if NbS are or are expected to become sufficiently profitable to ensure returns for financiers (whether in the form of dividends, growth, or interest).

Table 9 Revenue, funding, and finance instruments: categorisation

Main category	Instruments	Categorisation
1. Income instruments	1.1 User fees	Revenue
	1.2 Business improvement districts	Funding: private
	1.3 Betterment levies	Funding: public
	1.4 Development rights and leases	Revenue
	1.5 Sale of market goods	Revenue
	1.6 Other revenue raising measures	Revenue/funding
2. Contracting approach	2.1 Community asset transfer	Cost avoidance/reduction ⁴⁰
	2.2 Public private partnership	Cost avoidance/reduction
3. Voluntary contributions/donations	3.1 Philanthropic contributions	Funding: private
	3.2 Voluntary beneficiary contributions	Funding: private
	3.3 Crowdfunding	Funding: private
4. Tradable rights/permits and payment for ecosystem services	4.1 Payment for ecosystem services	Revenue
	4.2 Transfer-based instruments: voluntary carbon markets	Revenue
	4.3 Transfer-based instruments: Biodiversity offsets and habitat banking	Revenue
	4.4 Transfer-based instruments: Water quality trading systems	Revenue
5. Subsidies	5.1 Environmental subsidies	Funding: public
	5.2 Tax concessions	Funding: public
6. Grants	6.1 Grants	Funding: public
7. Debt instruments	7.1 Loans and green loans	Debt/equity finance
	7.2 Bonds and green bonds	Debt/equity finance
8. Equity finance	8.1 Impact investing	Debt/equity finance
	8.2 Commercial investing	Debt/equity finance

Three different examples illustrate potential pathways for the upscaling of pondscape NbS. Farming within the EU offers one model: European farmers are profitable due to a blend of income from revenue (e.g. sale of market goods such as milk or grain in the commercial market) and public funding (in the form of subsidies and grants, e.g. through the Common Agricultural Policy, which in part aims to subsidise farmer actions that generate public

³⁹ Philanthropic donations offer another potential model, as illustrated by e.g. the crowdfunding Example 3.3.1 Wetland construction in Treflach, UK. However, UNEP (2022) found that NGO and philanthropic sources currently provide only 12% of private NbS financing; it seems it would be challenging to drastically increase NGO and philanthropic finance to support widespread upscaling, though it could be part of the solution.

⁴⁰ This is cost-avoidance from the perspective of the public actor divesting of the asset (and associated costs).

benefits). Upscaling pondscapes in this way would require the ponds to generate significant amounts of market goods, such as achieved by Example 1.5.1 Carp Ponds in Bavaria, Germany, as well as to be able to secure large and ongoing public funding. An alternative model could involve funding pondscape NbS by developing economic markets for the public goods that they generate. Example 4.3.2 ‘District Licensing’ for Great Crested Newts illustrates the potential of this model: regulation requiring developers to purchase biodiversity offsets to compensate for the negative impact of their developments on biodiversity, combined with the development of a streamlined biodiversity offset market, have combined to generate considerable funding for the creation of high biodiversity value ponds. Another potential model was illustrated by work with the DEMO-sites, where stakeholders identified many small and sometimes surprising ways to generate income within or adjoining pondscapes, with the income then earmarked for the NbS. Examples included charging for ferry trips or nearby parking for visitors/tourists (La Platera case study), charging for visits and tours or generating additional profits through eco-labelling (UK demosite), or siting solar panels on pondscapes (Turkey demosite). While the financial analyses and stakeholder feedback make clear that these may be insufficient and challenging to realise, such creative revenue-raising efforts may be able to help close the financing gap, alongside other financing.

Developing the PONDERFUL Sustainable Finance Inventory has identified a number of areas for further research. The most pressing is further research into how financing instruments can be scaled up to increase investment sufficient to meet global biodiversity and other societal objectives. A related and equally pressing question is how small-scale NbS such as pondscapes can be aggregated to reach a scale sufficiently large enough to be interesting for large investors. Here, the question of how to increase private financing is particularly pressing, given its relatively limited contribution to NbS financing to date. In addition, it will be important to gather feedback from practitioners on which financing instruments are most appropriate for pondscape NbS development and what practical challenges are faced by pondscape NbS developers.

5 Conclusion

Pondscapes generate numerous benefits. These benefits include food and materials, water for irrigation, livestock and groundwater recharge, habitats for flora and fauna, climate adaptation through water storage, flood management, and groundwater recharge, habitat provision, and cultural benefits including recreation and aesthetic benefits, among others. The exact type and scale of benefits depends on the specific design of the pondscape and on the local ecological and socio-economic context.

The numerous benefits of pondscapes mean that their restoration, creation, and management can be regarded as a nature-based solution for a number of societal challenges, including biodiversity enhancement and climate adaptation, among others. However, the implementation of pondscapes as NbS involves costs. These costs include upfront planning and capital investment costs, as well as ongoing operational costs. These costs must be financed.

Our review of the NbS financing literature identified that while globally there is already significant expenditure on NbS, this is currently insufficient to meet global biodiversity objectives and other societal goals. Indeed, financing is identified as a key barrier for NbS implementation. NbS pose a number of challenges for financing. This including their prevalence of undervalued public goods, the difficulty of coordinating multiple actors who enjoy ‘scattered’ benefits, the challenge of measuring and valuing those benefits, and the lack of experience with NbS (as with other unconventional types of investments) within the finance sector.

The PONDERFUL Sustainable Finance Inventory provides an overview of financing instruments that can be used to pay for pondscape NbS. It covers eight categories of

financing instruments, including income instruments, contracting approaches, debt instruments, tradable rights/permits, subsidies, voluntary contributions, and ownership models. Through one-page templates and examples, the Inventory aims to help pondscape developers understand the strengths and benefits of different instruments, and their appropriateness for different types of pondscape projects.

Overall, our research and development of the Sustainable Finance Inventory and work with the PONDERFUL project DEMO-sites has identified a number of potential financing instruments that pondscape developers could use to pay for their ponds. The identification of instruments and examples has also led to identification of considerable challenges for using these financing instruments for pondscape NbS, especially their production of predominantly public goods. Upscaling NbS will depend on developing profitable NbS – either through development of markets for pond products (including environmental goods) or through additional public funding. Our research suggests that debt/equity finance will only arise if pondscape NbS are profitable – “unlocking” private finance of NbS first requires to document NbS projects where their effects are clear and their potential income exceeds cost. These and other conclusions will continue to be explored in work with stakeholders and pondscape developers in the PONDERFUL DEMO-sites.⁴¹

⁴¹ See Annex C for a description of ongoing co-creation work within the PONDERFUL DEMO-sites.

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7 Annex A: Pondscape benefits conceptualised as Ecosystem Services and Natures Contributions to People

In the PONDERFUL project, we understand the benefits that ponds can offer to society in terms of their delivery of different Ecosystem Services (ES) and Nature's Contributions to People (NCPs). Both ES and NCPs categorise the benefits that ecosystems generate for society.⁴² The latest classification of ES is the Common International Classification of Ecosystem Services (CICES) 5.1, which distinguishes between provisioning, regulation and maintenance, and cultural services (Haines-Young & Potschin, 2018).⁴³ In 2017, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) introduced the closely related concept of Nature's Contributions to People (Díaz et al., 2018). The 18 NCPs are divided into the following categories: material, regulating and non-material. These frameworks are useful, because they help to understand and categorise the different types of benefits created by ponds. This, in turn, enables the quantification (and potentially monetisation) of these benefits, often a crucial step in assessing their impact or receiving financing for pondscape restoration, creation, and management.

Table 10 provides an overview of the range of benefits provided by ponds, categorised using the ES and NCP frameworks. It also gathers indicators of effect already reported in the literature. The same cautions regarding interpretation discussed in section 2.2 apply to this table, which does not indicate the scale of benefit provision and the level of evidence, distinguish between benefits provided by different types of ponds, or explicitly considers disservices (such as provision of breeding habitats for mosquitos). It is also worth noting that very few of the papers reviewed conceptualise the functions and processes of ponds as Ecosystem Services, and none used the concept Nature's Contributions to People; we perform this categorisation ourselves.

⁴² There are differences between the concepts of Nature's Contributions to People (NCPs) and Ecosystem Services (ES). The latter incorporates more diverse worldviews on human-nature relations and relational values of nature (Díaz et al., 2015, 2018; Kadykalo et al., 2019; Pascual et al., 2017). In the PONDERFUL project, we use both ES and NCP methodologies; and aim for the consolidation of concepts in relation to ponds and pondscales. Our overarching aim is to take advantage of both approaches to develop evidence that will support improved understanding of the many benefits delivered by pondscales (including climate mitigation, adaptation, biodiversity protection, as well as cultural and intrinsic value) and to support improved evidence-based decision making.

⁴³ Another commonly known classification of ES, the Millennium Assessment, divides them into four categories: provisioning, regulating, cultural and supporting services (Millennium Ecosystem Assessment, 2005). Supporting services are ecosystem processes and functions that underpin the other three types of services, e.g. photosynthesis, soil formation. There has been much debate about this fourth category, given that there is a risk that ecosystem features are counted twice as a provisioning/regulating/cultural service and as the support to these services. The latest CICES 5.1 classification does not consider supporting services specifically, but rather as functions of ecosystems underlying other categories of ES (Haines-Young & Potschin, 2018).

Table 10: The variety of potential benefits provided by ponds: ecosystem service and nature's contribution to people categorisation and indicators of effect

Ecosystem service type	Ecosystem service (ES) description [1]	Nature's Contributions to People (NCP) [2]	NCP type	Description of the benefits provided by ponds [3]	Indicators of effect
Provisioning	Materials from wild plants (biotic)	Materials and assistance	Material	<p>Food and materials: Ponds can be used to grow food (e.g. fish, water cress) and materials (e.g. reeds) occurring in the wild (Haslam, 2003; Nicholas, 1991). They can also be used for aquaculture production of fish, crustaceans, or algae, both at commercial and subsistence scale (Tucker & Hargreaves, 2012).</p> <p>Aquaculture products: Ponds are a type of aquaculture production system, which are used to grow fish or crustaceans both for large-scale commercial aquaculture and for subsistence consumption. Besides food, pond aquaculture is used to grow ornamental fish, sportfish and baitfish. In addition to animal aquaculture, spirulina algae can be grown in ponds (Tucker & Hargreaves, 2012).</p>	Yield/ culture intensity (kg/ ha) Total harvest (kg or tons) Profit (€ or \$)
	Food from wild plants (biotic)	Food and feed			Yield/ culture intensity (kg/ ha) Total harvest (kg or tons) Profit (€ or \$)
	Food from wild animals (biotic)				
	Animals that are cultivated in fresh or salt water that we eat (biotic)				
Surface water that we can use for things other than drinking (abiotic)	Regulation of water quantity, location and timing	Regulating	<p>Water source for irrigation: On-farm ponds can store water and provide irrigation in regions where precipitation does not reliably and sufficiently meet agricultural water demands. They can store excess rainwater, either when the growing season does not coincide with the wet season or when precipitation intensity exceeds the soil infiltration capacity, as well as water from streams at moments of maximum flow and reused water. Water harvesting and storage in ponds can be an alternative to the often unsustainable exploitation of aquifers and can also lead to an increase in crop production and recharging of groundwater, see Groundwater recharge (López-Felices et al., 2020; Sikka et al., 2018; Vico et al., 2020). In comparison to using groundwater pumps, irrigation ponds can also reduce the energy use of irrigation (Bouldin et al., 2004).</p> <p>Water source for livestock: Ponds can provide a drinking water source to livestock (Chen et al., 2019).</p>	<p>Pond size/ irrigated crop land (ratio) Water budget/ amount of water stored (= <i>inflow (precipitation, runoff) – outflow (evaporation, seepage, overflow, irrigation)</i>) Decrease in energy use for irrigation (Δ kWh) Change in loss of groundwater (Δ %) Change in crop yield (Δ kg/ha)</p> <p>Drinking water supplied to livestock (litres) Water budget/ amount of water stored Number of livestock supplied with drinking water</p>	

Regulation and Maintenance	Regulating the flows of water in our environment (biotic)			Groundwater recharge: Some ponds play a role in recharging aquifers as pond water percolates through permeable sand and rocks to an aquifer located below. (Healy, 2010; Ramsar Convention, 2015b). In contrast to natural recharge, infiltration ponds (also called percolation ponds) are specifically constructed for artificial groundwater recharge in areas with sufficient permeability and storage capacity of the target aquifer (Dillon et al., 2020).	Aquifer recharge rate (mm/ year) Aquifer water quality improvement
		Regulation of water quantity, location and timing		Flood management: In urban areas with large areas of impervious surfaces, stormwater detention and retention ponds can be part of the urban drainage system. Storm sewers deliver surface run-off to the retention ponds, which can hold large quantities of inflow and later release it at a controlled rate (Morales & Oswald, 2019). They can also manage water quality of stormwater runoff, as they allow suspended sediments and attached pollutants to settle out and be processed by biological and physicochemical processes (Nayeb Yazdi et al., 2021). → see Water quality improvement . Retention ponds can also feature in floodplains, where they take up and store floodwater, thereby decreasing the speed and volume of streams and rivers under high inflow. This postpones and decreases flood peaks (Ramsar Convention, 2015a).	Volume of water stocked during a flooding event (m ³ /event) Flood peak reduction (%Δ water level) Peak flow variation (%Δ m ³ /s) Change in timing of flood peak (Δ time) Value of damage prevented (€ or \$) Total surface area of pondscape (in ha) Pollutant reduction in captured storm water → see Water quality improvement
		Regulation of hazards and extreme events			
	Protecting people from fire (biotic)	Regulation of hazards and extreme events		Supply of extinguishing water: Natural or artificial fire retention ponds, often located in or near forest, can serve as reservoirs for extinguishing water (Kaulfuß, 2011).	Water budget/ amount of water stored
	Controlling the chemical quality of freshwater (biotic)	Regulation of water quality		Water quality improvement: Ponds can reduce various types of point and non-point source pollution and thus improve water quality through a variety of processes: sedimentation, flotation, infiltration, adsorption, biological uptake, biological conversion and pollutant degradation (Carpenter et al., 2014). In agricultural settings, ponds can intercept agricultural runoffs and consequently mitigate pollutants such as nitrate, phosphorus and pesticides (Díaz et al., 2012; Jia et al., 2019) Man-made waste stabilization ponds, sometimes in combination with constructed wetlands, are used to treat industrial, mining, sewage and municipal wastewaters. They can remove a variety of substances, including non- and hard-degradable organic pollutants, nutrients, pathogens, and emergent contaminants (Kumar & Kumar, 2020; Liu et al., 2014; Ramsar Convention, 2015c). Pond-	Pollutant removal efficiency (nutrients, pesticides, organic pollutants, pathogens, emerging contaminants, metals, etc.) (Δ %) Metabolization rate of pollutants (g/m ³ /year) Amount of water with improved quality (litres) Water quality: total suspended solid content (mg/L) Total faecal coliform bacteria content of pondscape effluents
	Decomposing wastes (biotic)				
	Filtering wastes (biotic)				

	Diluting wastes (abiotic)			wetland complexes can be used as preliminary processor of drinking water sources (Wang et al., 2016). The removal efficiency depends on several environmental, design and management factors such as climate, hydraulic loading rate, pollutant loading rate, hydraulic retention time, water depth, size, age, vegetation type, density and management (Díaz et al., 2012).	Cost saving in comparison to electromechanical water quality improvement system (Δ € or \$) Decrease in cost for drink water processing (Δ € or \$)
	Controlling or preventing soil loss (biotic)	Formation and protection of soils		Erosion control: Ponds can trap sediments from run-off water and thus mitigate erosion. This function is especially important in agricultural areas (Chen et al., 2019; Fiener et al., 2005). Trapping sediments also contributes to improving water quality. → see Water quality improvement .	Amount of sediment trapped Sediment trapping rate
	Providing habitats for wild plants and animals that can be useful to us (biotic)	Habitat creation and maintenance		Habitat provision for biodiversity: Ponds can provide habitats for a variety of fauna and flora and may thus contribute to biodiversity both at the individual pond and the pondscape level (Hill et al., 2016; Oertli et al., 2010; Williams et al., 2020). Ponds are also important for biodiversity because they function as stepping-stone habitats and thus enhance habitat connectivity (Simaika et al., 2016; Watts et al., 2015), and because they often are biodiversity hotspots in otherwise ecologically poor areas such as cities or agricultural land (Céréghino et al., 2014; Sayer et al., 2012). Ponds also trap nutrients and supply them to the food web (Chen et al., 2019).	Alpha diversity of species (in one pond), beta diversity of species (across a pondscape) Species richness Functional habitat connectivity Structural habitat connectivity Increase in nutrient supply to food web Number of conservation priority species (n) Number of mesohabitats (n) Conservation score
	Pollinating our fruit trees and other plants (biotic)	Pollination		Habitat for pollinating insects: Ponds and the associated terrestrial vegetation support populations of pollinating insects, for example by providing a habitat for aquatic larvae, a drinking water source to insects or flower resources. This can increase the quantity and quality of pollinator-dependent crops (Stewart et al., 2017; Walton et al., 2021).	Abundance of pollinators (n) Number of pollinator species (n) Crop yield (Δ kg/ ha) Crop quality (Δ quality)
	Regulating our global climate (biotic)	Regulation of the climate		Greenhouse gas sequestration: Ponds sequester and then store carbon in their sediments, while at the same time releasing carbon dioxide, nitrous oxide and methane into the atmosphere. The overall balance depends on a variety of factors, likely including nutrient and organic matter input, pond hydrology, sediment properties and associated microbial communities, water depth, eutrophication status and temperature (Bergen et al., 2019; Peacock et al., 2019, 2021; Ramsar Convention, 2015e; Taylor et al., 2019).	Carbon dioxide equivalent(t CO ² -e - considering CO ² sequestration and release, as well as CO ² , CH ⁴ and N ₂ O release) Total carbon removed or stored in vegetation and soil per unit area per unit time (kg/ha/y) Capacity of C storage (by primary production, by organic matter accumulation)

					Rate of sediment carbon decomposition (% p.a. or t CO ²) Sediment carbon content (Kg/ha/y)
	Regulating the physical quality of air for people (biotic)	Regulation of air quality		Cooling of surrounding area: During hot days, pond water temperature generally lies below air temperature, cooling the surrounding area. However, during the night ponds are generally warmer than the air, thus warming the surrounding area. There is a debate over the significance of these cooling (and warming effects): Some suggest that urban water bodies can mitigate the urban heat island effect (Sun & Chen, 2012), whereas others hold that the effects on surrounding air temperature are negligible (Jacobs et al., 2020; Manteghi et al., 2015). Besides evaporation effects, ponds may improve the thermal comfort experienced in urban areas because they provide opportunities to increase shade by trees and enable natural ventilation (Coutts et al., 2013; Jacobs et al., 2020).	Thermal effect on air temperature (°C) Perceived thermal effect (Perceived Equivalent Temperature, PET)
	Regulating living conditions by the physical environment (abiotic)				
Cultural	Using the environment for sport and recreation; using nature to help stay fit (biotic)	Physical and psychological experiences	Non-material	Opportunities for recreation: Ponds can be used for walking, jogging, boating, fishing, hiking, swimming, relaxation and other recreational pursuits (Ghermandi & Fichtman, 2015; Moore & Hunt, 2012).	Self-reported enjoyment Number of people visiting for recreation Value of visits (e.g. using qualitative scales, monetisation techniques)
	Watching plants and animals where they live; using nature to destress (biotic)			Contribution to well-being: Ponds support both physical and mental health in nearby residents and visitors, which have reported higher well-being and less mental distress (Blicharska & Johansson, 2016; Pedersen et al., 2019; Völker & Kistemann, 2013; White et al., 2021).	Self-reported well-being Number of people visiting for relaxation Value of visits
	Researching nature (biotic)	Learning and inspiration		Education and research: Ponds offer multiple opportunities for research as well as for environmental education through observation and experimentation (Ghermandi & Fichtman, 2015; Welker et al., 2010; Zhou et al., 2020).	Self-reported educational value Number of people visiting for studying and learning Value of visits
	Studying nature (biotic)			Aesthetic value: Ponds provide a sense of beauty to observers, whether they appreciate the scenery as a whole or specific sights,	Self-reported appreciation of sight, smells and sounds
	The beauty of nature (biotic)				

				sounds or smells (Moore & Hunt, 2012; Oertli & Parris, 2019; Zhou et al., 2020).	Number of people visiting for aesthetic experience Value of visits
	The things in nature that we think should be conserved (biotic)			Conservation value and maintenance of options: Ponds are valued by some because they want future generations to know and experience them as they are now (Zhou et al., 2020).	Self-reported future value
	The things in nature that we want future generations to enjoy or use (biotic)	Maintenance of options			
	The things in nature that help people identify with the history or culture of where they live or come from (biotic)	Supporting identities			Cultural importance: In some regions and cultures, ponds are part of the cultural heritage and identity, and therefore have significant value (Davenport et al., 2010; Hassall, 2014; Ramsar Convention, 2015d; Zhou et al., 2020).
	Using nature to as a national or local emblem (biotic)				

[1] Selection of ES relevant for PONDERFUL based on the CICES 5.1 classification (Haines-Young & Potschin, 2018)

[2] Selection of NCP relevant for PONDERFUL based on the IPBES classification of Nature's Contributions to Peoples (Díaz et al., 2018)

[3] The remainder of the table only explicitly refers to ponds, but the benefits described are provided by both ponds and pondsapes.

8 Annex B: PONDERFUL Sustainable Finance Inventory

INSTRUMENT NAME: 1.1 USER FEES	52
<i>Example name: 1.1.1 In-stream enhancement of Altnabrocky River, Owenmore Catchment, Ireland</i>	53
INSTRUMENT NAME: 1.2 BUSINESS IMPROVEMENT DISTRICTS	55
<i>Example name: 1.2.1 Vauxhall Missing Link</i>	57
INSTRUMENT NAME: 1.3 BETTERMENT LEVIES	58
<i>Example name: 1.3.1 Funding of Wimbledon and Putney commons</i>	59
INSTRUMENT NAME: 1.4 DEVELOPMENT RIGHTS AND LEASES	60
<i>Example name: 1.4.1 SANPark concessions for tourism enterprises</i>	61
INSTRUMENT NAME: 1.5 SALE OF MARKET GOODS	62
<i>Example name: 1.5.1 Carp Ponds in Bavaria, Germany</i>	63
INSTRUMENT NAME: 1.6 OTHER REVENUE RAISING MEASURES	64
<i>Example name: 1.6.1 UK Network Rail Property</i>	65
<i>Example name: 1.6.2 City of Port Townsend water utility fee to fund the purchase of the Winona Wetland Purchase</i>	66
INSTRUMENT NAME: 2.1 COMMUNITY ASSET TRANSFER	67
<i>Example name: 2.1.1 Chapman's Pond Community Interest Company</i>	68
INSTRUMENT NAME: 2.2 PUBLIC-PRIVATE PARTNERSHIP	70
<i>Example name: 2.2.1 Valley State Parks Camping and Day Use Area Concession, California, USA</i>	71
INSTRUMENT NAME: 3.1 PHILANTHROPIC CONTRIBUTIONS	73
<i>Example name: 3.1.1 The Living Danube Partnership – Philanthropic contribution</i>	74
INSTRUMENT NAME: 3.2 VOLUNTARY BENEFICIARY CONTRIBUTIONS	75
<i>Example name: 3.2.1 Wild Haweswater – United Utilities voluntary beneficiary contribution</i>	76
INSTRUMENT NAME: 3.3 CROWDFUNDING DONATIONS	77
<i>Example name: 3.3.1 Wetland construction in Treflach, UK – crowdfunding donations</i>	78

INSTRUMENT NAME: 4.1 PAYMENT FOR ECOSYSTEM SERVICES (PES)	80
<i>Example name: 4.1.1 Vittel (Nestlé Waters) PES</i>	82
INSTRUMENT NAME: 4.2 TRANSFER-BASED INSTRUMENTS: VOLUNTARY CARBON MARKETS	83
<i>Example name: 4.2.1 MoorFutures</i>	85
INSTRUMENT NAME: 4.3 TRANSFER-BASED INSTRUMENTS: BIODIVERSITY OFFSETS AND HABITAT BANKING	87
<i>Example name: 4.3.1 Eco-Accounts biodiversity offset: Lauter creek restoration</i>	89
<i>Example name: 4.3.2 'District Licensing' for Great Crested Newts</i>	91
INSTRUMENT NAME: 4.4 TRANSFER-BASED INSTRUMENTS: WATER QUALITY TRADING SYSTEMS	93
<i>Example name: 4.4.1 Pennsylvania Nutrient Trading Program, USA</i>	95
INSTRUMENT NAME: 5.1 ENVIRONMENTAL SUBSIDIES	96
<i>Example name: 5.1.1 Ecofarm Petra Marada, Czech Republic – CAP subsidies</i>	98
INSTRUMENT NAME: 5.2 TAX CONCESSIONS	100
<i>Example name: 5.2.1 Western Australia Conservation Covenant Tax Concessions</i>	101
INSTRUMENT NAME: 6.1 PUBLIC GRANTS	103
<i>Example name: 6.1.1 Hunte-Leda-Moorniederung, Delmenhorster Geest und Hümmling</i>	105
INSTRUMENT NAME: 7.1 LOANS/GREEN LOANS	107
<i>Example name: 7.1.1 Linnunsuo – Rewilding Europe Capital loan</i>	109
<i>Example name: 7.1.2 Clean Water State Revolving Fund loan - Winona Wetlands</i>	111
INSTRUMENT NAME: 7.2 BONDS/GREEN BONDS	112
<i>Example name: 7.2.2 The Conservation Fund's Green Bond</i>	114
INSTRUMENT NAME: 8.1 IMPACT INVESTING	116
<i>Example name: 8.1.1 Sumatra Merang Peatland Restoration Project</i>	118
INSTRUMENT NAME: 8.2 COMMERCIAL INVESTING	120
<i>Example name: 8.2.1 Mill Creek Mitigation Bank</i>	122

Instrument name: 1.1 User fees

Pondscape-specific definition: Compulsory or voluntary entrance fee, usage fee (e.g. guided tours), and/or associated fees (e.g. parking) for accessing ponds or pondscape sites, generally for tourism and recreation. User fees can be for one-off visits or include annual permits (e.g. for fishing).

Category	Income instruments			
Also-known-as	Entrance fee			
Related instruments	Development rights and leases			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private people (e.g. citizen, tourists), companies (e.g. private event planners)			
Payment form: What form is the payment?	Cash (entry fee, permit fee, guided tour fee etc)			
In return for what? What is the NBS project obliged to deliver in return?	Access and use of the site			
Recipient requirements: What requirements must recipients meet to receive finance?	No requirements			
Project requirements: What requirements must the pondscape project meet?	NbS site must be attractive, accessible, and safe for visitors. This might require additional infrastructure such as parking, a bus connection, shops, toilets, electricity, restaurants etc.			
Other requirements: What additional requirements are attached to the financing?	-Possibly high transaction costs (fencing, ticket sales, services, etc.). -Project must comply with land-use legislation, as public access and use of certain landscapes might be regulated (e.g. public right to free access).			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Ongoing: regular payments every time the site is visited/used. This may be seasonal			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Kettunen M. & Illes A. (eds.) (2017) Opportunities for innovative biodiversity financing: ecological fiscal transfers (EFT), tax reliefs, marketed products, and fees and charges. A compilation of cases studies developed in the context of a project for the European Commission (DG ENV) (Project NV.B.3/ETU/2015/0014), Institute for European Policy (IEEP), Brussels / London			

Instrument: 1.1 User fees

Example name: 1.1.1 In-stream enhancement of Altnabrocky River, Owenmore Catchment, Ireland

Example description: To combat declines in the population of wild salmon throughout Ireland, the Fisheries Ireland state agency promotes projects that aim to enhance salmon habitats, such as the restoration of 160m of the Altnabrocky River. Ireland Fisheries manages the Salmon and Sea Trout Rehabilitation, Conservation and Protection Fund (SSTRCPF), which it uses to pay for such projects, and which receives approximately 50% of its funding through fishing fees of 20€-50€/day.

NbS description	
Location	Owenmore Catchment, Ireland
NbS type	Creation Restoration Management
Ecosystem type	Wild salmon spawning beds and neighbouring riverbanks
NbS benefits	Biodiversity
NbS description	Use of local rock structures to combat erosion of riverbanks; redistribution of gravel to rebuild spawning beds; lowering of riverbanks to reduce the impact of flooding.
Scale (size)	160m of river
NbS performance criteria	Wild salmon population size.
NbS performance	The program is considered to be successful but no quantitative performance indicators have been reported.
Financing description	
Source of financing	Private and commercial fishers and fishery organisations, who pay 20€-50€ per day for a fishing license.
Recipient	The recipient was the GlenAlt Syndicate, an association of Irish fishers, who received funding from the Salmon and Sea Trout Rehabilitation, Conservation and Protection Fund (SSTRCPF). The Fund is managed by Irish state agency Fisheries Ireland, receives about 50% of its funds through fees for recreational and commercial fishing activities, and funds eligible biodiversity projects with grants through open calls.
Scale (financing)	€18,571
Timeline	One-off
Financing requirements	Examples of project types that are eligible for funding from the SSTRCPF: <ul style="list-style-type: none"> • Fish passage improvement • Spawning enhancement • Fencing (protection of riverbanks including fences, stiles, cattle drinkers) • Riparian zone improvement (e.g. selective tree pruning) • Removal/control of aquatic invasive species • In-stream structures (weirs, deflectors, rubble mats, etc.). • Riverbank protection (soft engineering measures, log revetments, etc.). • Feasibility studies, reporting, monitoring, etc.
Financing performance	Performance was not reported for this specific project, or generally for the total SSTRCPF awarded grants of €5 million to >250 projects throughout Ireland.
Transaction costs	Transaction costs are not reported. Generally, transaction costs include the administration of licenses, grants, project monitoring, enforcement of user fees, etc.

Reference	<p>Fisheries Ireland (2022) Habitats & Conservation Funding Call 2022 [Accessed online, 01.08.2022]. Available here: https://www.fisheriesireland.ie/services/funding/habitats-conservation-funding-call-2022</p> <p>Fisheries Ireland (2022) Fisheries Funding [Accessed online, 01.08.2022]. Available here: https://www.fisheriesireland.ie/services/funding</p> <p>Citizen Information (2021) Fishing licences and permits [Accessed online, 01.08.2022]. Available here: https://www.citizensinformation.ie/en/travel_and_recreation/sport_and_leisure/fishing_licences_and_permits.html</p>
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Instrument name: 1.2 Business improvement districts

Pondscape-specific definition: Business improvement districts are non-governmental initiatives where a set of stakeholders (business, citizens, organisations) enter an agreement with local government to contribute an additional levy to finance improvements in a specific geographic area. The business improvement district then establishes an independent management structure and manages the spending of the levy to achieve its pre-agreed goals. The business improvement district has to be voted on and approved by the affected businesses (or landowners) in the areas. Once approved, the levy is binding on all landowners in the area. Business improvement districts are time-limited (e.g. in the UK to a maximum of five years). Funded improvements can include implementation of NBS.

Category	Income instruments			
Also-known-as				
Related instruments	Voluntary beneficiary contributions; Betterment levies; Developer contributions and charges			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Business owners in the affected areas (i.e. commercial property occupants). Sometimes BIDs target property owners, instead of occupants.			
Payment form: What form is the payment?	Levy, tax on the rateable value of property within the area. In the UK, commonly a fee of 1-2%.			
In return for what? What is the NBS project obliged to deliver in return?	The business improvement district must deliver on their business improvement proposal ⁴⁴ . Generally, this promises to support the local business area, e.g., by increasing foot traffic, promoting the area, decreasing costs (e.g. crime). These could include NBS implementation.			
Recipient requirements: What requirements must recipients meet to receive finance?	The business improvement district, once approved, must establish its own independent management structure to manage the levy. Most BIDs are established as non-profit organisations of stakeholders (companies and citizens), but they can also take other forms. Business Improvement Districts are commonly initially facilitated by local government but are managed independently.			
Project requirements: What requirements must the pondscape project meet?	The business improvement proposal must be sufficiently attractive for a majority of businesses to vote for an additional levy.			
Other requirements: What additional requirements are attached to the financing?	BIDs are less effective in areas which are spread out or have mixed land use as it is more difficult for the payer to capture the benefits of targeted improvements.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Ongoing for limited time: Business improvement district levies are generally paid annually, once established, until end of BID lifetime (max. 5 years).			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance?	Simple	Medium	Complex	
Exist now in EU?	Yes		No	

⁴⁴ This proposal must be prepared by the business improvement district as part of the initial establishment, which outline what the levy would be and for what it would be used. This proposal then voted on in a ballot by those who would be affected (and must pay) the business improvement district.

References: Sandford, M. (2018) Business Improvement Districts. Briefing Paper 04591. House of Commons, London. Available at:
<http://researchbriefings.files.parliament.uk/documents/SN04591/SN04591.pdf>

Instrument: 1.2 Business improvement district example

Example name: 1.2.1 Vauxhall Missing Link

Example description: The Vauxhall Missing Link is an urban green space, which is said to improve the local business environment. Local businesses pay, own, and manage the green infrastructure collectively through the business improvement district Vauxhall ONE, to which they must pay a yearly fee.

NbS description			
Location	London, UK		
NbS type	Creation	Restoration	Management
Ecosystem type	Green infrastructure		
NbS benefits	Habitats for insects and plants; Recreation and well-being; Flood management; Air quality		
NbS description	The Vauxhall Missing Link connects existing green spaces through a pedestrian- and bicycle friendly installation of rain gardens (incl. 22 planted species), which improve water drainage and air quality, while attracting customers of local businesses and providing outside seating for gastronomy.		
Scale (size)	400m2		
NbS performance criteria	The objective is to improve the public realm and connect existing green spaces (Nine Elms, Vauxhall Park, Vauxhall Pleasure Gardens, South Bank).		
NbS performance	As a winner of the award 'Adding Value in the Public Realm,' the project is said to have created a better business environment for local enterprises, a calmer and more attractive neighbourhood, and new jobs in horticulture.		
Financing description			
Source of financing	Private local businesses		
Recipient	Vauxhall ONE Business Improvement District		
Scale (financing)	£260,000		
Timeline	Ongoing. Businesses are required to contribute on a yearly basis to the BID		
Financing requirements	The project design had to demonstrate that the project would make the district more attractive for local businesses and their customer target groups.		
Financing performance	The renewal proposal for the years 2022-2027 plans with a BID levy charge of "1.56% of the rateable value of each hereditament listed in the Ratings List [...] The BID levy rate will be amended on an annual basis in line with inflation, at a rate to be agreed by the Vauxhall One board, and not exceeding the national Retail Price Index." The levy amounts to roughly 1million£ per year, with a surplus of 17,290£ and 147.127£ for the years 2018 and 2019, respectively. Costs comprise NBS but also other activities, such as security and cleaning measures, events, etc.		
Transaction costs	Administrative expenses of the BID activities were 330.062£ and 314.282£ for years 2018 and 2019, respectively.		
Reference	<p>Cross River Partnership (2016) Green Capital - Green Infrastructure for a future city. Available here: https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/urban-greening/green-capital-green</p> <p>Carbon Accountancy Limited (2020) Vauxhall One – Annual Reports and Financial Statements for the Year Ended 31 March 2019. Available at: https://vauxhallone.co.uk/uploads</p>		

Instrument name: 1.3 Betterment levies

Pondscape-specific definition: A compulsory tax or fee levied by local government on land that has gained in value due to the development of public infrastructure (including NBS such as ponds), paid by landowners.

Category	Income instruments			
Also-known-as	Betterment charges; special assessment districts			
Related instruments	Business improvement district; Developer contributions and charges; Voluntary beneficiary contributions			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private: Landowners			
Payment form: What form is the payment?	Fee, tax on the value of property.			
In return for what? What is the NBS project obliged to deliver in return?	Increasing land values (implicitly due to ecosystem-service provision). Ecosystem-service provision:			
Recipient requirements: What requirements must recipients meet to receive finance?	Local/regional/city government with the ability to levy local landowners			
Project requirements: What requirements must the pondscape project meet?	<ul style="list-style-type: none"> -The project must lead to significant increases in land values for new and existing properties in the area where the betterment level applies. -Accordingly, most appropriate for large developments that are attractive to property buyers (e.g. recreation opportunities, restoration of unattractive sites). 			
Other requirements: What additional requirements are attached to the financing?	<ul style="list-style-type: none"> - Need to measure the 'amount of value uplift' that is attributable to the project/public investment (i.e. the value of the gains received by beneficiaries due to the intervention must be established). This is required to be able to set the levy. - Should consider whether there are negative financial consequences for landowners with limited cashflow, to ensure that the betterment levies do not push low-income groups out of neighbourhoods. - Due to relatively high costs of implementing (transaction costs), most appropriate for high value projects. 			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Ongoing: Betterment levies are paid as an additional property tax.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape <u>management</u>	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	World Bank (2015) Urban regeneration – betterment levies. https://urban-regeneration.worldbank.org/node/15 . Accessed 16.12.2021			

Instrument: 1.3 Betterment Levy

Example name: 1.3.1 Funding of Wimbledon and Putney commons

Example description: The Wimbledon and Putney commons are large park landscapes which provide urban recreational areas and biodiversity benefits. The commons are partly funded by levies, which owners of properties in geographic proximity must pay on a yearly basis.

NbS description			
Location	London, UK		
NbS type	Creation	Restoration	Management
Ecosystem type	Park landscape, including nine ponds		
NbS benefits	Biodiversity; Recreation and well-being		
NbS description	The Wimbledon and Putney commons are large and diverse park landscapes, which serve as an urban recreational area.		
Scale (size)	460 hectares		
NbS performance criteria	The yearly monitoring reports of the commons list a number of indicators, including biological, hydrological, and environmental data.		
NbS performance	N/A		
Financing description			
Source of financing	Private property owners sited within in a defined geographic proximity to the commons.		
Recipient	The board of Conservators (three appointed individuals by the government and five elected the levy payers), who direct the spending.		
Scale (financing)	Levies from 46.000 household reached 966.124€ in 2013/14		
Timeline	Ongoing. Levies are paid annually since 1990.		
Financing requirements	The proximity of the commons must increase the property value to legitimate the levy. The levy is calculated based on property value and the ratio of high value properties in the area.		
Financing performance	The performance of the levy is considered to be successful, as the levy has been raising substantial funds for about 30 years. Levies are considered to be fairer compared to a general tax increase, as the beneficiaries contribute more.		
Transaction costs	N/A		
Reference	Drayson, K. (2014). Green society: Policies to improve the UK's urban green spaces. London: Policy Exchange. Available at: https://policyexchange.org.uk/wp-content/uploads/2016/09/green-society.pdf		

Instrument name: 1.4 Development rights and leases

Pondscape-specific definition: Pond developers raise finance by selling or leasing the right to commercial development (e.g. restaurants, shops, etc) within or nearby the NBS. The land/buildings being leased are on the same or neighbouring sites to the NBS and benefit directly from the NBS (or from people visiting the NBS).

Category	Income instruments			
Also-known-as				
Related instruments	Other revenue raising instruments; User fees			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private companies			
Payment form: What form is the payment?	Cash (payment for lease)			
In return for what? What is the NBS project obliged to deliver in return?	The right to develop commercial operations on/nearby the NBS site (potentially including building or building sites).			
Recipient requirements: What requirements must recipients meet to receive finance?	Any large-scale pond developer with the right to exclude/offer development rights (e.g. public or private)			
Project requirements: What requirements must the pondscape project meet?	The NBS project must be commercially attractive to business developers, e.g., have many visitors, or develop productive land for farming etc.			
Other requirements: What additional requirements are attached to the financing?	To guarantee that proceeds from leases/land sales are used for NBS, they should be earmarked to avoid competition from other policy priorities.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Lease: Ongoing revenue; received regularly (weekly/monthly/annually, as per lease agreement).			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Baroni, L., Nicholls, G., and Whiteoak, K. (2019). Grow green: approaches to financing nature-based solutions in cities. Available online at: http://growgreenproject.eu/wp-content/uploads/2019/03/Working-Document_Financing-NBS-in-cities.pdf			

Instrument: 1.4 Development rights and leases

Example name: 1.4.1 SANPark concessions for tourism enterprises

Example description: Three percent of South Africa’s land surface is covered by national parks, which are home to endangered wildlife and scenic landscapes. The management of the parks is funded to 80% through own revenue stream, such as the leases for tourism enterprises who offer restaurants, lodges for stay overs, or gift shops.

NbS description			
Location	South Africa		
NbS type	Creation	Restoration	Management
Ecosystem type	National parks with multiple ecosystem types		
NbS benefits	Biodiversity; Eco-tourism		
NbS description	Parks deliver biodiversity conservation, and have cultural, historical, and economic significance.		
Scale (size)	SANParks administers nineteen parks covering 37.511,13 km ²		
NbS performance criteria	Performance criteria relate to multiple separate management plans with different objectives, include animal population numbers, area sizes of restored land patches, implemented educational projects, water consumption, climate change adaptation, etc.		
NbS performance	Generally, the number on medium-term targets from the 5-Year Strategic Plan 2019/20 – 2023/24 report progress towards the diverse objectives across a wide range of indicators.		
Financing description			
Source of financing	Businesses from the tourism sector, particularly safari and eco-tourism		
Recipient	SANPark, a public agency under the Department of Environmental Affairs responsible for the management of South Africa’s national park.		
Scale (financing)	Very large (>€10 million for all leases combined)		
Timeline	Long term right to use (with accompanying payment), i.e. approximately 20 years		
Financing requirements	Leases can only be charged as the parks provide highly profitable business opportunities within the tourism sector and because SANParks has the power to exclude enterprises from these opportunities.		
Financing performance	Indicators assessing the total financial sustainability of SANParks (including revenue streams beyond development rights and leases): <ul style="list-style-type: none"> • Percentage Own Revenue Generated (incl. concessions/leases): 80% 		
Transaction costs	Not reported		
Reference	Saparoti, N. (2006) Managing National Parks. The World Bank - Public policy for the Private Sector. Available here: https://openknowledge.worldbank.org/handle/10986/11185 SANParks (2021) 5-Year Strategic Plan 2019/20 – 2023/24 & Annual Performance Plan 2019/20. Available here: https://www.sanparks.org/assets/docs/about/annual_performance_plan_2019-2020.pdf		

Instrument name: 1.5 Sale of market goods

Pondscape-specific definition: Sale of commodities produced in the pond or surrounding pondscape, such as wood or fish. Care must be taken to ensure that the production and extraction of market goods does not negatively impact the NbS, e.g. due to planting of non-native species or over-extraction.

Category	Income instruments			
Also-known-as				
Related instruments	User fees; development rights and leases			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private or public buyers of goods			
Payment form: What form is the payment?	Cash			
In return for what? What is the NBS project obliged to deliver in return?	Goods produce on site (e.g. timber, fish)			
Recipient requirements: What requirements must recipients meet to receive finance?	Any private buyer of produced goods			
Project requirements: What requirements must the pondscape project meet?	The NbS project must produce commercially attractive goods.			
Other requirements: What additional requirements are attached to the financing?	To guarantee that proceeds from sale of goods are used for NbS, they should be earmarked.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off payment (if market goods can only be sold once) or ongoing (if market goods are produced on ongoing basis)			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Finance Earth and Green Purposes Company (2021) A Market Review of Nature-Based Solutions: An Emerging Institutional Asset Class. https://finance.earth/wp-content/uploads/2021/05/Finance-Earth-GPC-Market-Review-of-NbS-Report-May-2021.pdf			

Instrument: 1.5 Sale of market goods

Example name: 1.5.1 Carp Ponds in Bavaria, Germany

Example description: Small-scale carp farming is a traditional livelihood means in Bavaria, used to diversify the income of farmers. Carp are sold as food to buyers. Under the right management practices, carp ponds can provide habitats for biodiversity.

NbS description			
Location	Bavaria, Germany		
NbS type	Creation	Restoration	Management
Ecosystem type	Fishponds		
NbS benefits	Biodiversity; Fish production; Cultural heritage		
NbS description	Carp ponds provide a tradition income source for Bavarian farmers. Ponds under traditional management practices can be rich in biodiversity as they provide rare and diverse habitats for flora and fauna. Since carps are not fed, their yield depends on a functioning ecosystem with sufficient food sources.		
Scale (size)	Bavaria has 5,500 ponds with an average size of 3.5ha cover a total area of 20,000ha.		
NbS performance criteria	There are no formal criteria, but several suggestions have been made by experts to ensure and improve biodiversity in traditional Bavarian fish pond, including that 1/3 of the banks should receive direct sunlight throughout the day; the pond should have a diverse range of different depths including 10% shallow water at shores; ponds should contain dead biomass such as trees or shrubs; vegetation in the pond should not be removed.		
NbS performance	Not commonly assessed.		
Financing description			
Source of financing	Private consumers		
Recipient	Pond owners/managers		
Scale (financing)	Average yearly yields are estimated at 344 – 588kg/ha; sold at local market prices (roughly 10-15€/kg).		
Timeline	Ongoing: pond owners/managers receive payment every time they sell fish.		
Financing requirements	Extensive knowledge about traditional fish farming; Market access (60 – 70% of produce is directly sold to the consumer).		
Financing performance	Carp farming in Bavaria is done on a small scale and predominantly to diversify the incomes of farmers who keep other livestock or cultivate crops.		
Transaction costs	Low transaction costs, though some may arise from complying with legislation, e.g. laws concerning animal welfare, hygiene, or conservation goals.		
Reference	Wedekind, H., Hilge, V., Steffens, W. (2008) Present status, and social and economic significance of inland fisheries in Germany. <i>Fisheries Management and Ecology</i> 8(4-5): 405 – 414. Vökel, W. (2007) Artenvielfalt in Fischteichen – Erhalt durch Nutzung. Bezirk Oberfranken – Fachberatung für Fischerei. Accessed 08.08.2022. https://docplayer.org/37720910-Artenvielfalt-in-fischteichen.html		

Instrument name: 1.6 Other revenue raising measures

Pondscape-specific definition: Finance for pondscape NbS development can be raised independently of the pondscape in numerous ways. Other revenue raising measures include:

- Unrelated land or facilities can be sold or leased
- Local and national government actors can use general taxation
- Local and national government actors can implement specific environmental levies or fees, such as water pollution levies. These can provide dual benefits of incentivising a reduction in environmentally harmful activities and raising revenue for e.g. NbS.

The revenue from these measures should be explicitly earmarked to be spent to achieve specific objectives (e.g. realise pond projects).

Category	Income instruments			
Also-known-as				
Related instruments				
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Depends on specific revenue raising measure: <ul style="list-style-type: none"> - Land sale/lease: Land purchaser/leaser - Taxation: Citizens and companies - Environmental levies: Polluters/users of environmental goods 			
Payment form: What form is the payment?	Cash (e.g. for sale of land or in form of taxation)			
In return for what? What is the NBS project obliged to deliver in return?	Land (if sold); use of land (if leased); use of natural resources (for taxes, charges, levies, etc)			
Recipient requirements: What requirements must recipients meet to receive finance?	Land sale/lease: Any developer/agency with available land Taxation/levies: Public agencies with the respective authority and capacities.			
Project requirements: What requirements must the pondscape project meet?	No requirements on NbS project			
Other requirements: What additional requirements are attached to the financing?	To guarantee that revenue raised are used for NbS, they should be earmarked to avoid competition from other priorities. Land sales must be in accordance with any limits on sale of public assets.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Sales: one-off (at sale) Lease; tax, charges; levies; fees, etc.: ongoing revenue; received regularly			
NBS type: What types of NBS is the financing for?	Pondscape creation		Pondscape restoration	Pondscape management
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Mell, I.C. (2017) Financing the future of green infrastructure planning: alternatives and opportunities in the UK. Landscape Research, 43(6), 751-768.			

Instrument: 1.6 Other revenue raising measures (land sales and leases)

Example name: 1.6.1 UK Network Rail Property

Example description: Network Rail Property is a specialized property business of Network Rail, a public body of the United Kingdom’s Department for Transport, which owns and manages the majority of the national railway infrastructure. To finance the Railway Upgrade Plan, Network Rail Property sells surplus land that is considered strategically irrelevant, allowing Network Rail to generate £1.8bn without debt.

NbS description – not applicable as not linked specifically to a NbS example			
Location			
NbS type	Creation	Restoration	Management
Ecosystem type	n.a.		
NbS benefits	n.a.		
NbS description	n.a.		
Scale (size)	n.a.		
NbS performance criteria	n.a.		
NbS performance	n.a.		
Financing description			
Source of financing	Private real estate development		
Recipient	National govt. and public agencies. Network Rail is a public body of the United Kingdom’s Department for Transport, which owns, manages, and develops the majority of the national railway.		
Scale (financing)	£1.8bn		
Timeline	Multiple single one-off transfers over a period of four years.		
Financing requirements	Network Rail is justifying sales by showing that assets are of no more strategic value and that their disposal would not impair the railway operation or its ability for future development.		
Financing performance	Not disclosed		
Transaction costs	A single purchase takes a minimum of six months. Prospective buyers must pay fees for the following steps of transactions: consultation fees £1,500 surveyor fees £1,500 valuation fees £2,500 legal fees £1,500		
Reference	Network Railway (2017) Railway Upgrade Plan 2017/18. Available here: https://www.networkrail.co.uk/running-the-railway/railway-upgrade-plan/		

Instrument: 1.6 Other revenue raising measures (environmental levies and fees)

Example name: 1.6.2 City of Port Townsend water utility fee to fund the purchase of the Winona Wetland Purchase

Example description: The Winola Wetlands serves as a natural habitat for biodiversity and has a critical function or the stormwater management of the city of Port Townsend, USA. To protect the wetland and its ecosystem services, the city purchased the wetland and uses a monthly storm water utility fee that all households are obliged to pay (an environmental levy) to repay a loan.

NbS description – not applicable as not linked specifically to a NbS example			
Location	City of Port Townsend, Washington, US		
NbS type	Creation	Restoration	Management
Ecosystem type	Wetland		
NbS benefits	Stormwater management; Biodiversity benefits		
NbS description	The Winola wetland serves as a natural habitat for biodiversity and has a critical function or the stormwater management of the City of Townsend.		
Scale (size)	6.5 acres		
NbS performance criteria	Not reported		
NbS performance	Not reported		
Financing description			
Source of financing	Private households		
Recipient	City of Port Townsend		
Scale (financing)	\$400,000		
Timeline	City of Port Townsend purchased the Winola Wetland with a loan from the Clean Water State Revolving Fund (CWSRF). The loan is paid back over a time period of several years, for which the city uses the revenues from the monthly storm water utility fee that households must pay.		
Financing requirements	The fee must be used to pay for public benefits.		
Financing performance	Not disclosed		
Transaction costs	Administrative costs to enforce the fee.		
Reference	EPA (undated) Wetlands Projects funded by the Clean Water State Revolving Fund (CWSRF). Available here: https://www.epa.gov/wetlands/clean-water-state-revolving-fund-srf-and-wetlands-fact-sheet-and-projects		

Instrument name: 2.1 Community asset transfer

Pondscape-specific definition: Local or national governments can transfer community organisations the ownership or management of public assets (e.g. land) at less than market value (low or no cost). The government can require that in return the community group manages the assets in line with some restrictions or objectives. By doing so, they can transfer the costs of managing that land (and delivering societal objectives, such as implementing and managing pondscapes) to community groups.

Category	Contracting approach			
Also-known-as				
Related instruments	Public private partnership			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Community organisation			
Payment form: What form is the payment?	Reduction of costs (due to the transfer of assets). Cash payment for the asset (generally at below market value).			
In return for what? What is the NBS project obliged to deliver in return?	The organisation that receives the community asset commits to managing the asset in line with societal objectives, e.g., they could be required to create and maintain pondscapes and public access.			
Recipient requirements: What requirements must recipients meet to receive finance?	The local/city/regional or national government must have assets that they can transfer.			
Project requirements: What requirements must the pondscape project meet?	The recipient must commit to managing the community asset in line with societal objectives (e.g. management of pondscapes).			
Other requirements: What additional requirements are attached to the financing?	-There must be willing and capable community organisations to take on the assets. - There must be a regulatory framework that allows community asset transfer at below market value (in some countries, this may be restricted by national legislation).			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off payment for transfer of the asset (generally low, below market value) Ongoing reduction in management costs.			
NBS type: What types of NBS is the financing for?	Pondscape <u>creation</u>	Pondscape <u>restoration</u>	Pondscape <u>management</u>	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Locality (2018) Understanding Community Asset Transfer: A guide for community organisations. Power to Change. https://www.powertochange.org.uk/wp-content/uploads/2018/07/Understanding-CAT-Guide-for-Community-Organisations.pdf			

Instrument: 2.1 Community asset transfer example

Example name: 2.1.1 Chapman's Pond Community Interest Company

Example description: Chapman's Pond is an urban pond that provides a habitat for local biodiversity, while serving as site for educational and recreational activities such as fishing, volunteering, or school excursions. The management of the lake was transferred from the City of York Council to the community organisation 'Chapman's Pond Community Interest Company,' which aims to maintain and enhance the value of site for the public and the natural environment. This community asset transfer is in the form of a ten-year lease at below market rates.

NbS description			
Location	York, UK		
NbS type	Creation	Restoration	Management
Ecosystem type	Pondscape		
NbS benefits	Habitats for insects and plants; Conservation value; Education and research; Recreation and well-being		
NbS description	The site is a designated public open space located in a residential urban setting, where the pond and its surrounding natural environment is valued as a site for fishing, dog walking, relaxing, picnics, etc. Although there is no exhaustive up to date species survey, volunteers are engaged in providing and enhancing habitats for the local flora and fauna, which provides further opportunities for environmental education.		
Scale (size)	2.6 ha, with 1/3 covered by the lake and 2/3 being woodland and meadow		
NbS performance criteria	<p>The management plan 2021-25 lists measures to manage the landscape, the fisheries, and the public usage and is considered to be successful if the pond</p> <ul style="list-style-type: none"> • is maintained to the satisfaction of the stakeholders and the wider community, • provides a safe, attractive public open space for in-/formal recreation, • provides a haven for wildlife and development increases its biodiversity, • provides a safe venue for informal and formal educational opportunities, • obtains and then preserves its Green Flag status. 		
NbS performance	Not reported		
Financing description			
Source of financing	The Chapman's Pond Community Interest Company, a not-for-profit community organisation run by local volunteers and few part-time employees.		
Recipient	The City of York Council		
Scale (financing)	Not reported; the council reduces its costs by transferring pond management to The Chapman's Pond Community Interest Company		
Timeline	The current lease is for 10 years and might be ongoing or one-off		
Financing requirements	The asset transfer had to be formally assessed as very-low-risk by a public authority. The community management of the site was first tested for a period of three years, during which it demonstrated desirable outcomes such as a restored fish population and improved landscapes.		
Financing performance	The Chapman's Pond Community Interest Company can sustain the management of the NbS and afford the below market value lease by issuing annual fishing permits (free for under 12's; £10.00 for juniors aged 12-16; £30.00 for adults). Together with the work of volunteers, this model is regarded to be responsible for substantially better outcomes than public management and funds were able to achieve in the past.		
Transaction costs	Community hearings were held and a formal report assessed the potential risks and opportunities of an asset transfer as very low. Monetary costs for this report or the community consultations are not reported. The community organisation had to be fully constituted, formally registered, and insured.		
Reference	chapmanspondyork.org		

Chapman's Pond Community Interest Company (2021) Chapman's Pond
Management plan 2021 – 2025. Available here:
<https://www.chapmanspondyork.org/management-plan>

Instrument name: 2.2 Public-private partnership

Pondscape-specific definition: A Public-private partnerships (PPP) is a long-term contract between a government entity and a private entity for providing a publicly beneficial service or asset, where the private party bears some risk and responsibility. PPPs can be attractive for governments as they can transfer upfront costs to private partners, take advantage of external expertise, and open new financing options. However, they can require costly ongoing payments to the private party. PPPs can take many different forms, including concessions (where private entities receive their income according to use of the service/asset, either through tolls or through “shadow tolls” paid by government) or private finance initiatives (where private entities receive public payment for meeting their performance targets).

Category	Contracting approaches			
Also-known-as	PPP			
Related instruments	Community asset transfer			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private: private for-profit companies or community organisations			
Payment form: What form is the payment?	Reduction or restructuring of cost and responsibilities (e.g. transfer of upfront costs away from the government).			
In return for what? What is the NBS project obliged to deliver in return?	Depends on PPP. Commonly, long-term regular payments for delivering services/providing assets. Sometimes shares of ownership (and profits).			
Recipient requirements: What requirements must recipients meet to receive finance?	The local/city/regional/national government must be able to service any costs involved in long-term contracts.			
Project requirements: What requirements must the pondscape project meet?	The project must be profitable for the private entity. Profits could come from the project itself (i.e. from entry fees) or from government payments in accordance with the contract.			
Other requirements: What additional requirements are attached to the financing?	PPPs require carefully considered contracts that will ensure that the private entity manages the asset in accordance with the government’s requirements, including sufficient incentives (e.g. penalties). These can be complex and costly to develop.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off reduction in costs (transfer of upfront costs to private entity) but ongoing increase in costs related to the contract			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance?	Simple	Medium	Complex	
Exist now in EU?	Yes		No	
References:	Merk, O., Saussier, S., Staropoli, C., Slack, E., Kim, JH (2012) Financing Green Urban Infrastructure, OECD Regional Development Working Papers 2012/10, OECD Publishing; http://dc.doi.org/10.1787/5k92p0c6j6r0-en			

Instrument: 2.2 Public-private partnership example

Example name: 2.2.1 Valley State Parks Camping and Day Use Area Concession, California, USA

Example description: The State of California Department of Parks and Recreation relied on a Public-Private Partnership (PPP) to operate three State recreational areas (Turlock Lake, Woodson Bridge, and Brannan Island SRA). The recreational areas are publicly owned state parks, with natural resources and recreational value and amenities such as campgrounds and boat ramps.

The PPP was a contractual arrangement that shifted responsibility for managing, operating, and maintaining the parks to the private operator. The private partner was required to submit and keep to an operations plan, which included maintaining recreational facilities, ensuring adequate staffing to maintain e.g. trails, collect user fees, and protect the State’s natural and cultural resources (though the State remained manager of natural resources). All costs associated with this maintenance were transferred to the private partner. In return, the private partner was entitled to collect user fees (at a level comparable to other state parks) and sell merchandise/goods on the site (e.g. firewood). The private partner was also required to pay an agreed level of rent (negotiated, at a minimum of 3% of revenue), which the State earmarked for long-term maintenance and infrastructure investment in the parks. The contract ran for five years.

NbS description	
Location	California, USA
NbS type	Creation Restoration Management
Ecosystem type	Parks with multiple ecosystem types
NbS benefits	Conservation value; recreation and well-being
NbS description	The parks are large public parks with exceptional natural value, which also offer recreational benefits. Ecosystems include forests, lakes, rivers, and foothills, among others. Each park has a campground and also allow day visitors, and also features amenities such as boat ramps, bathing facilities, etc.
Scale (size)	
NbS performance criteria	The PPP proposal included an operations plan, which set out planned actions to ensure NbS performance. No reported quantitative or qualitative performance criteria.
NbS performance	Not reported.
Financing description	
Source of financing	The successful private bidder was a company called American Land & Leisure (i.e. the private partner who successfully bid to win the concession to operate the state parks in accordance with the PPP).
Recipient	State of California, Department of Parks and Recreation
Scale (financing)	Rent: Minimum annual rent equivalent to 3% of gross receipts (e.g. from user fees and merchandise sales); minimum annual rents for each of the parks ranged from \$400-\$12,200. Cost saving: In addition to this annual rental fee, the Department of Parks and Recreation transfers all operating costs to the private partner. This is a significant cost saving, e.g. one of the five parks had operating costs of \$740,000 in 2011.
Timeline	<ul style="list-style-type: none"> - The Department of Parks and Recreation published a request for proposals, which outlines the PPP description, requirements, and selection process - Private parties submit proposals that include an operations plan for operating the park (vision, services offered, maintenance, staffing, natural resource management, community outreach etc.), rental offer, and evidence of financial ability. - The Department awards a five-year concession to the best bidder. - The concessionaire operates the park in accordance with their operations plan and pay annual rent to the Department.
Financing requirements	The private partner is required to,

	<p>“1. Maintain campground, day use, and recreational facilities, as well as signage; 2. Ensure adequate staffing to maximize use and protection of facilities, including roads and trails; 3. Collect campground and day use entrance fees; 4. Ensure the safety and convenience of park visitors; and 5. Protect the state’s natural and cultural resources.” (Gilroy, Kenny, & Morris 2013).</p> <p>The private partner was also required to take out a bond to cover full rental costs over the five-year contract, to minimise risk of non-payment to the State.</p>
Financing performance	Not reported
Transaction costs	Transaction costs include development and supervision of Request for Proposals and ongoing supervision of contractual agreement. No quantitative data reported.
Reference	<p>Gilroy, L; Kenny, H.; Morris, J. (2013) Parks 2.0: Operating State Parks Through Public-Private Partnerships. Reason Foundation Policy Study 419. Accessed 08.08.2022. Available https://www.buckeyeinstitute.org/library/doclib/Parks-2.0-Operating-State-Parks-Through-Public-Private-Partnerships.pdf</p> <p>State of California, Department of Parks and Recreation (2012) Request for Proposals at Valley State Parks Camping and Day Use Area Concession. Accessed 08.08.2022. Available: http://www.parks.ca.gov/pages/22374/files/Valley%20RFP%20%20Final%203-9-12.pdf</p>

Instrument name: 3.1 Philanthropic contributions

Pondscape-specific definition: Charitable donations for nature-based solution projects from private individuals, companies, or other private actors (e.g. foundations, NGOs), with low levels of conditionality relative to e.g. Voluntary beneficiary contributions.

Category	Voluntary contributions			
Also-known-as	Donations; bequest; charity			
Related instruments	Crowdfunding; voluntary beneficiary contributions			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private companies, private individuals, private charity foundations			
Payment form: What form is the payment?	Cash (donations)			
In return for what? What is the NBS project obliged to deliver in return?	No obligation but generally in return for non-market outputs (e.g. ecosystem services)			
Recipient requirements: What requirements must recipients meet to receive finance?	<ul style="list-style-type: none"> - The recipient must be trusted by donators, making it well-suited to NGOs and non-profits or to well-known (often local) pondscape developers. - Charitable donations can be tax deductible for the donator, but this may require the recipient to be a registered charity. 			
Project requirements: What requirements must the pondscape project meet?	The project must be attractive to the donator. For example, it may deliver socially beneficial outcomes or outcomes that are personally important to the donator.			
Other requirements: What additional requirements are attached to the financing?	Differ per funder. The project must meet the specific requirements of the funding body or person. Sometimes, this may require positive visibility for funder. If contributions are to be tax deducted as donations, high transparency may be required.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off or repeated.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes			No

Instrument: 3.1 Philanthropic contribution

Example name: 3.1.1 The Living Danube Partnership – Philanthropic contribution

Example description: The living Danube Partnership contributes to the restoration of rivers, wetlands, floodplains, reducing flood risk and restoring habitats along the Danube. The initiative was enabled through a €4.2 million donation by The Coca-Cola Company, which wishes to replenish freshwater resources.

NbS description	
Location	Danube River
NbS type	Creation Restoration Management
Ecosystem type	Wetland, floodplains
NbS benefits	Conservation value, flood management
NbS description	Measures included the removal of dykes, reconnection of former floodplains, improvement of flood capacity, reconstruction of wetland habitats for threatened and endangered species, and building of a fish passage.
Scale (size)	53 km ²
NbS performance criteria	Target to replenish 12 million m ³ freshwater by 2021; forecast river restoration of 134,5 km by 2021; Target to restore 5.327 ha wetland and floodplains by 2021.
NbS performance	According to forecasts and estimations in 2018, the targets will be met and even surpassed.
Financing description	
Source of financing	The Coca-Cola Company, through The Coca-Cola Foundation
Recipient	WWF (in cooperation with multiple private and public stakeholders)
Scale (financing)	€4.2 million
Timeline	Ongoing. The financial commitment by the Coca-Cola Company came in the form of a private grant. A steering group of different stakeholders was responsible for the yearly budget planning over a period of seven years. The group aimed at flexible financial governance to allow for adaptive management.
Financing requirements	The motivation of the Coca Cola Company is to “safely return to communities and nature an amount of water equal to what [they] use in [their] finished beverages.” Hence, the project design had to project a maximum water replenishment rate for its interventions, as well as an effective media outreach.
Financing performance	Not reported.
Transaction costs	Not reported. The partnership has to sustain substantial coordination costs.
Reference	WWF (2021) Restoring Rivers and Wetlands Living Danube Partnership – Results and Lessons May 2021. Available here: https://www.wwfcee.org/uploads/partnerships/LDP/WWF_CEE_Coca_Cola_Report_210526.pdf WWF. 2018. The Living Danube Partnership - Mid-term progress report. Available here: http://awsassets.panda.org/downloads/wwf_dcp_coca_cola_report_180810_screen.pdf

Instrument name: 3.2 Voluntary beneficiary contributions

Pondscape-specific definition: Negotiated, voluntary payments from beneficiaries (i.e. private companies or individuals who would receive a benefit from the development of the pond) to help cover NBS costs. Generally, these are for benefits that are localised and non-market, or for those that accrue indirectly through e.g. property value increases. Payments are donations and can be one-off or ongoing.

Category	Voluntary contributions			
Also-known-as				
Related instruments	Crowdfunding; philanthropic contributions; betterment levies; business improvement districts			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private companies (local), private individuals (local)			
Payment form: What form is the payment?	Cash (donation)			
In return for what? What is the NBS project obliged to deliver in return?	Non-market outputs (e.g. private benefits generated by the pond)			
Recipient requirements: What requirements must recipients meet to receive finance?	No requirements			
Project requirements: What requirements must the pondscape project meet?	Must generate benefits for the beneficiaries (which motivate them to voluntarily contribute)			
Other requirements: What additional requirements are attached to the financing?	May be more effective if donors receive additional benefits relative to others (e.g. involved in an association, better access, etc.), as this will reduce the risk of “free-riding” on others’ contributions.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off or ongoing.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	EY (2016) Value capture: options, challenges and opportunities for Victoria Technical Appendix Advice to Infrastructure Victoria October 2016. Infrastructure Victoria. Available here: https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/05/EY-Technical-Appendix-for-Value-Capture.pdf			

Instrument: 3.2 Voluntary beneficiary contributions example

Example name: 3.2.1 Wild Haweswater – United Utilities voluntary beneficiary contribution

Example description: Haweswater is a diverse watershed landscape, which provides a large share of the regional drinking water. In partnership with a conservation NGO, United Utilities (a privately owned water utility company) voluntarily invests into the restoration, conservation, and management of the landscape and its ecosystems to improve the flow, the availability, and the quality of raw drinking water.

NbS description	
Location	North West England, UK
NbS type	Creation Restoration Management
Ecosystem type	Watershed landscape
NbS benefits	Conservation value; Greenhouse gas sequestration; Water quality improvement; Recreation and well-being, Flood management; Water source for irrigation and livestock.
NbS description	The restoration of the watercourse of the Swindale Beck river slows water flow, reduces flooding, improves irrigation, and provides wildlife habitats. The blocking of artificial drains and restoring of peat bogs increased carbon stocks, recovered habitats, raised water storage, and improves water quality. The planting of >100.000 trees reduced soil erosion, improves water quality, and creates new habitats.
Scale (size)	3.000 ha
NbS performance criteria	<i>Not reported</i>
NbS performance	The partnership is considered very successful and was awarded the CIEEM High Commended in the Large Scale Conservation category.
Financing description	
Source of financing	United Utilities (private enterprise)
Recipient	NGOs and non-profits. The Royal Society for the Protection of Birds (RSPB) is a UK based conservation charity, co-managing the Haweswater Reservoir landscape.
Scale (financing)	Large (€100k-€999k) - Very large (€1million+)
Timeline	Ongoing. The collaboration between UU and RSPB is a long-term partnership. Various projects receive single contributions, e.g. £150,000 for a native tree and wildflower nursery.
Financing requirements	<i>Not reported</i>
Financing performance	<i>Not reported</i>
Transaction costs	The partnership between UU and RSPB is facilitated through the joint initiative Wild Haweswater, which employs a staff of ten people.
Reference	IUCN (2021) Haweswater - Demonstrating how upland farming, biodiversity recovery and water services work together to provide benefits for people, nature and the economy. Available here: https://www.iucn.org/news/ecosystem-management/202111/haweswater-demonstrating-how-upland-farming-biodiversity-recovery-and-water-services-work-together-provide-benefits-people-nature-and-economy

Instrument name: 3.3 Crowdfunding donations

Pondscape-specific definition: Raising funds for a pond or small-scale pondscape of local public interest through one-off or repeated donations of small amounts from a large number of individuals. Crowdfunding is generally facilitated through online platforms (e.g. Kickstarter). In addition to donation-based crowdfunding, crowdfunding can be based on equity models or loans; here we focus on donations. Crowdfunding is often based on an all-or-nothing model: if the funding target is reached, the NBS developer gets the money, if not, then it goes back to the donors.

Category	Voluntary contributions			
Also-known-as				
Related instruments	Philanthropic contributions; voluntary beneficiary contributions			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Multiple private individuals, private companies			
Payment form: What form is the payment?	Donation			
In return for what? What is the NBS project obliged to deliver in return?	No obligation. Experience of participation and shared ownership. Note: crowdfunding can also be equity or debt-based, which has different obligations.			
Recipient requirements: What requirements must recipients meet to receive finance?	The recipient must be trusted by donors, making it well-suited to NGOs and non-profits or to well-known (often local) pondscape developers.			
Project requirements: What requirements must the pondscape project meet?	- The project goal should be relatable to a broad audience, and the project processes need to be transparent.			
Other requirements: What additional requirements are attached to the financing?	- Effective communication strategy to attract initial donations - Active, ongoing outreach to establish and sustain connection with the donor base to facilitate a personal identification with the project, its goals, and its benefits (and ensure ongoing donations).			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Mostly one-off, but possible as repeated (for consecutive project phases) or regular ongoing (e.g. monthly).			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple	Medium	Complex	
Exist now in EU?	Yes		No	
References:	Baroni et al. (2019) Grow Green – Approaches to financing nature-based solutions in cities.			

Instrument: 3.3 Crowdfunding example

Example name: 3.3.1 Wetland construction in Treflach, UK – crowdfunding donations

Example description: The aim of the project is to construct a wetland on private land at the organic Treflach farm, starting in 2020. It consists of five new swales and a shallow pond, as well as the incorporation of an existing pond. There are multiple benefits, such as to reduce the speed of water flow, reduce flooding, reduce nutrient leakage, create ponds for biodiversity, support soil water filtering, facilitate learning for school education but also for replication by other regional landowners, provide local jobs, and offer opportunities for recreation. The benefits extend beyond the farm, as the proposed wetland will slowly release clean water, with low nutrient levels, to feed the adjacent Sweeney Fen Nature Reserve. In return, rare plants from the Fen are likely to colonise the proposed wetland. The proposed wetland constructions follows already undertaken efforts to regenerate an existing wetland (including a pond) through preventing animal access, making drainage alterations to farm buildings, addressing silting, and laying a reed way. The proposed wetland construction is financed through a crowdfunding campaign conducted over 31 days in February - March 2020, during which 288 private individuals donated £12,703 to the owner of Treflach farm, Ian Steele. Treflach Farm will provide the land and the labour to build the site; the money will be for the hire of a digger, bentonite clay and geo-membranes, trees, plants, reeds and woodchip.

NbS description			
Location	The organic Treflach farm in England, United Kingdom		
NbS type	Creation	Restoration	Management
Ecosystem type	Wetland (five swales and two ponds)		
NbS benefits	reduce flooding, reduce speed of water flow, biodiversity, reduce nutrient leakage, support soil water filtering, facilitate learning for schools and landowners, provide local jobs, recreation		
NbS description	Construction of five swales - clay lined ditches dug along the contour of the hill – and a shallow ponds, as well as the restoration and incorporation of an existing pond into the wetland		
Scale (size)	140 metres (swales), ca. 0.6 ha (new and existing pond)		
NbS performance criteria	No assessment of this project found.		
NbS performance	The performance of the NbS is not reported. However, the restoration efforts undertaken before 2020 already led to increased sightings of protected species (as evidenced in photos used in crowdfunding campaign).		
Financing description			
Source of financing	Donors to crowdfunding campaign (288 supporters)		
Recipient	Pondscape developer (private organic farm)		
Scale (financing)	Medium (£12,703) – spend on material costs and education/ outreach (labour and land are provided by Treflach farm)		
Timeline	One-off payment 1. Preparation of crowdfunding 2. Crowdfunding (31 days, completed on 22.03.2020)		
Financing requirements	No specific conditions on the finance, needed to convince individual private donors that the project was worth supporting. In this case, this required: - A clear, non-technical, project proposal and description including a video, maps, photos, project history - Clear communication on the underlying values and principles, as well as the anticipated benefits for the landowner and the surrounding environment/community - Outreach on social media and crowdfunding platform		
Financing performance	Return on investment not reported.		
Transaction costs	- Cost of communication not reported but probably low. - Donors received rewards (gift packages of various extent and value, depending on the amount donated).		

	- Platform costs for standard projects is: 3%+VAT; platform costs for charities, personal causes, community projects, not-for-profit campaigns and not-for-profit businesses: 1.9%+VAT (not reported which category applied)
Reference	Steele, I. (2020). <i>Wetland Construction & Regeneration</i> . Crowdfunder UK. https://www.crowdfunder.co.uk/wetland-construction-regeneration . (Last accessed 15-12-2021)

Instrument name: 4.1 Payment for ecosystem services (PES)

Pondscape-specific definition: PES are a voluntary transaction where a user (e.g. a beneficiary) pays a provider of ecosystem services (e.g. a Pondscape landowner or manager) for natural resource management that delivers offsite services (Wunder 2014). Offsite services can be understood as ecosystem services, such as water quality improvements, pollination, cultural or spiritual values, among others. Payments can be input-based (e.g. based on the costs of managing a pondscape) or result-based, i.e. depending on the achieved level of ecosystem service provision (Illes et al., 2017). Payment for ecosystem service agreements create incentives for providers (e.g. pondscape NbS developers) to maintain or increase ecosystem service supply, paid for by those who enjoy the external benefits that they generate.

Payment for ecosystem services can take many different forms, including bilateral agreements between a singular beneficiary and singular provider; collective action PES, where an institution combines resources from multiple beneficiaries (private parties, NGOs, government bodies) to pay landowners for management actions that deliver ecosystem services; or market-approaches (see the Transfer-based instruments factsheets).

Note: we discuss publicly funded PES under Grants; here we focus on privately funded PES).

Category	Tradable rights/permits and payments for ecosystem services			
Also-known-as	PES			
Related instruments	Biodiversity offsets; habitat banking; voluntary beneficiary contribution; water quality trading systems			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Any actor who wants to voluntarily fund provision of ecosystem services (note: we discuss publicly funded PES under <i>grants</i> ; here we focus on privately funded PES).			
Payment form: What form is the payment?	Cash OR offset credit or certificate (which can then be sold for cash).			
In return for what? What is the NBS project obliged to deliver in return?	Ecosystem-service provision – any ecosystem service (e.g., biodiversity provision, climate adaptation, climate mitigation, other).			
Recipient requirements: What requirements must recipients meet to receive finance?	Any landowner generating ecosystem services can participate.			
Project requirements: What requirements must the pondscape project meet?	<p>If PES are <u>input-based</u> (i.e. pondscape developer receives payment for taking actions e.g. installing ponds), then fewer requirements (just must demonstrate you have taken actions that will lead to ecosystem service provision).</p> <p>If PES are <u>result-based</u>:</p> <ul style="list-style-type: none"> - Measurable impacts: The pondscape project needs to be able to demonstrate measurable change or continuation of ecosystem service provision. This can increase complexity and cost for NbS providers. 			
Other requirements: What additional requirements are attached to the financing?	<ul style="list-style-type: none"> - Access to users of ecosystem services willing to pay providers (i.e. pondscape NbS developers) - May require technical expertise in PES standards and certification processes. - Landowners may have to finance the development of the project upfront (and verify results) before receiving offset credits or certificates that they can sell. 			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off or ongoing. Some PES payments occur only once, while others are structured to provide long-term annual payments for landowners.			

NBS type: What types of NBS is the financing for?	Pondscape creation		Pondscape restoration		Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)		Very large (€1million+)	
Complexity: How complex is applying for the finance	Simple		Medium		Complex	
Exist now in EU?	Yes			No		
References:	<p>Illes, A., Russi, D., Kettunen, M., and Robertson M. (2017) Innovative mechanisms for financing biodiversity conservation: experiences from Europe, final report in the context of the project "Innovative financing mechanisms for biodiversity in Mexico / N°2015/368378". Brussels, Belgium https://ieep.eu/uploads/articles/attachments/dcc74b53-6750-4ccd-99b9-dc9e9d659dd4/IFMs_for_biodiversity_EUROPE_Illes_et_al_2017.pdf?v=63664510044</p> <p>Vaissière, A.-C., Quétier, F., Calvet, C., Levrel, H., & Wunder, S. (2020). Biodiversity offsets and payments for environmental services: Clarifying the family ties. Ecological Economics, 169, 106428. doi:10.1016/j.ecolecon.2019.10642</p> <p>Wunder, S. (2014) Revisiting the concept of payments for environmental services. Ecological Economics. http://dx.doi.org/10.1016/j.ecolecon.2014.08.016</p>					

Instrument: 4.1 Payment for Ecosystem (PES) example

Example name: 4.1.1 Vittel (Nestlé Waters) PES

Example description: Agricultural intensification in the water catchment area of the Nestlé Waters' Vittel water source in Northern France led to increased nitrogen pollution of soil and ground water resources. For this reason, Nestlé Water started a PES scheme to incentive farmers to adopt improved agricultural and land-use practices. Under these long-term contractual agreements, farmers reduce their chemical fertiliser input and change their crop management, among other actions, to decrease nitrification of local waters.

NbS description	
Location	Vittel, France
NbS type	Creation Restoration Management
Ecosystem type	Water catchment area with intensive agricultural land-use.
NbS benefits	Improved quality of ground water resources.
NbS description	Improved agricultural- and land-management practices reduce the nitrification of groundwater resources.
Scale (size)	The total size of the affected area is not reported but is likely to cover thousands of hectares.
NbS performance criteria	Nitrate concentrations in ground water (measured daily); nitrate concentration in the soil.
NbS performance	The programme has been assessed to be successful.
Financing description	
Source of financing	Nestlé Waters, owner of the Vittel water brand.
Recipient	Local farmers
Scale (financing)	Very large. Overall Vittel spent about 24 million € within the first seven years of the programme. Farmers receive on average €200/ha/year and may receive €150.000 per farm for modernisation investments.
Timeline	Contracts are long-term, ranging from 5 to 30 years. Depending on the specific agreements, some payments can be one-off (investments for farm modernisations) or on-going (for ongoing land-use practices).
Financing requirements	Farmers need to apply improved land management practices that are expected to reduce nitrate concentrations in the soil. Such practices include among others the replacement of maize animal feed with alfalfa and hay, the reduction of stocking rates to one head per hectare, a reduced use of agrochemicals and improved waste management. Farmers are paid to implement the practices (i.e. not result-based).
Financing performance	The estimated costs of the PES solution equals per m ³ of purified drinking water equals €1.52.
Transaction costs	The cooperation bears substantial transaction costs, which include among other things monitoring activities and the establishment of an intermediary agency (Agrivair institute) to facilitate the transactions between farmers and Nestlé Waters. No quantitative data has been published on these costs.
Reference	Illes, A., Russi, D., Kettunen, M. and Robertson M. (2017) Innovative mechanisms for financing biodiversity conservation: experiences from Europe. Available here: https://ec.europa.eu/environment/nature/biodiversity/financing_en.htm Perrot-Maître, D. (2006) The Vittel payments for ecosystem services: a “perfect” PES case? Available here: https://pubs.iied.org/sites/default/files/pdfs/migrate/G00388.pdf

Instrument name: 4.2 Transfer-based instruments: voluntary carbon markets

Pondscape-specific definition: Where a pondscape landowner/manager provides a verified level of an ecosystem service (e.g. carbon sequestration) in return for tradeable certificates, which they can then sell to buyers either bilaterally or through a market. To earn certificates, landowner/managers generally must implement specific methodologies that specify monitoring, reporting, and verification guidelines, alongside other rules. Markets can be voluntary markets (where buyers voluntarily purchase certificates) or compliance markets (where buyers are obligated to purchase certificates to meet regulatory requirements).

Voluntary carbon markets⁴⁵ occur where landowners/managers (or other actors) voluntarily generate carbon credits by implementing a specific action and methodology to mitigate climate change, e.g. by reducing emissions or sequestering carbon through e.g. tree planting, where each carbon credit is equivalent to a tonne of carbon dioxide mitigation (Climate Focus, 2021). They then sell these certificates to buyers in the voluntary market, who use these to “offset” their own emissions (TSVCM, 2021). Voluntary carbon markets generally establish specific methodologies, which landowners/managers must implement to calculate and earn offset credits (Climate Focus, 2021). Examples of voluntary carbon markets include Verra VCS, Gold Standard, and MoorFutures, among others. Eligible voluntary carbon market activities include, e.g., afforestation, rewetting peatlands, among others.⁴⁶

Category	Tradable rights/permits and payments for ecosystem services			
Also-known-as				
Related instruments	Biodiversity offsets; habitat banking; voluntary beneficiary contribution; water quality trading systems			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Any actor who wants to voluntarily fund climate mitigation, e.g. a corporation with net zero targets, an individual offsetting their own emissions, etc.			
Payment form: What form is the payment?	Carbon credit or certificate that is equivalent to 1t of carbon dioxide mitigated, which can then be sold for cash.			
In return for what? What is the NBS project obliged to deliver in return?	Ecosystem-service provision - climate mitigation, as demonstrated by implementing the voluntary carbon market methodology and following their rules.			
Recipient requirements: What requirements must recipients meet to receive finance?	Any landowner can participate. Some voluntary carbon markets have eligibility requirements; these will differ across different voluntary carbon markets.			
Project requirements: What requirements must the pondscape project meet?	Only projects with activities that are eligible for the voluntary carbon market will be acceptable (e.g. peatland rewetting, afforestation, etc). The project must implement activities in line with the voluntary carbon market methodology, which will include specific instructions for calculating and monitoring the mitigation impact, verifying and validating impacts, among other rules. This can be complex and costly for NbS providers.			
Other requirements: What additional requirements are attached to the financing?	<ul style="list-style-type: none"> - Existence of a voluntary carbon market and methodology that is pond-appropriate, - May require technical expertise in voluntary carbon market standards and certification processes. - Landowners may have to finance the development of the project upfront (and verify results) before receiving offset credits or certificates that they can sell. 			

⁴⁵ In compliance carbon markets, buyers are regulatorily required by governments to mitigate climate change or to offset their emissions by purchasing carbon credits from others. An example is the European Emissions Trading Scheme. We do not discuss compliance carbon markets in the inventory as they are less likely to be a source of funding for pondscape NBS projects than voluntary markets. This is because compliance markets often focus on reducing industrial emissions (rather than mitigation by incentivizing carbon removals by NbS) and often exclude the land sector.

⁴⁶ See for example the different methodologies approved for earning Verra VCS credits: <https://verra.org/methodologies/>

Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off or ongoing. Some PES payments occur only once, while others are structured to provide long-term annual payments for landowners.			
NBS type: What types of NBS is the financing for?	Pondscape creation		Pondscape restoration	Pondscape management
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Climate Focus (2021) VCM Primer. https://vcprimer.org/ TSVCM (2021) Taskforce on Scaling Voluntary Carbon Markets Final Report. https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf Verra (2022) Voluntary Carbon Markets (webpage) https://verra.org/voluntary-carbon-markets/			

Instrument: 4.2 Voluntary carbon market example

Example name: 4.2.1 MoorFutures

Example description: MoorFutures is a voluntary carbon market whose methodology mitigates climate change by rewetting peatlands (and thus reducing carbon emissions). It is located in the German states of Schleswig-Holstein, Brandenburg and Mecklenburg Western Pomerania. The programme was established in 2011 by the Ministry for Agriculture, Environment and Consumer Protection of Mecklenburg Western Pomerania. The Ministry acts as an intermediary body and guarantees that the projects financed through the MoorFutures will be maintained at least for a period of 30 to 50 years. The projects cover about 140 ha in the three federal states. They provide benefits not only in terms of carbon storage, but also of biodiversity conservation. The programme is financed through a voluntary carbon credit scheme, where private citizens, companies and government bodies can buy carbon offsetting credits that finance the peatland restoration. One carbon credit corresponds to one tonne of saved CO₂. This is calculated with support from external consultants, who estimate the reduction in carbon emissions in the future due to peatland rewetting. Landowners are required to ensure that carbon storage is permanent through 50+ year contracts. In return, they receive payments sufficient to cover costs, equivalent to between 35 and 67 Euro per certificate (i.e. per tonne of carbon emissions avoided). As of 2021, MoorFutures credits for three of the five projects are already sold out.

NbS description	
Location	Germany (Schleswig-Holstein, Brandenburg and Mecklenburg-Western Pomerania)
NbS type	Creation Restoration Management
Ecosystem type	Peatland
NbS benefits	Carbon capture and storage, biodiversity conservation
NbS description	Peatland restoration at five sites: <ol style="list-style-type: none"> 1. Königsmoor (Schleswig-Holstein): 68 ha, ongoing since 2016, 39520 MoorFutures = 39520 t CO₂e, 53,78 Euro 2. Polder Kieve (Mecklenburg Western Pomerania): 65 ha, ongoing since 2012, 14325 MoorFutures = 14325 t CO₂e, 35 Euro (sold out) 3. Kamerunwiese (Mecklenburg Western Pomerania), 8 ha, since 2018, 3000 MoorFutures = 3000 t CO₂e, price unknown (sold out, all credits have been purchased by the Hamburg Ministry of Environment and Energy) 4. Gelliner Bruch (Mecklenburg Western Pomerania), 6,7 ha, since 2017, 5800 MoorFutures = 5800 t CO₂e, 40 Euro (sold out) 5. Rehwiese (Brandenburg), 9,7 ha, since 2015, 6744 MoorFutures = 6744 t CO₂e, 67,23 Euro
Scale (size)	ca. 140 ha (four sites in total)
NbS performance criteria	Based upon estimated mitigation (t carbon dioxide equivalent). This is estimated based upon difference between baseline emissions (i.e. current emissions) and emissions after rewetting.
NbS performance	See NbS description cell above for amount of mitigation achieved in each MoorFutures site.
Financing description	
Source of financing	Carbon credits purchased by private citizens and companies. The main buyers are companies (70% of credits sold), including Engbers, McDonald's, Commerzbank, with the remainder sold to individuals.
Recipient	MoorFutures partner organisations, which implement the peatland restoration (i.e. landowners)
Scale (financing)	Large: from €90,000- €213,000 per project (*assuming a price of 30 Euro per MoorFutures credit for the project Kamerunwiese)
Timeline	Ongoing restoration depending on the sale of credits, project should be maintained for at least 30-50 years
Financing requirements	Not reported
Financing performance	Not reported
Transaction costs	Not reported

Reference

<https://www.moorfutures.de/projekte/> (last accessed 17/01/2021)

Illes, A., Russi, D., Kettunen, M. and Robertson M. (2017) Innovative mechanisms for financing biodiversity conservation: experiences from Europe, final report in the context of the project “Innovative financing mechanisms for biodiversity in Mexico / N°2015/368378”. Brussels, Belgium,
https://ieep.eu/uploads/articles/attachments/dcc74b53-6750-4ccd-99b9-dc9e9d659dd4/IFMs_for_biodiversity_EUROPE_Illes_et_al_2017.pdf?v=63664510044.

McDonald, H.; Bey, N.; Duin, L.; Freluh-Larsen, A.; Maya-Drysdale, L.; Stewart, R.; Pätz, C.; Hornsleth, M.; Heller, C.; Zakkour, P. (2021): Certification of Carbon Removals: Part 2. A review of carbon removal certification mechanisms and methodologies. Prepared for European Commission DG CLIMA under contract no. 40201/2020/836974/SER/CLIMA.C.2 Environment Agency Austria, Wien, Reports, Band 0796. Available at:
<https://www.umweltbundesamt.at/fileadmin/site/publikationen/rep0796.pdf>, last accessed 05.07.2022.

Instrument name: 4.3 Transfer-based instruments: Biodiversity offsets and habitat banking

Pondscape-specific definition: Transfer-based instruments consist of pondscape landowner/managers providing a verified level of an ecosystem service (e.g. carbon sequestration) in return for tradeable certificates, which they can then sell to buyers either bilaterally or through a market. To earn certificates, landowner/managers generally must implement specific methodologies that specify monitoring, reporting, and verification guidelines, alongside other rules. Markets can be voluntary markets (where buyers voluntarily purchase certificates) or compliance markets (where buyers are obligated to purchase certificates to meet regulatory requirements).

Biodiversity offsets are a transfer-based funding system where the person implementing the NbS is paid for providing a measurable ecological gain (i.e., biodiversity improvement) by an external party who are offsetting an ecological loss that occurs on a different site (DEFRA, 2013). Biodiversity offsets are commonly motivated by regulations requiring any business developments (e.g., new factory or housing) to achieve No Net Loss⁴⁷ of biodiversity (*Ibid.*). To achieve no net loss, developers then pay others to deliver biodiversity improvements in other areas. Biodiversity offsets can be voluntary (e.g. to achieve corporate social responsibility objectives) but are most often a form of compliance market, with different degrees of government intervention (Siak Koh, Hahn & Bonstra, 2019).

Habitat banking is a type of transfer-based instrument where landowners or managers manage land for conservation in line with streamlined guidelines in return for payment in the form of biodiversity offset credits, which are paid to them by an intermediary (who “banks” the biodiversity offsets) (ICF GHK 2013). The resulting credits can then be sold as biodiversity offsets to buyers required to compensate for ecological damage (as long as the habitat banking biodiversity gains are considered ecologically equivalent). By centralising and streamlining the process, the intermediary aims to lower the cost of generating biodiversity credits (relative to biodiversity offsets) by establishing robust, consistent methods for developing and verifying conservation actions and results and through economies of scale (ICF GHK 2013). Habitat banks are distinct from other biodiversity offsets as the credits are produced before and without links to the biodiversity debits that they will later compensate for and can be stored over time (eftec et al 2010).

Category	Tradable rights/permits and payments for ecosystem services			
Also-known-as				
Related instruments	Payment for Ecosystem Services (PES); Voluntary carbon markets; water quality trading systems			
Appropriate for: <i>Who can use this type of financing instrument?</i>	Pondscape developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: <i>Who provides the finance?</i>	Any actor who requires biodiversity compensation because they are negatively impacting biodiversity on another site and are required to offset this damage to achieve No Net Loss of biodiversity. This may include private real estate developers but also municipalities or cities.			
Payment form: <i>What form is the payment?</i>	Offset credit or certificate (which can then be sold for cash).			
In return for what? <i>What is the NBS project obliged to deliver in return?</i>	Ecosystem-service provision – biodiversity.			
Recipient requirements: <i>What requirements must recipients meet to receive finance?</i>	Any landowner can participate.			

⁴⁷ No Net Loss implies that any negative impacts that human development has on biodiversity must be balanced by at least equivalent biodiversity gains elsewhere. No Net Loss is often implemented through the mitigation hierarchy, which calls for development to avoid, minimize, and restore any biodiversity damage on site, with any remaining damage required to be offset elsewhere.

<p>Project requirements: What requirements must the pondscape project meet?</p>	<ul style="list-style-type: none"> - The project must deliver biodiversity improvements, and these must be considered ecologically equivalent to the biodiversity losses. This is sometimes calculated using indicator metrics that aim to capture the habitat distinctiveness and change in quality (e.g. DEFRA, 2013). - Measurable impacts: The pondscape project needs to be able to demonstrate measurable ecological gains (i.e. biodiversity improvements). This is generally demonstrated in relation to a pre-NBS baseline. - Additional impacts: The biodiversity improvements need to go beyond what would have occurred without the biodiversity offset incentive (“additionality”). This means that biodiversity offsets are most suitable for land with high biodiversity improvement potential, rather than land that is already under protection. - Permanence: The project must ensure that the biodiversity benefits will remain for the long-term (e.g. by proving that there is sufficient funding for the entire project lifetime). 			
<p>Other requirements: What additional requirements are attached to the financing?</p>	<ul style="list-style-type: none"> - Access to biodiversity offset credit markets or habitat banks. - Technical expertise in standards and certification processes. - Landowners may have to finance the development of the project upfront (and verify results) before receiving offset credits or certificates that they can sell. 			
<p>Speed: How quickly do recipients receive money?</p>	<p style="text-align: center;">Fast (<4months) – Medium(5-12months) – Slow (12months+)</p>			
<p>Funding timeline: When does the recipient receive the funding?</p>	<p>One-off or ongoing. Some biodiversity offset payments occur only once, while others are structured to provide long-term annual payments for landowners.</p>			
<p>NBS type: What types of NBS is the financing for?</p>	<p>Pondscape creation</p>		<p>Pondscape restoration</p>	<p>Pondscape <u>management</u></p>
<p>Scales: What scale of financing?</p>	<p>Small (<€10k)</p>	<p>Medium (€10k-€99k)</p>	<p>Large (€100k-€999k)</p>	<p>Very large (€1million+)</p>
<p>Complexity: How complex is applying for the finance</p>	<p>Simple</p>		<p>Medium</p>	<p>Complex</p>
<p>Exist now in EU?</p>	<p>Yes</p>			<p>No</p>
<p>References:</p>	<p>DEFRA (2013) Biodiversity offsetting in England Green paper. UK Government. https://consult.defra.gov.uk/biodiversity/biodiversity_offsetting/supporting_documents/20130903Biodiversity%20offsetting%20green%20paper.pdf</p> <p>eftec et.al (2010) The use of market-based instruments for biodiversity protection –The case of habitat banking – Technical Report. https://ec.europa.eu/environment/enveco/pdf/eftec_habitat_technical_report.pdf</p> <p>ICF GHK (2013) Exploring potential demand for and supply of habitat banking in the EU and appropriate design elements for a habitat banking scheme. Final Report submitted to DG Environment. https://ec.europa.eu/environment/enveco/taxation/pdf/Habitat_banking_Report.pdf</p> <p>Niak Sian Koh, Thomas Hahn, and Wiebren J. Boonstra (2019) “How Much of a Market Is Involved in a Biodiversity Offset? A Typology of Biodiversity Offset Policies,” Journal of Environmental Management 232. https://www.sciencedirect.com/science/article/pii/S0301479718313458</p> <p>Vaissière, A.-C., Quétier, F., Calvet, C., Levrel, H., & Wunder, S. (2020). Biodiversity offsets and payments for environmental services: Clarifying the family ties. Ecological Economics, 169, 106428. doi:10.1016/j.ecolecon.2019.10642</p>			

Instrument: 4.3 Transfer-based instruments: Biodiversity offsets and habitat banking example

Example name: 4.3.1 Eco-Accounts biodiversity offset: Lauter creek restoration

Example description: A small creek, the ‘Lauter’ in Germany, was modified to resemble a more natural stream which allows for fish migration. The 50.000€ restoration costs were paid for by private purchasers of newly constructed houses to offset the residual biodiversity impact of the development. The process followed the Eco-Accounts framework of the federal state of Baden-Württemberg, which quantifies negative biodiversity impacts to facilitate their offsetting through likewise quantifiable compensation measures.

Generally, the Eco-Accounts framework in Germany requires local municipalities to measure the negative biodiversity impact of building developments and require that these be offset by like-for-like biodiversity restoration. This biodiversity restoration can be either developed individually to offset a specific new development (as in the Lauter creek restoration). Alternatively, a habitat banking approach can be used, where the local municipality pays landowners in advance for compensatory actions which are then credited as “eco-points” to a central compensation pool, that developers can then purchase to cover their negative biodiversity impacts (Sian Koh, Hanh, & Boonstra 2019).

NbS description	
Location	Dettingen unter Teck, Germany
NbS type	River restoration
NbS benefits	Habitats for insects and plants; Conservation value
NbS description	The restoration of the municipal river ‘Lauter’ contributed to the broader goal of achieving river continuity for fish migration. For this purpose, a dam and weirs were removed, and the riverbed was restored by constructing rapids and pools. Riparian vegetation was replanted along the river benches.
Scale (size)	Not reported.
NbS performance criteria	Not reported.
NbS performance	Not reported.
Financing description	
Source of financing	90% of the total costs were covered by 50 private homeowners, who paid a share proportional to their purchase of the total land for which compensation was required due to the residual impact of new housing development. The remaining 10% of the total costs were paid by the municipality.
Recipient	StadtLandFluss, a regional landscape planning office specialized in conservation and restoration planning, who developed the project.
Scale (financing)	€50.000
Timeline	One-off, as a commercial service.
Financing requirements	<p>Eco-Accounts are the biodiversity offsetting credits of the German state of Baden-Württemberg. They are managed on the municipal level and compensation measures are carried out within the municipal boundaries. Credits are mostly generated by the same actor for whose activities compensation is required, in which case credits are not traded (also applying to this example).</p> <p>Offsetting measures must satisfy one of the following criteria:</p> <ul style="list-style-type: none"> - improve the quality of a given habitat, - create high value habitats, - support specific species, - re-create natural retention areas, - re-create and improve the functions of soils, - improve groundwater quality <p>The restoration of the ‘Lauter’ was assessed as a “punctual compensation measure,” which is defined as a “small-area compensation measures resulting in ecological improvements going far beyond their surface and yielding positive effects across an area which is difficult to determine strictly” (Mazza & Schiller, 43-44).</p>

	Under this scheme every Euro spent for the compensation is accredited four Eco-Account credits, resulting in 200.000 credits.
Financing performance	Not reported.
Transaction costs	The process requires a technical valuation of the residual impacts, as well as a quantification of the offsetting measures. Transaction costs are not reported for this case but have likely resulted from the relatively high complexity of this task and the expertise required for it.
Reference	<p>Mazza L. & Schiller J. (2014) The use of eco-accounts in Baden-Württemberg to implement the German Impact Mitigation Regulation: A tool to meet EU's No-Net-Loss requirement? Available here: https://ieep.eu/publications/the-use-of-eco-accounts-in-baden-w-rttemberg-to-implement-the-german-impact-mitigation-regulation</p> <p>Sian Koh, Niak; Hahn, Thomas; Boonstra, Wiebren J. (2019) "How Much of a Market Is involved in a Biodiversity Offset? A Typology of Biodiversity Offset Policies," Journal of Environmental Management 232.</p>

Instrument: 4.3 Transfer-based instruments: Biodiversity offsets and habitat banking example

Example name: 4.3.2 ‘District Licensing’ for Great Crested Newts

Example description: In the South Midlands, England, private real estate developers whose developments have potentially adverse effects on newts can offset those impacts through the ‘District Licensing’ for Great Crested Newts. It is an alternative to the conventional mitigation and compensation approach for real estate developments. The ‘District Licensing’ approach compensates each destroyed pond with four newly constructed ponds, fully funded by the developer. Conservation entities implement the scheme, using the financing to fund pond development on This approach is considered a win-win. The private real estate developer benefits from a faster licensing process and greater planning certainty, while newts benefit from a net increase in habitats.

NbS description			
Location	South Midlands, England, UK		
NbS type	Creation	Restoration	Management
Ecosystem type	Ponds		
NbS benefits	Biodiversity		
NbS description	Ponds are rare habitats for the endangered and protected Great Crested Newts.		
Scale (size)	The scheme aims to create/restore 500 ponds of at least 600m ² , with 386 already restored/created by Dec. 2020.		
NbS performance criteria	Pond size: ponds must be larger than 600 m ² Biodiversity score: Ponds must reach a habitat suitability index score of greater than 0.7 Surrounding area: There must be 0.5 ha of adjoining terrestrial habitat and 500 m of ‘connecting’ habitat such as hedgerows for each new pond.		
NbS performance	The scheme is considered to be more successful than the conventional licensing approach as it creates a net increase in newt habitats.		
Financing description			
Source of financing	Private real estate developers.		
Recipient	Conservation entities who act as pond developers (e.g. The Wildlife Trust), intermediated through Natural England (a public agency).		
Scale (financing)	Direct financing in first year was £200,000 ⁴⁸ , across 29 projects (average of £6900 per project). Payment rates to pond developers are individually negotiated, so range in size. Real estate development payments in first year were £0.5 million, with individual developer payments ranging from £500-more than £20,000, depending on expected negative impact on ponds.		
Timeline	Ongoing: Landowners receive an annual payment on a five-year rolling contract (to allow for flexibility) with a commitment to payments for at least 25 years.		
Financing requirements	Financing goes to private or public sites. The site must offer potential high-quality habitat for newts. Pond developers must sign rolling five-year contracts.		
Financing performance	Although the habitat offsetting approach can be slightly more expensive in some cases than the conventional approach, private real estate developers favour the approach as it is faster and reduces uncertainties. This advantage has funded the creation of 386 ponds.		
Transaction costs	“A significant investment of time and resources was needed to set the scheme up because it required: <ul style="list-style-type: none"> • brokering partnerships with Local Planning Authorities • surveying and modelling the newt distribution and habitats across the region • defining conservation objectives and a conservation plan (that refer to local and regional Favourable Conservation Status) 		

⁴⁸ Note this figure includes pond creation and set aside for ongoing management, excludes all transaction costs administration costs.

	<ul style="list-style-type: none"> • ensuring compliance with European Protected Species legislation and the new licensing policies • ensuring that the technical, legal and administrative processes are simple for developers and planners • establishing a delivery mechanism for creating, managing and monitoring large networks of newt habitats in perpetuity.” (Tew et.al 2019; 37). 85% of developer money goes directly into habitat creation/restoration, management and monitoring, leaving 15% for other purposes of which some (or all) may cover transaction costs (i.e. administration of the scheme through Natural England).
Reference	<p>Tew, T., Biggs, J. and Gent, T. (2018). ‘District Licensing’ for Great Crested Newts – Delivering a Big Idea. In Practice – Bulletin of the Chartered Institute of Ecology and Environmental Management, 100: 33-37.</p> <p>Tew, T., Biggs, J. and Gent, T. (2019) District Licensing for Great Crested Newts – A Successful First Year for the South Midlands Scheme. In Practice – Bulletin of the Chartered Institute of Ecology and Environmental Management, 103: 28-32.</p>

Instrument name: 4.4 Transfer-based instruments: Water quality trading systems

Pondscape-specific definition: Transfer-based instruments consist of pondscape landowner/managers providing a verified level of an ecosystem service (e.g. carbon sequestration) in return for tradeable certificates, which they can then sell to buyers either bilaterally or through a market. To earn certificates, landowner/managers generally must implement specific methodologies that specify monitoring, reporting, and verification guidelines, alongside other rules. Markets can be voluntary markets (where buyers voluntarily purchase certificates) or compliance markets (where buyers are obligated to purchase certificates to meet regulatory requirements).

Water quality trading systems are a mandatory transfer-based instrument where a government sets a limit on the total amount of pollution (a 'cap') and require polluters to meet this cap by either reducing their own pollution and/or by purchasing pollution reduction credits from other actors who have reduced their pollution (Faeth 2000). NbS landowners/managers can finance their projects by selling credits (also called allowances or certificates), which they receive for mitigating pollution, either based on inputs (e.g. implementation of specific measure, such as building a pond) or on results (e.g. estimated impact of pond management on water quality). Common pollutants targeted include phosphorus or nitrogen, but other examples include temperature, salinity, and temperature (Salzman et al 2018). In return for mitigating pollution, landowners/managers receive nutrient trading credits, which can be sold to buyers who are regulatorily obliged to offset their existing or wish to increase their own discharge of pollutants (e.g. sewerage plants or other regulated entities).

Category	Tradable rights/permits and payments for ecosystem services			
Also-known-as				
Related instruments	Payment for Ecosystem Services (PES); Voluntary carbon markets; Biodiversity offsets and habitat banking			
Appropriate for: <i>Who can use this type of financing instrument?</i>	Pondscape developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: <i>Who provides the finance?</i>	Regulated entities obliged to reduce or offset their water pollution, e.g. sewerage plants			
Payment form: <i>What form is the payment?</i>	Credit or certificate, equivalent to a set level of pollution reductions (which can then be sold for cash).			
In return for what? <i>What is the NBS project obliged to deliver in return?</i>	Ecosystem-service provision – water quality improvement (e.g. through reduced nutrient pollution).			
Recipient requirements: <i>What requirements must recipients meet to receive finance?</i>	Any landowner can participate.			
Project requirements: <i>What requirements must the pondscape project meet?</i>	If water quality payments are <u>input-based</u> (i.e. pondscape developer receives payment for taking actions e.g. installing ponds), then fewer requirements (just have to demonstrate you have taken actions that will lead to water quality improvement). If <u>result-based</u> , impact must be measurable: The pondscape project needs to be able to demonstrate measurable change or continuation of water quality improvements. This can increase complexity and cost for NbS providers.			
Other requirements: <i>What additional requirements are attached to the financing?</i>	<ul style="list-style-type: none"> - Access to water quality trading market, which do not currently exist in the EU. - Landowners may have to finance the development of the project upfront (and verify results) before receiving offset credits or certificates that they can sell. 			
Speed: <i>How quickly do recipients receive money?</i>	Fast (<4months) – Medium(5-12months) – Slow (12months+)			

Funding timeline: When does the recipient receive the funding?	One-off or ongoing. Some biodiversity offset payments occur only once, while others are structured to provide long-term annual payments for landowners.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration		Pondscape management
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple	Medium		Complex
Exist now in EU?	Yes		No	
References:	Faeth (2000) Fertile ground: Nutrient trading's potential to cost-effectively improve water quality. World Resources Institute. ISBN: 1-56973-197-7 Salzman, James; Bennett, Genevieve; Carroll, Nathaniel; Goldstein, Allie; Jenkins, Michael (2018) The global status and trends of Payments for Ecosystem Services. Nature Sustainability, 1. https://doi.org/10.1038/s41893-018-0033-0			

Instrument: 4.4 Transfer-based instruments: Water quality trading market example

Example name: 4.4.1 Pennsylvania Nutrient Trading Program, USA

Example description: The Pennsylvania Nutrient Trading Program was established to more cost-efficiently meet nutrient pollution reduction targets in the Chesapeake Bay watershed. It allows regulated point sources (i.e. sewerage plants) to comply with their nutrient reduction targets through nutrient reduction credits that they purchase from farmers. Farmers receive payments for these nutrient reduction credits, which they generate and can use to pay for reducing nutrient pollution by implementing best management practices, such as manure storage and streamway management. The nutrient reductions are calculated using an online tool.

NbS description	
Location	Pennsylvania, USA
NbS type	Stream and drainage management; agricultural ponds
NbS benefits	Water quality improvement
NbS description	Improved management of farms, including manure and waste management, decreases nutrient leaching and pollution of watershed waterways.
Scale (size)	22,600 square miles (Pennsylvania part of the Chesapeake Bay watershed); individual farm sizes vary.
NbS performance criteria	The Chesapeake Bay Nutrient Tracking Tool calculates the nutrient leaching reductions that will result from introducing best management practices (in kg/nitrogen and phosphorus).
NbS performance	In 2020, non-point sources generated 1,377,000 nitrogen reduction credits (equivalent to a pound of nitrogen) leaching and 89,000 phosphorus credits (equivalent to a pound of phosphorus).
Financing description	
Source of financing	Private: Point sources who purchase nutrient credits (e.g. regulated sources of nutrient pollution such as sewerage plants)
Recipient	Farmers (who reduce nutrient pollution through implementation of farm best management practices)
Scale (financing)	Per farm/project: Small (e.g. \$300) – medium (\$70,000) ⁴⁹
Timeline	Annual payments based upon implemented Best Management Practices
Financing requirements	Farmer must demonstrate nutrient impact using Chesapeake Bay Nutrient Tracking Tool, which models nutrient reductions based upon farm management. Must also submit verification/validation plan and will be subject to verification/validation by administrators, including data collection and reporting, site visit. Farmer must also find a buyer for credits (through auction facilitated by administrators)
Financing performance	Historical auction data shows price per credit (i.e. per pound) ranges around \$1-3.
Transaction costs	For farmers, transaction costs include the cost of identifying practices to implement, calculating and verifying nutrient pollution reductions, and trading. These are estimated to be relatively low, approximately \$0.25 per credit (Ribaldo & McCann, 2012).
Reference	IHSMarkit(2022) Environmental Registry (webpage). Accessed 04.08.2022. Available https://ihsmarkit.com/products/environmental-registry.html Ribaldo, M., and McCann, LMJ (2012) Accounting for Transaction Costs in Point/Nonpoint Water Quality Trading Programs in the Chesapeake Bay Watershed. Conference paper, 2012 Agricultural and Applied Economics Association Conference. DOI: 10.22004/ag.econ.123509 Pennsylvania Department of Environmental Protection (2020) Current PA Nonpoint Source Certified Generators 2020. Accessed 04.08.2022. Available: https://files.dep.state.pa.us/Water/BNPNSM/NutrientTrading/NutrientCreditRegistry/NPS_Generators.pdf Pennsylvania Department of Environmental Protection (2022) Nutrient Credit Trading (webpage). Accessed 04.08.2022. Available: https://www.dep.pa.gov/Business/Water/CleanWater/NutrientTrading/Pages/default.aspx

⁴⁹ Based upon Current PA Nonpoint Source Certified Generator offers of approx. 150-34,000 pounds/participant, and credit price of \$2.

Instrument name: 5.1 Environmental subsidies

Pondscape-specific definition: An environmental subsidy is a financial contribution from the government to a person, company or organisation to support activities which protect the environment or reduce the use and extraction of natural resources. Governments provide subsidies in order to lower the cost of providing a service or good (or reducing the use/extraction of natural resources). Subsidies should be targeted to increase incentives for goods/services that have public benefits but that are otherwise underproduced, such as NBS. Subsidies generally cover a proportion of costs. Subsidies generally cover a proportion of costs. Subsidies can be either related to the production of an NbS (i.e. recipient is rewarded/compensated for a particular production approach or element) or on the output (i.e. the NbS, where the level of subsidy depends on how many NbS are produced).

Subsidies can take many forms, including tax concessions (*Tax concessions*), one-off grants (see *Public Grants*),⁵⁰ or low-cost loans (see *Green loans, green bonds*). Here, we focus on direct payments in return for activities/outputs that protect/restore the environment.

Category	Subsidies			
Also-known-as				
Related instruments	Grants; tax concessions			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Public funding: national, EU			
Payment form: What form is the payment?	Cash			
In return for what? What is the NBS project obliged to deliver in return?	Ecosystem-service provision – differs per subsidy Products or services – differs per subsidy			
Recipient requirements: What requirements must recipients meet to receive finance?	Private organisation or individual			
Project requirements: What requirements must the pondscape project meet?	-The project must deliver products or services or implement production processes that are targeted by the environmental subsidy in a manner that is recognised by the subsidy.			
Other requirements: What additional requirements are attached to the financing?	- The requirements differ per environmental subsidy.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Ongoing: the recipient receives the subsidy payment either every time they deliver the product (e.g. pond creation) or in an ongoing manner for production (e.g. pond management)			
NBS type: What types of NBS is the financing for?	<u>Pondscape creation</u>	<u>Pondscape restoration</u>		<u>Pondscape management</u>
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	Eurostat (2015) Environmental subsidies and similar transfers. Publications Office of the European Union			

⁵⁰ Grants are closely related to subsidies. Like subsidies, grants generally do not have to be repaid. The key difference is that grants are payments for a specific activity, while subsidies are payments made by the government to lower the costs of purchases or production.

<https://ec.europa.eu/eurostat/documents/3859598/6923655/KS-GQ-15-005-EN-N.pdf/e3be619b-bb19-4486-ab23-132a83f6ff24>

Instrument: 5.1 Environmental subsidies example

Example name: 5.1.1 Ecofarm Petra Marada, Czech Republic – CAP subsidies

Example description: The Marada family farm near the village of Šardice in the South Moravia region of the Czech Republic is an ecological farm. It received subsidies from 2015-2020 under the second pillar of the EU's Common Agricultural Policy, in the form of agri-environment climate measures, a funding mechanism aiming to provide financial support to farmers to contribute to the protection or enhancement of biodiversity, soil, water, landscape, or air quality, or climate change mitigation or adaptation.

From 2015-2020, the following sustainable practices were implemented for the protection of soil, water, landscape and regenerative processes, including establishing grass buffer zones on the land most at risk of water erosion, setting up a network of feed bio-belts to support farmland birds and wildlife, among others. Other EU funds were used in conjunction to promote the implementation of agri-environment-climate measures on-farm, such as the Operational Programme Environment 2014-2020, which financed wetlands, pools, bio-belts, the planting of regional varieties of fruit trees, and green infrastructure measures.

Payments were made as part of Common Agricultural Policy payments. Payments were made annually for the funding time period (e.g. 2015-2020) on a per ha rate, conditional on implementation of particular actions.

NbS description	
Location	Ecofarm Petra Marada, Czech Republic
NbS type	Creation Restoration Management
Ecosystem type	Wetland, grassland, farmland
NbS benefits	Climate adaptation, biodiversity, soil restoration, reduce erosion, education
NbS description	Management measures were undertaken to protect soil, water and landscape, specifically: a) establishing grass buffer zones on the land most at risk of water erosion; b) setting up a network of feed bio-belts to support farmland birds and wildlife; c) implementing measures on arable land with the aim to protect northern lapwing and wetland ecosystem habitats bordering the fields; d) planting grassy areas with typical regional varieties of fruit trees
Scale (size)	Not reported
NbS performance criteria	Key environmental indicators (ha where measures were implemented)
NbS performance	<ul style="list-style-type: none"> Measures for water retention in the landscape (wetlands and pools): built on 3 ha of previously arable land, which provide for better adaptation to climate change throughout the farm's landscape by maintaining soil cover and establishing perennials to reduce soil disturbance and improve structure so that water permeability is improved as well as retention. In addition: Bio-belts: established on 6 hectares of arable land to stop the decline in plant and animal biodiversity, populations of wild partridge, common pheasant and hare – indicator species of the health status of the landscape – were restored special forage mix grown ecologically on 14 hectares of arable land has improved soil fertility and water management 28 hectares of extensive organically managed orchards were established, which has helped to restore the soil structure and landscape diversity as well as generate predators of crop pests Green infrastructure for outdoor recreation, space for indoor vocational education, information and advisory services, as a result of which hundreds of individuals have been trained
Financing description	
Source of financing	European Agricultural Fund for Rural Development (EAFRD), Czech national government
Recipient	Pondscape developer
Scale (financing)	Total budget €56 311 - of which 31100€ as a subsidy from the EAFRD, 10300€ as a subsidy from the national/ regional government, 3100€ from private sources and 11,811€ from other sources

Timeline	The financing was provided over a period of 5 years, from 2015 to 2020.
Financing requirements	<ul style="list-style-type: none"> - positive contribution to the environment and climate - benefits must go beyond the greening measures required by Pillar 1 of the COP (crop diversification, maintenance of permanent grassland, Ecological Focus Areas)
Financing performance	Not reported
Transaction costs	Not reported
Reference	<p><u>Specific project:</u> European Network for Rural Development (2020), Agri-environment business focused on adaptation to climate change (Ekofarma Petra Marada), https://enrd.ec.europa.eu/projects-practice/agri-environment-business-focused-adaptation-climate-change-ekofarma-petra-marada_en.</p> <p><u>Agri-environment measures in general:</u> European Network for Rural Development (n.d.), RDP analysis: Support to environment & climate change: M10.1 Agri-environment-climate commitments, https://enrd.ec.europa.eu/sites/enrd/files/rdp_analysis_m10-1.pdf.</p>

Instrument name: 5.2 Tax concessions

Pondscape-specific definition: Tax concessions aim to incentivise provision of particular goods or services or use of particular production processes by rewarding recipients in the form of reduced tax obligations; they are an indirect transfer from governments to private organisations or individuals who are the recipients. The production processes or goods/services should be socially beneficial, such as ecosystem service provision or environmentally friendly production processes (such as NBS implementation). Tax concessions can take different forms: complete exemption, partial exemption (i.e. reduce the tax rate payable), or only taxing a portion of the otherwise taxable assets/income/revenue (i.e. excluding some of the tax base). Tax concessions can be used to incentivise environmentally beneficial actions, such as implementing nature-based solutions, as they reduce recipient costs in an equivalent manner to a subsidy payment.

Category	Subsidies			
Also-known-as	Tax abatements; tax exemptions; tax allowances; tax credits			
Related instruments	Grants; subsidies			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Public funding: local, national, EU			
Payment form: What form is the payment?	Tax exemption (i.e. reduced tax costs)			
In return for what? What is the NBS project obliged to deliver in return?	Provision of ecosystem services or market outputs Implementing production processes			
Recipient requirements: What requirements must recipients meet to receive finance?	Private organisation or individual. Requirements differ per tax concession type.			
Project requirements: What requirements must the pondscape project meet?	-The project must deliver products or services or implement production processes that are targeted by the environmental subsidy in a manner that is recognised by the subsidy.			
Other requirements: What additional requirements are attached to the financing?	- The requirements differ per tax concession.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	Ongoing or one-off: Recipient may receive a one-off tax exemption (e.g. for pond creation) or in an ongoing annual reduction in tax costs (e.g. pond management)			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple	Medium		Complex
Exist now in EU?	Yes		No	
References:	Eurostat (2015) Environmental subsidies and similar transfers. Publications Office of the European Union https://ec.europa.eu/eurostat/documents/3859598/6923655/KS-GQ-15-005-EN-N.pdf/e3be619b-bb19-4486-ab23-132a83f6ff24			

Instrument: 5.2 Tax Concessions

Example name: 5.2.1 Western Australia Conservation Covenant Tax Concessions

Example description: Private landowners in the state of Western Australia may enter a voluntary Nature Conservation Covenant agreement with the Government to improve the conservation value of their land and protect its biodiversity by restricting land-use and implementing certain management practices. If the market value of their land decreases because of the covenant agreement, landowners may be entitled for a one-off tax reduction of their income tax that equals the loss of land value, offsetting the costs of biodiversity protection.

NbS description			
Location	Western Australia		
NbS type	Creation	Restoration	Management
Ecosystem type	Different ecosystem types apply		
NbS benefits	Biodiversity		
NbS description	Privately owned land can enter a voluntary Nature Conservation Covenant agreement with the Department of Biodiversity, Conservation and Attraction. Under the covenant, land owners receive guidance and funding to improve the conservation value of their land and protect its biodiversity. The agreement includes legally binding land management principles and provisions that restrict land-use activities.		
Scale (size)	Small-large.		
NbS performance criteria	Each covenant is individually negotiated and includes different provisions.		
NbS performance	N.A.		
Financing description			
Source of financing	Australian Taxation Office		
Recipient	Private landowners		
Scale (financing)	The Tax Concession applies to the income tax and equals the difference between the market value of the land before entering the covenant and its decreased market value because of entering the covenant. The decrease must be at least \$5,000 (a decrease of land market value below \$5,000 is not eligible for a tax concession unless the land was acquired within 12 months before entering the covenant).		
Timeline	One-off: The tax reduction occurs once in the year of entering the covenant.		
Financing requirements	<ul style="list-style-type: none"> - Land must be privately owned (not leased) and be subject to a voluntary Nature Conservation Covenant agreement (agreement cannot be older than July 1st, 2002), have good nature conservation and biodiversity values that will be sustainable long-term under reasonable land management (e.g. considering the management of invasive species, water use, adjacent land-use). - The market value of the land must have decreased due to the Nature Conservation Covenant agreement by at least \$5,000 (unless the land was acquired within 12 months before entering the covenant). - The covenant is perpetual, i.e. binding on the current landowner as well as all future owners of the land. - The landowner cannot receive money, property or any other material benefit for entering the covenant. - The covenant is signed with an accepted public recipient (e.g. the national or state government or local governing body). 		
Financing performance	Not reported		
Transaction costs	On the public side, transaction costs encompass the administration of the tax concession. On the private side, transaction costs encompass the costs to demonstrate that the conditions for the concession are fulfilled.		
Reference	Western Australia Department of Biodiversity, Conservation and Attraction (2017) Nature Conservation Covenant Program Components. Accessed 04.08.22. Available: https://www.dpaw.wa.gov.au/management/off-reserve-conservation/nature-conservation-covenant-program		

Australian Taxation Office (2020) Claiming conservation covenant concessions.
Accessed 04.08.22. Available: <https://www.ato.gov.au/non-profit/gifts-and-fundraising/in-detail/fundraising/claiming-conservation-covenant-concessions/>

Instrument name: 6.1 Public grants

Pondscape-specific definition: Direct financial contribution from government (local, national, or EU) to a recipient in return for undertaking a specific activity. Grants are generally one-off payments (though they may be paid in instalments). Grants are commonly used to support activities aligned with government objectives that would not otherwise occur (e.g. due to a lack of market incentives), such as implementing NBS. Grants commonly involve an application process that may be competitive.

Grants are closely related to subsidies. Like subsidies, grants generally do not have to be repaid. The key difference is that grants are payments for a specific activity, while subsidies are payments made by the government to lower the costs of purchases or production (and can take the form of direct contributions, tax breaks, tax concessions, among other forms). EU examples of grant programmes include Horizon Europe, LIFE, European Agricultural Fund for Rural Development (EAFRD – pillar two of the Common Agricultural Policy).

Category	Subsidies			
Also-known-as	Research funding			
Related instruments	Environmental subsidies; tax concessions			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Public: local, national, and EU governments			
Payment form: What form is the payment?	Cash			
In return for what? What is the NBS project obliged to deliver in return?	Ecosystem-service provision – depends on grant (e.g. conservation, recreation) Market outputs – depends on grant(e.g. research services, implementation of NBS)			
Recipient requirements: What requirements must recipients meet to receive finance?	Requirements differ per type of grant.			
Project requirements: What requirements must the pondscape project meet?	- Grants generally require completion of an application process. - Grants are generally issued with specific objectives (e.g. a specific research goal or specific societal goal); the project must meet these objectives			
Other requirements: What additional requirements are attached to the financing?	- Grants may not cover the full costs of undertaking the funded activity; i.e. the recipient may need to provide or find “co-financing” in addition to the grant funding. - Grants are often awarded on a competitive basis (i.e. in competition with other regions, localities, or project types), so grant applications must be convincing. - Sometimes, grants require collaboration with other organisations. -Additional conditions depend on the specific grant requirements, and their intended objectives.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off (though payments may be paid in instalments over time.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	
Exist now in EU?	Yes			No

References: Baroni et.al (2019) Grow Green – Approaches to financing nature-based solutions in cities.
Circular City Funding Guide (2022) Grants and subsidies
<https://www.circularcityfundingguide.eu/funding-types-and-their-applicability/grants-and-subsidies/>

Instrument: 6.1 Public grants

Example name: 6.1.1 Hunte-Leda-Moorniederung, Delmenhorster Geest und Hümmling

Example description: For the support of the German national biodiversity programme, this project restored landscapes and wetlands in Lower Saxony, Germany. The recipient of the grant was the State of Lower Saxony, who received German federal government grant funding of roughly €5 million provided by 'Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB)' and 'Bundesamt für Naturschutz' in context of the program 'Bundesprogramm Biologische Vielfalt'. The project received the grant through an application process which proves that the project is feasible, encourages public interest in biodiversity, exceeds mandatory actions, is partly financed by the project proponent, and can be completed within six years.

NbS description							
Location	Lower Saxony, Germany						
NbS type	<table border="1"> <thead> <tr> <th>NbS creation</th> <th>NbS restoration</th> <th>NbS management</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	NbS creation	NbS restoration	NbS management			
NbS creation	NbS restoration	NbS management					
Ecosystem type	Landscapes, including wetlands						
NbS benefits	Biodiversity						
NbS description	Restoration and conservation of culturally significant landscapes (incl. wetlands) and their biodiversity and ecosystems.						
Scale (size)	1233.68 km ²						
NbS performance criteria	No assessment of this project found. Generally, project specific ecological as well as socio-economic indicators, corresponding to the stated project objectives were identified. Examples include: water chemistry, species count, number of public workshops, volunteers mobilised.						
NbS performance	Not yet assessed.						
Financing description							
Source of financing	Federal German Government, Bundesprogramm Biologische Vielfalt						
Recipient	State of Lower Saxony, Germany						
Scale (financing)	4.95 Mio. €						
Timeline	<p>Project implementation over six years, following these steps:</p> <ol style="list-style-type: none"> 1. Submission of a project draft 2. Technical and economic evaluation of the draft 3. Request for a formal proposal 4. Submission of a proposal 5. Funding decision and transfer 						
Financing requirements	<p>The Project needed to demonstrate a national relevance by being representative of the goals in the national strategy for the protection of biodiversity. The project did so by targeting a rare German biodiversity hotspot (one of four possible criteria).</p> <p>Funding by the Bundesprogramm Biologische Vielfalt is</p> <ul style="list-style-type: none"> - not limited but cannot exceed 75% of the total project cost. The remaining costs have to be partly covered by the proponent and can include other sources of funding. - The project should be completed six years after the having received the grant, and - must not have started. - The project must not be limited to actions which are mandatory for the states, must be of federal interest, and must encourage the public interest in biodiversity 						
Financing performance	No financing indicators reported						
Transaction costs	Preliminary research, grant application, coordination						

Reference	Bundesamt für Naturschutz (2021) Vielfalt in Geest und Moor – Landschaft im Wandel der Zeiten. biologischevielfalt.bfn. Available here: https://biologischevielfalt.bfn.de/bundesprogramm/projekte/projektbeschreibungen/hotspot-23.html
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Instrument name: 7.1 Loans/green loans

Pondscape-specific definition: Loans are an instrument for raising finance from a private or public provider (commonly a bank), where the borrower receives a sum of money (the principal) from the lender in return for a promise to repay it in the future, as well as interest. Green loans are loans where the finance is used exclusively to finance “green” projects, i.e. those that generate an environmental benefit. Lenders for green loans are commonly public banks (such as the European Investment Bank or KfW) though private banks and others can also offer green loans. What qualifies as “green” may differ depending on the lender. A commonly used reference is the Green Loan Principles⁵¹. Green loans are generally smaller and less complex than green bonds.

Category	Debt instruments			
Also-known-as	Green promotional loans			
Related instruments	Bonds, green bonds, revolving market funds			
Appropriate for: <i>Who can use this type of financing instrument?</i>	Pondscape developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: <i>Who provides the finance?</i>	Private, public: Private banks or public banks (e.g. European Investment Bank)			
Payment form: <i>What form is the payment?</i>	Cash (the principal)			
In return for what? <i>What is the NBS project obliged to deliver in return?</i>	Principal repayment over time plus interest payments. Depending on the loan conditions, the loan may be guaranteed by the lender having recourse to collateral related to loan (e.g. the infrastructure built using the loan) or to the borrower.			
Recipient requirements: <i>What requirements must recipients meet to receive finance?</i>	<ul style="list-style-type: none"> - The requirements will differ depending on the loan and who it is being offered by. Some green loans will only be available to national and/or regional governmental bodies, while others will be exclusively available for private actors. - Recipients will need to be able to demonstrate that they can manage the loan and repay it. This may require formal registration as an association or business, as well as evidence of capacity (e.g. bank statements, financial plans, etc.) 			
Project requirements: <i>What requirements must the pondscape project meet?</i>	<ul style="list-style-type: none"> - Projects must be “green”, i.e. the financing must be used only for projects that deliver environmental benefits (referred to as “Use of Proceeds”). Pondscape creation/restoration/management are likely to be considered green. - A common definition of what is considered “green” is given by the LMA, APLMA & LSTA (2018) Green Loan Principles, which requires projects to deliver environmental benefits. This is closely linked to the requirements for the Green Bond Principles. The Green Loan Principles also require transparent pre- and post-issuance reporting and management of proceeds. - To attract creditors, projects may need to be able to demonstrate that the project will generate economic returns (that will enable repayment of the principal). 			
Other requirements: <i>What additional requirements are attached to the financing?</i>	<ul style="list-style-type: none"> - Transparent pre- and post-issuance reporting: Borrowers commonly need to justify to lenders that their project is eligible for a green loan (as well as evidence that they will be able to repay the bond), as well as report on the project over the life of the loan. 			

⁵¹ The Green Loan Principles are closely related to the Green Bond Principles (see *Bonds/green bonds*). They state that to be labelled “green”, the proceeds of the loans must be used for projects that deliver environmental benefits, and that this is clearly evaluated and justified, that funds are managed transparently, and there is transparent reporting (LMA, APLMA & LSTA, 2018).

Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off: the debtor receives the principle up front. They must then pay creditors regular interest payments (e.g. annually), as well as repay the principal when the loan is due.			
NBS type: What types of NBS is the financing for?	Pondscape <u>creation</u>		Pondscape <u>restoration</u>	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	LMA, APLMA & LSTA (2021) Green Loan Principles: Supporting environmentally sustainable economic activity. https://www.lma.eu.com/application/files/9115/4452/5458/741_LM_Green_Loan_Principles_Booklet_V8.pdf			

Instrument: 7.1 Loans/green loans example

Example name: 7.1.1 Linnunsuo – Rewilding Europe Capital loan

Example description: The restoration of the Linnunsuo wetland in Finland sequesters carbon, restores habitats, and enables various cultural and providing ecosystem-services services. The purchase of the wetland was financed with a commercial loan of 75,000€ by Rewilding Europe Capital, which supports so-called ‘rewilding’ enterprises.

NbS description	
Location	Finnish North Karelia, Finland
NbS type	Creation Restoration Management
Ecosystem type	Wetland
NbS benefits	Conservation value; Greenhouse gas sequestration; Education and research; Culture and Heritage.
NbS description	The restoration of the Linnunsuo wetland improves the quality of the surrounding 9,000ha Jukajoki watershed as a ground for traditional-cultural subsistence, including hunting, fishing, berry picking, and cultural-spiritual health, while sequestering carbon and providing habitats for regional biodiversity, including protected bird species. The site is also used for educational purposes and bird watching-related tourism.
Scale (size)	110 ha
NbS performance criteria	Internal monitoring indicators include: <ul style="list-style-type: none"> - Decreased levels of acidic compounds and heavy metals from former industrial peat extraction - Increased presence of bird and fish species Rewilding Europe Capital’s general wetland restoration impact indicators include: <ul style="list-style-type: none"> - Extension of the area within the original floodplain with a natural flooding system; - Extension of the river length without dams; - Extension of the river length with natural erosion and sedimentation; - Extension of natural marshlands; - Extension of natural estuaries; - Increased fish migration and water- and marshland bird populations
NbS performance	Not reported
Financing description	
Source of financing	Rewilding Europe Capital (REC), a limited liability company owned by the non-for-profit foundation Rewilding Europe, based in the Netherlands.
Recipient	NGOs and non-profits. Snowchange Cooperative is a Finland based non-profit organization, representing Arctic Indigenous communities, and supporting the restoration and conservation of landscapes and heritage.
Scale (financing)	This case: 75.000€. Generally, REC loans for wetland restoration and water management range from €25,000 to €600,000.
Timeline	One-off, within a 1-year process, with a general REC loan-term of 6-8 years.
Financing requirements	REC is looking to finance wetland-related activities capable of generating a commercial return that may include: <ul style="list-style-type: none"> - Rewilding of former polders: To change from unsustainable farming to more productive aquatic ecosystems, that at the same time can play a role in flood management (especially in deltas); - Natural protection: Cooperation in protecting natural vegetation on riverbanks and mountain slopes to avoid erosion of these areas and water management problems downstream; - Wildlife habitats: Form habitats protecting wildlife, for example the colonisation of beaver in its natural river habitat, especially

	<p>upstream where beaver dams can help to store and buffer water (upstream water retention) which flattens flood peaks; or the creation of natural marshes that provides breeding habitat for marshland birds, providing nature-tourism opportunities;</p> <ul style="list-style-type: none"> - Natural breakwaters: Stimulate the development of natural vegetation as a breakwater in front of dykes and dams, reducing the costs of management of such infrastructure; - Removal of (obsolete) dams: Eliminating maintenance costs and restoring free flowing rivers with natural fish migration that provide new sources of income from wildlife tourism and (sustainable) fishing; - Drinking water: Protecting sources of drinking water through the establishment of nature reserves is important for both conservation and supplies of high-quality drinking water.
Financing performance	Interest rate: 2.5%–6%
Transaction costs	Not reported
Reference	<p>Rewilding Europe Capital (2022) Wetland restoration and water management – Factsheet. Available here: https://rewilding-europe.com/our-story/</p> <p>Rewilding Europe Capital (2017) Finland’s Snowchange purchases wetland with its first Rewilding Europe Capital loan. Available here: https://rewilding-europe.com/news/finlands-snowchange-purchases-wetland-with-its-first-rewilding-europe-capital-loan/</p>

Instrument: 7.1 Loans/green loans example

Example name: 7.1.2 Clean Water State Revolving Fund loan - Winona Wetlands

Example description: The Winona Wetlands serve as a critical biodiversity habitat, regulating stormwater and capturing accumulative pollutants. The \$400,000 purchase of the wetland was enabled by the Clean Water State Revolving Fund (CWSRF), which finances diverse nonpoint source projects with loans below market rate. As loans are repaid to the fund, it sustains its capacity to support more and more projects over time, making it a revolving fund.

NbS description	
Location	Port Townsend, Washington, US
NbS type	Creation Restoration Management
Ecosystem type	Wetland
NbS benefits	Flood management, water quality improvement, conservation value
NbS description	Port Townsend bought the Winona Wetlands for the purpose of its preservation as a biodiversity habitat and its function for stormwater control and water purification.
Scale (size)	2.6 ha
NbS performance criteria	Not reported
NbS performance	Not reported
Financing description	
Source of financing	Clean Water State Revolving Fund (CWSRF) by the United States Environmental Protection Agency (EPA)
Recipient	City of Port Townsend, Washington, US
Scale (financing)	\$400,000. Other CWSRF loans are much higher (e.g. \$9.5 million for the conservation of the Vernal Pools in California).
Timeline	One-off. The City of Port Townsend received \$400,000 to purchase the wetland and repays the debt to the revolving fund over a period of 5 years with a portion of the \$5/month storm water utility fee paid by each household. The CWSRF can issue loans with repayment periods of up to 20 years. Projects can receive several CWSRF loans over time. As loans are repaid, the fund sustains its capacity to issue new loans, which makes it a revolving fund.
Financing requirements	CWSRF loans target nonpoint source projects (combatting accumulative pollution) and cover up to 100% of the project costs. Loan eligibility varies from state to state as priorities are set locally. 15 states issue loans to private entities, mostly not-for profit organizations in collaboration with private banks. Otherwise loan recipients are generally municipalities.
Financing performance	0% interest rate. The CWSRF generally issues loans below market rate, but loans may have interest rates >0%, depending on the recipient and the context.
Transaction costs	Not reported
Reference	EPA (2001) Protecting Wetlands with the CWSRF - Fact sheet on how the CWSRF can be used to fund restoration projects. Available here: https://www.epa.gov/wetlands/clean-water-state-revolving-fund-srf-and-wetlands EPA (2001) CWSRF Funded Wetlands Projects - Case studies on wetlands projects using CWSRF. Available here: https://www.epa.gov/wetlands/clean-water-state-revolving-fund-srf-and-wetlands

Instrument name: 7.2 Bonds/green bonds

Pondscape-specific definition: Bonds are an instrument for raising finance through the debt capital market. It is effectively a loan from multiple parties. By issuing bonds, the bond issuer (the debtor) receives a fixed amount of funding (the principal) from multiple investors (creditors). In return, the debtor must repay the creditors the money they received (the principal) over an agreed time period plus interest (called “coupons”). Green bonds are bonds where the principal is used exclusively to finance or re-finance “green” projects i.e. those that generate an environmental benefit. What qualifies as a “green” project has commonly been defined by alignment with the voluntary Green Bond Principles (ICMA, 2021)⁵², though the EU Commission has proposed its own voluntary EU Green Bond Standard (EU Commission, 2021).⁵³

There are numerous sub-categories of green bonds including standard green use of proceeds bonds, green revenue bonds, green project bonds, and green securitised bonds, among others. Each has different specific structures and requirements. Here we focus on green bonds generally.

Category	Debt instruments			
Also-known-as	Fixed income securities, green revenue bonds, green project bonds, and green securitised bonds			
Related instruments	Loans, green loans, revolving fund			
Appropriate for: Who can use this type of financing instrument?	Pondscape developer	NGOs and non-profits	Local/city/regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Private, public: Investors in bond markets (e.g. pension funds, mutual funds, corporates, governments)			
Payment form: What form is the payment?	Cash (equal to the principal)			
In return for what? What is the NBS project obliged to deliver in return?	<ul style="list-style-type: none"> - Principal repayment over time plus coupon payments (i.e. interest payments). - Different types of green bonds give different recourse to the creditor if the bond cannot be repaid. Some types of green bonds are only guaranteed by the assets and balance sheet of the project, others have recourse to revenue generated by the investment (e.g. taxes, fees), while others are guaranteed by the issuer as a whole or to pools of projects (Climate Bonds Initiative, 2021a). 			
Recipient requirements: What requirements must recipients meet to receive finance?	Green bonds are commonly issued by large institutional actors, such as local/regional/national/international governments and agencies (e.g. cities, regional water authorities, European Investment Bank), or by financial institutions (such as banks). This is linked to the complexity of bond issuances and the scale requirements of capital markets (green bond issuances are generally very large, while some recent issuances are as small as €85,000, multiple million and even billion-dollar issuances are more common (Climate Bonds Initiative, 2021b))			
Project requirements: What requirements must the pondscape project meet?	<ul style="list-style-type: none"> -Projects must be “green”, i.e. the financing must be used only for projects that deliver environmental benefits (referred to as “Use of Proceeds”). Pondscape creation/restoration/management are likely to be considered green. 			

⁵² The ICMA Green Bond Principles require bond finances to be used for specific types of projects (including e.g. environmentally sustainable management of living natural resources and land use, terrestrial and aquatic biodiversity conservation), and requires debtors to transparently justify the project’s green credentials, manage proceeds, and report on projects.

⁵³ The EU Green Bond Standard is also proposed to be a voluntary standard. Once adopted, it would require that finance is used exclusively for projects that are aligned with the EU Taxonomy, which classifies economic activities as sustainable/non-sustainable (based on their impact on six environmental objectives: climate change mitigation, adaptation, biodiversity, pollution, sustainable use and protection of water, and transition to a circular economy). It also requires transparent reporting and that projects are externally reviewed (with supervision from the European Securities Markets Authority) (EU Commission, 2021)

	<p>- A common definition of what is considered “green” is given by the ICMA Green Bond Principles, which specify different eligible categories (such as renewable energy, environmentally sustainable management of living natural resources and land use, terrestrial and aquatic biodiversity conservation, climate change adaptation, among others). These principles also require transparent pre- and post-issuance reporting and management of proceeds.</p> <p>- The EU Green Bond Standard is an under-development voluntary standard that aims to establish a new baseline for green bonds. It would require proceeds to be used only for projects classified as sustainable by the EU Taxonomy, as well as additional external review and reporting requirements.</p> <p>- To attract creditors, projects may need to be able to demonstrate that the project will generate economic returns (that will enable repayment of the principal).</p>			
Other requirements: What additional requirements are attached to the financing?	<p>- Transparent pre- and post-issuance reporting: Debtors commonly need to prepare detailed justifications for investors that outline how the project is eligible as a green bond (as well as evidence that they will be able to repay the bond). To maintain creditor trust (and support secondary market trades) they must also monitor and report on the project once the bond has been issued. This may need to be externally evaluated and approved. These additional requirements can generate transaction costs.</p>			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off: the debtor receives the principal up front. They must then pay creditors regular coupon (i.e. interest) payments (e.g. annually), as well as repay the principal when the bond matures. Green bonds are commonly long-term, with maturity after 10-30 years.			
NBS type: What types of NBS is the financing for?	Pondscape creation	Pondscape restoration	Pondscape management	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	<p>Climate Bonds Initiative (2021a) Explaining green bonds (webpage). Accessed 03.01.2021 .https://www.climatebonds.net/market/explaining-green-bonds</p> <p>Climate Bonds Initiative (2021b) Labelled Green Bonds Data: Latest 3 Months (webpage). Accessed 03.01.2021. https://www.climatebonds.net/cbi/pub/data/bonds</p> <p>EU Commission (2021) REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on European green bonds. 2021/0191(COD). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0391</p> <p>ICMA (2021) Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds. Accessed 03.01.2021 https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/</p>			

Instrument: 7.2 Green Bond example

Example name: 7.2.2 The Conservation Fund's Green Bond

Example description: Forest in the US are at risk of land-use change and fragmentation due to new developments. To conserve productive forest at risk, The Conservation Fund (TCF) has issued a \$150 million green bond, with the proceeds used to acquire, restore and permanently protect forests and their ecosystem services including wildlife habitats, carbon sequestration, recreational values, as well as their value for sustainable timber production.

NbS description	
Location	USA, different locations
NbS type	Creation Restoration Management
Ecosystem type	Productive forests (including other landscapes e.g. wetlands)
NbS benefits	Biodiversity; Carbon sequestration; Water filtration and purification; Production of timber; Recreation and wellbeing
NbS description	Targeted are productive forests that are threatened by fragmentation or land-use change, which are then permanently protected for the benefits they provide, including recreation, carbon sequestration, climate adaptation, water provisioning and purification, timber production, and other services.
Scale (size)	500,000 acres of forest, with another 390,000 acres in the planning
NbS performance criteria	Area of forest conservation; carbon sequestration; rivers streams under protection; regional economic impact
NbS performance	The Conservation Fund reports: <ul style="list-style-type: none"> - 890,790 acres impacted forest - 779,443,000\$ annual economic impact - 213,957,000t CO2-equivalent sequestered carbon - 1,613 miles of streams affected - 138,617 acres of wetlands affected
Financing description	
Source of financing	Institutional investors; private investors on the bond market
Recipient	The Conservation Fund (TCF)
Scale (financing)	\$150 million
Timeline	10-year issue length, with financing paid by investors upfront, who then receive annual coupon (interest) payments and repayment at the end of the ten-year period.
Financing requirements	According to TCF the bond required: <ul style="list-style-type: none"> - a strong investment grading - a diversified and reliable revenue stream to repay principal and interests - a strong asset base (i.e. the forest and its resources) - possibilities of blended finance (grants for initial start-up phase)
Financing performance	The bond received a triple A rating from Moody's, was oversubscribed 2.5 times and priced at 3,47%. <p>TCF report:</p> <ul style="list-style-type: none"> - \$1.87 million value of forests acquired per \$1 million of bonds. - \$131,602,987 out of \$150,000,000 bond money invested (Dec. 2020) - \$245,712,725 total value of projects utilizing proceeds
Transaction costs	Transaction costs are not reported but include the costs of launching and marketing the bond, which encompasses Moody's credit rating service, Goldman Sachs' bond offering services, auditing and monitoring activities, among other things.
Reference	Green Finance Institute (2020) The Conservation Fund Green Bonds [Accessed online 03.08.22]. Available here: https://www.greenfinanceinstitute.co.uk/gfihive/case-studies/conservation-fund-green-bonds/ Kart, J. (2021) Conservation Fund's Green Bonds Pay Off: Eight Forests And 220,000 Acres [Accessed online 03.08.22]. Available here: https://www.forbes.com/sites/jeffkart/2021/01/23/conservation-funds-green-bonds-pay-off-eight-forests-and-220000-acres/?sh=10d3c1933800 The Conservation Fund (2020) GREEN BOND IMPACT REPORT DECEMBER 31, 2020. Available here:

https://www.conservationfund.org/images/The_Conservation_Fund_Green_Bond_Impact_Report.pdf

Instrument name: 8.1 Impact investing

Pondscape-specific definition: Impact investors invest in projects and businesses that deliver social or environmental benefits, as well as profits. They are willing to accept lower profits or higher risks for projects that deliver social or environmental benefits. For pondscape developers, accepting impact investment will involve giving up some ownership of the project, independence, and some claim on future revenues or profits. In addition to the money gained, NbS projects may also benefit from the involvement of the impact investors, who may have additional skills or contacts.

Impact investment often takes the form of specialised impact investment companies that set up impact funds, funded by indirect investors, to invest in multiple promising social or environmental businesses (Banto et.al 2022; Chen & Murry 2022). Impact investors may also include so-called angel investors, wealthy private individuals who support projects for which any near-time success or profitability is highly uncertain (e.g. during the initial phases of start-ups). Angel investors generally only invest amounts that they can tolerate to lose and their primary motivation is to allow interesting ideas to develop further (Ganti et.al 2022). Other actors, such as foundations, can also act as impact investors. Commercially focused investors, such as venture capitalists or investment funds, are less likely to be impact investors (see 8.2 Commercial investors).

Category	Equity finance			
Also-known-as				
Related instruments	Commercial investing			
Appropriate for: Who can use this type of financing instrument?	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Professional investors (e.g. investment companies) with a focus on maximising societal and environmental benefits.			
Payment form: What form is the payment?	Any form of capital, but mostly cash.			
In return for what? What is the NBS project obliged to deliver in return?	An ownership share of the business and/or its profits.			
Recipient requirements: What requirements must recipients meet to receive finance?	Pondscape managers should be able to demonstrate experience and have the necessary capacities to facilitate growth and/or deliver profits.			
Project requirements: What requirements must the pondscape project meet?	<p>Projects must be able to demonstrate to investors that they deliver social and environmental benefits. Projects must also be bankable investments, i.e. profitable investment opportunity with relatively low risk. The characteristics of bankable projects include:</p> <ul style="list-style-type: none"> - Cash flow generating activity - Sufficient collateral - High probability of success - A clear exit strategy - An acceptable risk-adjusted rate of return (WWF 2020). In return for higher anticipated social and environmental benefits, impact investors tolerate higher risks and lower returns than other investments (Chen & Murry 2022). 			
Other requirements: What additional requirements are attached to the financing?	Impact investors may demand a stake in management and decision making.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			

Funding timeline: When does the recipient receive the funding?	One-off or ongoing. Investors might invest only once or on an ongoing basis.			
NBS type: What types of NBS is the financing for?	Pondscape <u>creation</u>		Pondscape <u>restoration</u>	Pondscape <u>management</u>
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)
Complexity: How complex is applying for the finance	Simple		Medium	Complex
Exist now in EU?	Yes		No	
References:	<p>WWF. (2020) Blueprints for bankable nature solutions to help tackle nature and climate crises. Available here: https://wwf.panda.org/discover/our_focus/freshwater_practice/?364413/Blueprints-for-bankable-nature-solutions-to-help-tackle-nature-and-climate-crises</p> <p>Chen J. & Murry C. (2022) Impact Investing [Website, accessed Oct. 5th 2022]. Available here: https://www.investopedia.com/terms/i/impact-investing.asp</p> <p>Banton C.; Drury A.; Jackson A. (2022) Equity Financing: What It Is, How It Works, Pros and Cons [Website, accessed Oct. 5th 2022]. Available here: https://www.investopedia.com/terms/e/equityfinancing.asp</p> <p>Ganti A.; Scott G.; Schmitt K. R. (2022) Angel Investor Definition and How It Works [Website, accessed Oct. 5th 2022]. Available here: https://www.investopedia.com/terms/a/angelinvestor.asp</p> <p>Cennane A. (2022) Angel investors vs. venture capitalists. [Website, accessed Oct. 5th 2022]. Available here: https://www.chase.com/personal/investments/learning-and-insights/article/angel-investors-vs-venture-capitalists</p>			

Instrument: 8.1 Impact Investing

Example name: 8.1.1 Sumatra Merang Peatland Restoration Project

Example description: A 22,922 ha peatland forest in South Sumatra, Indonesia, is restored through rewetting, reforestation, and the prevention of illegal logging, to sequester 3.4 million t carbon, protect the habitat of 31 threatened- and three endangered species, and prevent wildfires. The project integrates environmental and social benefits by generating local employment, funding educational programs, and providing other livelihood support activities (e.g. for local fishermen and farmers). The national implementing partners Forest Carbon Partners and PT Global Alam Lestari operate on capital from the Mirova / Athelia Climate Fund, an impact investment fund with a size of \$120 million. Through its investment, the fund acquired an ownership share of the project and its revenues that have been generated through the sale of 3,329,923 certified carbon credits, generating revenue of approximately \$15 million.

NbS description	
Location	Musi Banyuasin District, South Sumatra, Indonesia
NbS type	Creation Restoration Management
Ecosystem type	Wetland and peatland forest
NbS benefits	Conservation value; Wildfire prevention; Carbon sequestration; Research and Education
NbS description	The project restores degraded peatland forests by rewetting the peatland through the instalment of >100 dams, implemented measures to prevent illegal logging (incl. ground patrols, remote sensing), and reforestation of native species. The Zoological Society of London undertakes a complete flora and fauna inventory for research purposes, and for monitoring and evaluating the project. The project engages with local communities through rural development projects (health, infrastructure, sustainable agriculture), employs local staff and is funding scholarships for high school and university degrees.
Scale (size)	22,922 ha
NbS performance criteria	Carbon sequestration; ecosystem area restored; biodiversity benefits; local job creation and livelihood benefits.
NbS performance	<ul style="list-style-type: none"> • The restored ecosystem is habitat to three endangered species (Hornbill, Sumatran Tiger, Sun Bear) and 31 species threatened with extinction. • 145 local residents have been employed, with 25% of jobs created held by women. • 22,934 ha of peatland forest are restored and protected. • 3.4 million t of carbon have been sequestered.
Financing description	
Source of financing	Mirova / Athelia Climate Fund.
Recipient	Implementing partners: Forest Carbon Partners (technical advisory Company) and PT Global Alam Lestari (forest concession management company).
Scale (financing)	Not publicly reported for this specific project but probably large scale (>\$1.000.000).
Timeline	2016 - 2062.
Financing requirements	The investment case dependents on the voluntary carbon market and the certification that project standards are met (Verified Carbon Standards; Climate, Community and Biodiversity Standards).
Financing performance	The project sold 3.329.923 carbon credits (NCS 2022). With prices on the voluntary carbon market averaging \$4–5 (ClimateTrade 2022), the project might generate roughly \$15 million.
Transaction costs	Transaction costs include the certification of standards (Verified Carbon Standards; Climate, Community and Biodiversity Standards), and finance coordination of the investment case through the Mirova / Athelia Climate Fund.

Reference	<p>ClimateTrade. (2022) Voluntary carbon market value tops US\$2B. [Website, accessed Oct. 5th 2022]. Available here: https://climatetrade.com/voluntary-carbon-market-value-tops-us2b/</p> <p>NCS (2022) NCS Lighthouse Programme - Sumatra Merang Peatland Project. Natural Climate Solutions Alliance. Available here: https://www.wbcsd.org/contentwbc/download/14220/204797</p> <p>Forest Carbon. 2021. Peatland ecosystem restoration in Indonesia. Available here: https://forestcarbon.com/wp-content/uploads/2020/10/Forest-Carbon-SMPP-Brief-20201030.pdf</p> <p>Capital for Climate. 2021. Athelia Climate Fund (ACF) [Website, accessed Oct. 5th 2022]. Available here: https://nbs.capitalforclimate.com/fundsandvehicles/24</p>
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Instrument name: 8.2 Commercial investing

Pondscape-specific definition: Commercial investors will invest in projects that deliver profits at acceptable risks. They would not treat NbS projects any different from other investments (i.e. only financial returns relevant for investment decision). The minimum investment size can be high, meaning this type of financing is most appropriate for large or consolidated projects. For pondscape developers, accepting commercial investment will require giving up some ownership of the project, and some claim on future revenues or profits. It may also be associated with high degree of business and legal formality (such as audits).

Commercial investors include venture capitalists, i.e. professional investment companies focused on capital growth, and institutional investors (Hayes et.al 2022), i.e. are large companies such as banks, insurers or pension funds, who invest the money of their clients, members, or shareholders, to conserve and grow their wealth.

Category	Equity finance			
Also-known-as				
Related instruments	Impact investing			
Appropriate for: Who can use this type of financing instrument?	Private developer	NGOs and non-profits	Local/city/ regional govt. and agencies	National govt. and public agencies
Source of finance: Who provides the finance?	Professional investors, including venture capitalists and institutional investors.			
Payment form: What form is the payment?	Any form of capital, but mostly cash.			
In return for what? What is the NBS project obliged to deliver in return?	An ownership share of the business or/and its profits.			
Recipient requirements: What requirements must recipients meet to receive finance?	Projects managers should be well-experienced and have the necessary capacities to facilitate growth and/or revenues.			
Project requirements: What requirements must the pondscape project meet?	Investments must be bankable, i.e. profitable investment opportunity with relatively low risk. The characteristics of bankable projects include: <ul style="list-style-type: none"> - Cash flow generating activity - Sufficient collateral - High probability of success - A clear exit strategy - An acceptable risk-adjusted rate of return (WWF 2020). 			
Other requirements: What additional requirements are attached to the financing?	Impact investors might want a stake in management and decision-making to influence project management and strategy.			
Speed: How quickly do recipients receive money?	Fast (<4months) – Medium(5-12months) – Slow (12months+)			
Funding timeline: When does the recipient receive the funding?	One-off or ongoing. Investors might invest only once or on an ongoing basis.			
NBS type: What types of NBS is the financing for?	Pondscape <u>creation</u>	Pondscape <u>restoration</u>	Pondscape <u>management</u>	
Scales: What scale of financing?	Small (<€10k)	Medium (€10k-€99k)	Large (€100k-€999k)	Very large (€1million+)

Complexity: How complex is applying for the finance

Exist now in EU?

References:

	Simple	Medium	Complex
	Yes		No
References:	<p>WWF. (2020) Blueprints for bankable nature solutions to help tackle nature and climate crises. Available here: https://wwf.panda.org/discover/our_focus/freshwater_practice/?364413/Blueprints-for-bankable-nature-solutions-to-help-tackle-nature-and-climate-crises</p> <p>Banton C.; Drury A.; Jackson A. (2022) Equity Financing: What It Is, How It Works, Pros and Cons [Website, accessed Oct. 5th 2022]. Available here: https://www.investopedia.com/terms/e/equityfinancing.asp</p> <p>Cenname A. (2022) Angel investors vs. venture capitalists. [Website, accessed Oct. 5th 2022]. Available here: https://www.chase.com/personal/investments/learning-and-insights/article/angel-investors-vs-venture-capitalists</p>		

Instrument: 8.2 Commercial Investing

Example name: 8.2.1 Mill Creek Mitigation Bank

Example description: JMT, an infrastructure development company, and the Lyme Timber Company purchased the mitigation use right easement for a 1,034 ha wetland landscape in Richland County, South Carolina. The mitigation use right easement means that, in return for improving, protecting and managing the wetland habitat, they are allowed to offset unavoidable damages to similar wetland habitats in the same watershed (in accordance with the USA federal Clean Water Act). The Lyme Conservation Opportunities Fund, managed by the Lyme Timber Company, invested in the project in return for an undisclosed share of the project.

NbS description	
Location	Richland County, South Carolina
NbS type	Creation Restoration Management
Ecosystem type	Wetland
NbS benefits	Conservation value
NbS description	The project consists of the restoration and management of a wetland habitat. It is created as a habitat bank to allow offsetting of unavoidable damages to similar wetland habitats in the same watershed.
Scale (size)	1,034 ha (total property including wetland and other landscape types).
NbS performance criteria	The project is established as a mitigation bank under Clean Water Act, for which federal-but also state specific requirements apply. General eligibility for mitigation banking in South Carolina is assessed on a case by case basis, but projects have to fall within one of the following broader categories: <ul style="list-style-type: none"> wetland protection and enhancement, wetland restoration, wetland creation, a combination of the above (SCDHEC).
NbS performance	Not explicitly reported; the project is already listed in the portfolio of the Lyme Conservation Opportunities Fund, indicating success.
Financing description	
Source of financing	The Lyme Conservation Opportunities Fund, managed by the Lyme Timber Company.
Recipient	JMT, an infrastructure development company.
Scale (financing)	Not reported for this specific project. The Lyme Conservation Opportunities Fund holds >\$50 million (Capital for Climate 2021).
Timeline	Not reported for this specific project. The Lyme Conservation Opportunities Fund has an investment period of 3-4 years.
Financing requirements	The investment case was entirely dependent on the existence of a wetland banking mechanism, through which the project is able to generate revenues by selling offsetting credits.
Financing performance	Not reported for this specific project. Mitigation credits are estimated to be \$2,500 to \$10,000 per acre of wetland (Fenstermaker Team 2022). The Lyme Timber Company has created seven funds, investing around \$400 million over the past five years in restoration projects, carbon sequestration, habitat banking, sustainable forestry, and high-value conservation real estate.
Transaction costs	Not reported. The substantial coordination costs of fund management require economies of scale and the pooling of multiple projects.
Reference	The Fenstermaker (2022) How Much Does Wetland Mitigation Cost? [Website, accessed Oct. 5th 2022]. Available here: https://blog.fenstermaker.com/wetland-mitigation-cost/ Capital for Climate (2021) The Lyme Conservation Opportunities Fund [Website, accessed Oct. 5th 2022]. Available here: https://nbs.capitalforclimate.com/fundsandvehicles/35

SCDHEC. Undated. Wetlands Mitigation Guidelines. Available here:
https://scdhec.gov/sites/default/files/docs/Environment/docs/Mitigation_Guidelines.pdf

9 Annex C Stakeholder co-creation: working with the PONDERFUL Demosites

Objective and intended outcomes

Objective: Within the PONDERFUL sustainable finance task, we work with stakeholders and particularly with pondscape developers (i.e. demosite leads) to gather practical insight into challenges and opportunities with funding pondscales. This is facilitated through the eight PONDERFUL DEMO-sites⁵⁴: multiple pondscales across eight different countries in Europe, Turkey, and Uruguay. Each demosite features a stakeholder group, who each meet for three workshops during the life of the project.

Specifically, stakeholder co-creation work aims to achieve the following outcomes:

1. **Feedback:** Feedback on PONDERFUL financing instruments (especially the Sustainable Financing Inventory) to ensure accuracy and relevance of sustainable finance results for each demosite.
2. **Input:** Stakeholder and demosite input on barriers and challenges related to financing is essential to test and develop conclusions and recommendations and to assess alignment of pondscape NbS with wider NbS financing literature.
3. **Support DEMO-sites:** The financing co-creation work should support PONDERFUL DEMO-sites by developing high quality, practical financing plans to pay for pondscape NbS projects.
4. **Dissemination and exploitation:** By testing and developing sustainable finance plans with DEMO-sites, co-creation should support the development useful resources for future pondscape (and other) NbS overcome financing challenges.

Process: Progress and next steps⁵⁵

PONDERFUL sustainable finance work with DEMO-sites is separated into two channels: Focus DEMO-sites and Other DEMO-sites. We work closely with Focus DEMO-sites (as described below), while Other DEMO-sites receive more limited support and interaction.

To select the Focus DEMO-sites, a financing questionnaire was prepared and circulated by email in the first year of the project. The questionnaire aimed to assess the potential for the demosite to provide an interesting financing case study, and to assess demosite leads level of interest in participating as a focus demosite. Based on the questionnaire responses, we selected the following DEMO-sites:

- **UK:** The UK DEMO-sites were attractive due to the experienced and interested project leads, and the swiftly developing policy landscape in the UK following its exit from the European Union (including interesting biodiversity financing policies). The UK demosite also included a pondscape in an agricultural landscape (the Water Friendly Farming pondscape), which was of interest alongside the other DEMO-sites we selected.
- **Turkey:** The Turkish demosite offered a large-scale pondscape at a relatively early stage of NbS development. It's location outside of the EU and resultingly differing policy and political institutions (and public funding opportunities) also made it an attractive case study. The demosite features urban/peri-urban ponds, as well as interested demosite leads.

⁵⁴ See <https://ponderful.eu/demo-sites/>

⁵⁵ As of 23.04.2023.

- Spain (La Platera): The La Platera case offered a relatively data-rich case study, as we could build on a previous LIFE project. Other positives included that it also had a strong existing stakeholder process and interested demosite lead. Its siting on a protected area and its touristic attractions also offered potentially interesting financing opportunities.

Focus DEMO-sites

The Focus DEMO-sites have been the key collaborators for the stakeholder work of the pondscape financing work. This work occurs principally through preparation for and participation in the three stakeholder workshops. In each workshop in the focus demosite, a session focusses specifically on sustainable financing. Two stakeholder workshops have been held in each of the focus DEMO-sites so far (over winter 2021/2022, and winter 2022/2023), with a third session to be held in the third workshop (over winter 2023/2024).

Preparatory work: Before the first workshop, interviews were carried out with demosite leads to understand the demosite NbS plans, and the financing interests of each demosite.

Workshop one: In light of Coronavirus, the first workshop sustainable financing sessions were lead by the demosite leads, with support from sustainable financing experts from a distance. An introductory video was recorded and shown at each focus demosite, to introduce key concepts of financing NbS and the objectives and process of PONDERFUL sustainable financing work within PONDERFUL. Workshop facilitators then lead the stakeholders through a worksheet and discussion. Stakeholders each completed a worksheet, and then discussed the questions and their responses in small groups, before reporting back to plenary. The questions covered the following:

- Personal background, and experience/expertise with financing
- Financing ideas: Drawing on participant knowledge and experience, stakeholder suggested public, private, and mixed sources of financing that would be appropriate for their demosite
- Barriers/opportunities: Stakeholder assessed whether (lack of) financing was a barrier for their pondscape, and identified where financing was needed.

Demosite responses and discussions were recorded.

Interim work: Based on the workshop results, follow-up interviews with demosite leads, and additional research, a draft *PONDERFUL Financing Workflow* was developed for each demosite (see description of *Financing Workflow* in subsequent section).

Workshop two: Ecologic Institute finance experts attended each focus demosite meeting to lead a sustainable finance session. The first objective of the session was to gather stakeholder feedback and input on the draft financing workflow. The results of the workflow (context, NbS description, benefits and beneficiaries, and costs) were presented to stakeholders and discussed. The second objective of the session was to develop detailed proposals for financing the demosite NbSs. Based on the draft financing workflow and drawing on the PONDERFUL Sustainable Finance Inventory, stakeholders were introduced to a shortlist of four appropriate financing instruments, with a focus on revenue-raising instruments. They then worked in small groups to develop proposals for how these could be implemented within the local context. For each financing instrument, stakeholders identified:

- **An idea:** describe their idea is, and how it would be implemented
- **Revenue:** Estimated how much revenue the instrument would raise, and describe their thinking.

- **Barriers:** Discussed barriers to their idea being implemented, or reasons why they would not want to implement it.

Stakeholders were encouraged to come up with multiple ideas. Results were discussed in plenary and recorded.

Ongoing work: Based on workshops, a revised financing plan will be developed for each demosite, including proposals for financing instruments. These financing plans will be reported Deliverable 1.6 and key results in the Task 4.3 demosite leaflets.

Workshop three (planned): Stakeholders will be presented the revised finance plan for feedback. Discussion will focus on key barriers and opportunities for financing in the specific context of their demosite, and how this compares or contrasts with other DEMO-sites and other NbS finance conclusions.

Other Demosites

Other Demosites receive targeted support to develop a *PONDERFUL Simplified Finance Plan* (described below). A draft simplified finance plan is developed based on existing information on each demosite (e.g. data collected for WP4), and drawing on the PONDERFUL Sustainable Finance Inventory. A one-hour phone call is then arranged to go through the simplified finance plan, gathering all necessary information to complete it. After it is revised, it is sent to the demosite to review in writing, adjust (if necessary), and confirm. These simplified finance plans will then be analysed and used to support ongoing sustainable finance work in PONDERFUL (and reported on in Deliverable 1.6, with key results published in the PONDERFUL Task 4.3 demosite leaflets. The work with these other DEMO-sites is ongoing and will be completed over 2023.

Demosite materials

PONDERFUL Finance Workflow template: The PONDERFUL Finance Workflow Template is a four-section document that sets out all relevant information for a finance plan. It was developed to be completed sequentially while working with Focus demosite leaders and their stakeholders. It is relatively detailed, setting out the context of the demosite, describing multiple alternative Nature-based solution scenarios that could be implemented, and recording the costs and benefits to identify potential finance gaps, and identifying applicable financing instruments (see *template reproduced on following pages*).

PONDERFUL Simple finance plan template: The Simple Finance Plan template was developed building on experience completing the PONDERFUL Finance Workflow Template with the Focus DEMO-sites. The Simple Finance Plan is designed for work with the Other Demosites: it is simpler, allowing it to be completed with DEMO-sites in a shorter amount of time, whilst still collecting the essential information for a finance plan and allowing later analysis of financing in PONDERFUL's eight DEMO-sites. It takes the form of an excel worksheet, rather than a document, as demosite leads were found to prefer working in excel, and to simplify the calculation of financial information. The Simple Finance Plan template draws on and supports Task 4.3 work on the economic costs and benefits of pondsapes (*see Tables reproduced on pages after the PONDERFUL Finance Workflow template*).



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Task 1.5 – Sustainable Finance Workflow

1. Who? Describe pondscape developer

- Name:
- Contact details:
- Institution:

2. NbS Action

2.a. What? Describe pondscape NbS and context

- Google Maps Coordinates:
- Pondscape Area:
- Number of Ponds:
- Ponds included in the stratified sampling:
- Pond size:
- Pond depth:
- Pond age:
- NbS Type:
- Context:
- Land-use:
- Description of Pondscape:
- Challenges / Threats:
- Stakeholders / Stakeholder mapping:
- Photos

2.a. Scenarios

Concrete description of the different scenarios, including the required measures and their costs.

Scenario 1: No actions taken. No costs. Site will slowly deteriorate.

Scenario 2: Maintain the minimal ecological and hydrological functions of the site as they are currently given, conducting small scale maintenance work. Some costs.

Scenario 3: Improve or expand the site. For example, improve the biodiversity of the current site through additional measures or upscale the current measures to a larger area.

Scenario	Scen. 1: No action	Scen. 3: Maintain and Expand					
		Scen. 2: Maintain			Expand		
		Maintaining Activities	Expenses	Notes	Expanding activities	Expenses	Notes
Planning	None		<i>e.g. 200€/ha</i>			<i>(e.g. Previous costs for design and planning)</i>	
Constructio n and develop.	None		/ha			<i>(e.g. Previous costs for other type of fixed costs)</i>	
Ongoing maintenance	None		/year			/year	
Monitoring	None		/year			/year	
Outreach	None		/year			/year	
Project management	None		/year			/year	
Total Expenses:	0						

2.b. Cost avoidance and reduction

Consider for example:

- *Contracting approach such as Community asset transfer*
- *Volunteering*
- *Citizen Science*
- *In-kind contributions*
- *Subsidies*
- *Tax rebates*
- *Resource pooling, sharing*
- *Etc.*

3. Revenue and funding/financing gap

3.a. Budget gaps & surpluses

Please use the following table to indicate your total budget, currently available to pay for any of the given future scenarios. If you currently do not have any funding to pay for these scenarios, please write zero. The aim is to identify the current funding gap (or surplus), which will allow us to develop a finance strategy.

Currently available budget:			
Expenses:	Scenario 1	Scenario 2	Scenario 3
Budget gap & surplus:			

3.b. Revenue options

Include results from 1st Stakeholder Workshop.

4. Funding/finance

4.a. Funding/finance conditions

Why: Different funding and financing instruments come with different conditions and are appropriate for different types of developers/NbS projects. To help select the best funding and financing instruments, in this section we answer some key questions.

4.b. Funding

Why: Funding (i.e. upfront or ongoing money that does not need to be repaid, such as grants, donations, etc.) offers a useful source of money to cover NbS costs. Funding is often motivated by the positive externalities generated by the NbS, including recreation, conservation, climate adaptation etc.

Based upon answers to section 1, 3b, and 4a, the demosite should consider appropriate funding instruments from PONDERFUL Sustainable Finance Inventory.

4.c. Financing

Why: Financing (i.e. money that needs to be repaid or that otherwise has claim on future revenues) is the final option to cover any financing gap. It is well-suited for smoothing cash flow issues, e.g. if you do not have enough money to cover upfront investments (but expect to have sufficient revenue to cover this in the future).

Based upon answers to section 1, 3b, and 4a, the demosite should consider appropriate financing instruments from PONDERFUL Sustainable Finance Inventory

5. Blended options

How can different funding options strategically blend to minimize private risk and attract investors.

Appendix:

Add additional Information.

Simplified Finance Workflow

(FUTURE SCENARIO)

Use this sheet, if you have plans for changing the pondscape in the future, to describe what you have planned. E.g. expansion of the site, change in management

1. General Information (some Information might have been entered by us, based on previous information)

PLEASE COMPLETE THE MISSING INFORMATION BELOW AND CORRECT WHERE NECESSARY		Additional Notes (if relevant...)
Name of the demo site:		
Name of pondscape:		
Location of the pondscape:		
Total ha size of pondscape:		
Area covered by ponds in the pondscape:		
Number of ponds in the pondscape:		

2. Pond actions (find detailed explanations in protocol version 3 Page 9 of 53)

Pond Creation:	PLEASE SELECT (PLANNED) ACTIONS BY ENTERING A "X"	Add detailed description
Creating a pond in a site where there was formerly no waterbody		
Other (please specify)		

Pond restoration:	PLEASE SELECT (PLANNED) ACTIONS BY ENTERING A "X"	Add detailed description
Creating or restoring a pond in a site where formerly a pond was existing, e.g. excavating a pond that had been filled in		
Significant alterations to existing pond, e.g. depth, morphometry, slopes, shoreline, flora or fauna		
Other (please specify)		

Onsite infrastructure measures (acting on areas immediately surrounding pond):	PLEASE SELECT (PLANNED) ACTIONS BY ENTERING A "X"	Add detailed description
Access restrictions, e.g. fencing to prevent access by livestock, dogs, or visitors - or removing fencing to allow livestock access		
Development of trails or wildlife observatories		
Management of riparian vegetation and wetland plants		
Removing invasive alien plant species		
Implementing (or enlarging) the buffer area immediately surrounding the pond		
Creation of terrestrial habitats in the vicinity of the pond (e.g. for reptiles or amphibians)		
Removing hard infrastructure (e.g. concrete edge)		

Other (please specify)		
------------------------	--	--

Pond management measures (actions within pond):	PLEASE SELECT (PLANNED) ACTIONS BY ENTERING A "X"	Add detailed description
Removing invasive alien plant and animal species		
Removing of all fish		
Reintroducing or protecting threatened plant and animal species		
Pond water management, e.g. manage input, output (e.g. sluice repair or adjustments, lining), drying rate		
Routine management measures in relation with the pond design and depth (e.g. slight re-profiling of banks, removal of sediments, creation or removal of an island, scraping edges to maintain populations of pioneer species)		
Mowing and removal of submerged, floating or emergent plants		
Regular monitoring of physical, chemical or biological indicators		
Planting or introducing structured vegetation into ponds (e.g. planted coil rolls)		
Shade management (e.g. a few trees or large % of cover)		
Part-desilt		
Other (please specify)		

Pondscape-scale land use and management actions:	PLEASE SELECT (PLANNED) ACTIONS BY ENTERING A "X"	Add detailed description
Placing the pondscape (or a part of the pondscape) under protective status (e.g. protected areas regulations)		
Changing land use in the pondscape and in the area surrounding the pondscape (e.g. convert arable land or intensive livestock grazing area to extensive grassland; decrease impervious surfaces e.g. asphalt in neighbouring areas).		

Enhancing the connectivity between ponds or pondscapes. This involves the creation of terrestrial or aquatic corridors, removing obstacles, or active transport of propagules.		
Pondscape management measures in agricultural land. Please specify: 1) Soil Management (e.g. Allow field drainage systems to deteriorate or reinstate/increase infiltration to decrease sediment load), 2) Livestock Management (e.g. Reduce the length of the grazing day or grazing season), 3) Fertiliser Management (e.g. Reduce fertiliser application rates), 4) Manure Management (e.g. change from slurry to a solid manure handling system) and 5) Farm infrastructure (e.g. Fence off pondscape from livestock)		
Pondscape management measures in urban land. Please specify: 1) Manage water quality (e.g. inputs of nutrient, salt, other pollutants); 2) Increase good quality terrestrial habitats in neighbouring areas (e.g. other green/blue spaces); 3) Promote natural hydroperiods, 4) Encourage water harvesting from buildings (rainwater), among other actions		
Other (please specify):		

3. Societal Challenges (find detailed explanations in protocol version 3 Dec 2022 - Page 20 of 53)

PLEASE ENTER NUMBERS 1-5, TO INDICATE A HIERARCHY WITH 1 BEING THE MOST IMPORTANT (Further information for each category as notes)	Add brief justification for your choice
Climate Resilience	
Water Management	
Natural and Climate Hazards	
Green Space Management	
Biodiversity Enhancement	
Air Quality	

Place Regeneration		
Knowledge and Social Capacity Building for Sustainable Urban Transformation		
Participatory Planning and Governance		
Social Justice and Social Cohesion		
Health and Wellbeing		
New Economic Opportunities and Green Jobs		
Other missing from list above (please explain)		

4. Nature's Contribution to People generated by the Pondscape

PLEASE ENTER an assessment of importance, TO INDICATE A HIERARCHY WITH 5 pluses BEING very high and 1 plus to be low. 0 means no benefit	Add brief justification (with the use of indicators if possible) for your choice
Water quality improvement	
Water source	
Flood management	
Groundwater recharge	
Habitat provision	
Cooling	
Greenhouse gas	
sequestration	

Erosion control		
Recreation and well-being		
Education and research		
Food and materials		
Conservation value		
Other (please explain)		

5. Costs (find detailed explanations in protocol version 3 Dec 2022 - Page 23 of 53)

PLEASE COMPLETE THE MISSING INFORMATION

One-off costs	Unit: €	Additional Notes (if relevant...)
Design and planning:		
Land acquisition costs:		
Legal and regulatory fees:		
One-off equipment purchases:		
Construction and development (please use the selected items under "2. Pond actions" to specify the composition of construction and development costs in the Notes column or in additional rows):		
Other types of one-off costs (please explain):		
Total one-off costs:		

Yearly ongoing costs	Unit: €/Year	Additional Notes (if relevant...)
Maintenance and operation costs:		
Regulatory costs:		
Depreciation:		
Other types of on-going costs (please explain):		
Total yearly ongoing costs:		

6. Funding Sources

**PLEASE LIST ALL SECURED OR POSSIBLE FUNDING SOURCES FOR YOUR PROJECT AND INDICATE FUNDING AMOUNT AND HOW CERTAIN YOU ARE TO RECEIVE THESE FUNDS.
IF YOU HAVE MORE THAN FIVE FUNDING SOURCES YOU CAN ADD MORE ROWS.**

Funding Source Name (DATE)	(estimated)Funding amount in Euro	CERTAINTY IN %	Additional Notes (if relevant...)

STOP HERE - To be discussed in follow-up telephone call.

7. Financing Gap Assessment (some information might have been entered by us, based on previous information)

PLEASE INSERT AN ASSESSMENT OF THE FOLLOWING

	Assessment from (0-5)	Additional comments to justify assessment
TOTAL PONDSCAPE COSTS (based on step 5)		
One-off costs		
Yearly ongoing costs		
REVENUES (based on step 6)		
FUNDING GAP ASSESSMENT		

Additional Instruments for Funding, Revenues, and 8. Financing

Category	Instrument	Applicable? Please enter: YES / NO / UNSURE	Additional Notes (if relevant...)

Income instruments	User fees		
	Business improvement districts		
	Betterment levies		
	Development rights and leases		
	Sale of market goods		
	Other revenue raising measures		
Contracting approach (cost reduction/restructure)	Community asset transfer		
	Public private partnership		
Voluntary contributions	Philanthropic contributions		
	Voluntary beneficiary contributions		
	Crowdfunding		
Tradable rights/permits and payments for ecosystem services	Payment for ecosystem services		
	Voluntary carbon markets		
	Biodiversity offset and habitat banking		
	Water quality trading systems		
Subsidies	Environmental subsidies		
	Tax concessions		
Grants	Grants		
Debt instruments	(Green) loans		
	(Green) bonds		
Ownership models	Impact investing		
	Commercial investing		



Ponderful



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Pond Ecosystems for Resilient Future Landscapes in a Changing Climate

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