

D6.3. Initial Plan of REWET Business Models



REstoration of WETlands to minimise emissions and maximise carbon uptake – a strategy for long-term climate mitigation

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TABLE OF CONTENTS

DOCUMENT CONTROL PAGE	2
REVISION HISTORY	3
ACKNOWLEDGEMENTS	4
DISCLAIMER.....	5
TABLE OF CONTENTS	6
EXECUTIVE SUMMARY.....	7
1. INTRODUCTION	8
1.1. Description of the document and pursue.	10
1.2. WPs and tasks related with the deliverable.....	10
2. Financing and investment.....	11
2.1. Public, private and blended finance	11
2.2. Breaking down a blended finance scheme	14
3. Regulations and Guidelines of influence in Nature Restoration Financing and REWET.....	23
3.1. Nature Restoration Law (NRL).....	23
3.2. The Peatland Code (UK).....	24
3.3. The Global Peatlands Initiative (GPI).....	25
4. Risk Management.....	27
4.1. Limits to scalability	27
4.2. The People-Nature dichotomy	28
4.3. Greenwashing.....	28
5. REWET Ecosystem Services (ES) and Cost of Restoration.....	30
5.1. REWET identified Ecosystem Services in its OLS.	30
5.2. Preliminary analysis of cost of restoration in a REWET OL.....	39
6. Conclusions	42
7. Next steps	44
8. References.....	45

EXECUTIVE SUMMARY

Large-scale restoration of ecosystems has been identified as a key challenge that both the European Union and the broader international community are dedicated to enhancing. A healthy ecosystem provides with the so-called “Ecosystem Services” (ES), benefits that nature gives out to people due to their inherent characteristics, such as food/material provision, flood mitigation, water purification, climate change mitigation and social services (cultural and educational).

Wetlands have been deteriorating for over three centuries as a result of human activities such as intensive farming, urbanisation, and infrastructure development, which have been exacerbated by the effects of climate change. This pressing issue has triggered the activation of programs and initiatives at governance level aiming at restoring the health of Europe's wetlands to their former natural state.

At this critical moment, creative schemes and initiatives are needed to promote the main objective of securing funds for natural environment restoration. The majority of the restoration activities are funded by government authorities and public programs, and recent strategic efforts have underlined the significance of increasing private-sector participation in such efforts. While several financial structures are available to direct private resources towards restoration actions, the shortage of return-generating investment opportunities discourages potential private investors.

An overview of the key aspects of nature restoration financing and investment is provided, including an analysis of public, private, and current blended finance instruments and mechanisms. The deliverable identifies the main regulations and guidelines of influence for REWET in its task of developing novel financing models, as well as some potential risks and challenges associated with peatland restoration projects. Finally, the report presents a comprehensive analysis of the ecosystem services identified in REWET's Open Labs (OLs) and offers a preliminary assessment of restoration costs for one of the project's OLs. This information aims to provide stakeholders with a solid foundation for understanding the financial, regulatory, and practical aspects of nature restoration initiatives within the REWET project framework.

1. INTRODUCTION

According to the Ramsar Convention on Wetlands, although they only cover around 6 per cent of the Earth's land surface, 40 per cent of all flora and fauna species live in this type of ecosystem. Apart from providing natural habitats to life organisms, its healthy conservation state matters for human beings by providing vital ecosystem services, such as food provisioning, water regulation (flood control and water purification), climate mitigation (as they play a key role as carbon sinks) and cultural (recreational and educational) services. From the economic aspect, as studied by Davidson et al. ¹, based on data generated in 2011 ^{2,3}, the global monetary values of natural wetland ecosystem services can be estimated at \$47.4 trillion per year, accounting for 43.5% of the worldwide monetary value derived from natural biomes' ecosystem services. Nonetheless, these estimations do not translate into market or tradable values due to the lack of established markets for ecosystem services; instead, they serve primarily to inform policy and decision-making. This disparity presents a significant issue: natural wetlands have a huge positive impact on human livelihoods and well-being, yet they continue to face degradation and destruction.

The recent EU Nature Restoration Law outlines the importance of regenerating these vital ecosystems by establishing binding targets to EU Member states to collectively restore at least 20% of ecosystems by 2030, with a special focus in enhancing the ecosystem services provided by wetlands and other biomes. To achieve this, large-scale projects must be implemented, which necessitates the joint effort of numerous important actors at each step of the initiative to meet the vast number of resources required. Initially, restoration projects can be facilitated by various policy and governance instruments, regulatory approaches, education campaigns (to raise awareness), environmental taxation and restoration subsidies ^{4,5}.

Moreover, apart from regulatory and policy instruments input, there is a growing need for the integration of novel financing strategies that enable the long-term implementation of large-scale restoration programmes by combining public and private funds. Here is where the private sector should play a role by complementing the public monetary stream to this sort of nature restoration initiatives. According to IPBES ⁶, the private sector has previously set an example in partnering with national/subnational governments and civil society for financing investments to meet the Sustainable Development Goals (SDGs) in the water sector. Also, private investment is recognised as one of the major funding streams (85%) in the EU ^{*}.

Encouraging greater private sector participation in environment restoration involves comprehensive planning that considers both investment risks and returns. Furthermore, there must be an extensive assessment and characterisation of the ecosystem services that conservation and restoration initiatives can improve. Finally, this process should also address the major private and public stakeholders who stand to benefit from these restoration efforts.

^{*} General government investment as % of total gross fixed capital formation. GDP and spending-Investment by sector
– OECD Data

The ultimate goal of developing a restoration project revolves around implementing measures that harness natural processes to tackle societal issues, including climate change, food security, water scarcity, risk of disasters, social and economic development, and the decline of biodiversity, through the use of Nature-Based Solutions (NbS). NbS that positively impact both ecosystems and human communities involve protecting intact and robust forests, such as the Amazon and Congo basins, European inland wetlands and coastal ecosystems. These efforts are crucial for local and global climate stabilisation, securing potable water resources, preserving biodiversity, and maintaining significant carbon pools ⁷. The REWET project has a significant focus on promoting rewetting initiatives throughout the managed Open Labs, which will enhance the ecosystem services associated with each wetland location. The first crucial step in this WP6 endeavour is to estimate the economic potential of the ecosystem services that could be supplied and determine how these can be matched with present and innovative nature conservation financing models.

1.1 Description of the document and pursue.

This report seeks to examine the existing and compelling evidence of viable sustainable finance instruments and mechanisms for ecosystem restoration, establishing a foundational benchmark for subsequent initiatives or business models under the REWET project, following a “desk research” approach. These models will be designed to ensure that investing in ecological restoration not only becomes a profitable venture but also helps to restore and maintain nature’s health. The goal is to establish a mutually beneficial partnership in which financial viability and ecological integrity complement one another, allowing both to thrive simultaneously. The report also addresses risks associated with financing nature restoration, providing valuable insights for potential stakeholders. Furthermore, we identify relevant regulations and initiatives influencing the REWET project in the financing restoration conversation. Finally, we present key findings from WP6 work, including a categorisation of the main Ecosystem Services identified in each Open Lab and a preliminary Cost-Benefit Analysis of restoration actions in a REWET Open Lab.

1.2 WPs and tasks related with the deliverable.

This deliverable refers to Task 6.2 included in WP6: Replication and business models.

2. Financing and investment

2.1. Public, private and blended finance

As introduced, nature restoration projects are essential for preserving biodiversity, combating climate change, and maintaining ecosystem services. Financing such projects can be complex and often requires a mix of funding sources^{8,9} to enable the sufficient scale that provides a significant impact to society and environment. The main existing financing sources for nature restoration projects can be categorised into public, private, and blended finance:

1. **Public Finance:** typically comes from government entities at local, regional, national, or international levels. Grants, subsidies, tax incentives, and direct investment are the most common financial methods used to deliver nature restoration funds. Public finance is frequently motivated by policy goals and can be used to leverage extra funding from other sources. Examples of this type of funding are:
 - National budgets allocated to environmental protection and conservation.
 - International financial institutions, such as the Global Environment Facility (GEF) and Green Climate Fund (GCF), help countries meet their environmental and climate commitments.
 - European Union funding programs such as LIFE, which supports environmental and climate action initiatives, and other frameworks like Horizon 2020 and Horizon Europe themselves, that also provide financing for a wide range of research and innovation projects, including ecological restoration efforts, such as REWET.
2. **Private Finance:** it refers to funds from individuals, corporations, and private associations aimed at promoting corporate social responsibility (CSR), investing in natural capital, and pursuing sustainable business practices. Private finance might take the form of direct investments, loans, or equity holdings in projects, among other unique mechanisms discussed in this section. Examples include:
 - Local landowners, such as farmers, forest owners, and local communities can invest in nature restoration projects on their own property, motivated by a desire to increase land productivity, improve ecosystem services, or comply with environmental requirements. In some cases, landowners may enter into agreements with governments or conservation organisations that offer financial incentives for preserving and restoring natural habitats on their property.
 - Traditional asset managers, like pension funds, insurance firms, and investment funds, are increasingly considering ecological factors when making investment decisions by dedicating a portion of their portfolio to nature restoration projects to diversify their investments and capitalise on rising markets for sustainable assets.
 - Corporate investments as part of sustainability strategies or offsetting environmental footprints (carbon and biodiversity markets).



- Impact investments from funds seeking environmental and social returns alongside financial returns.
 - Philanthropic donations from foundations and non-governmental organisations dedicated to environmental conservation.
3. **Blended Finance:** it is a strategic financing method that combines public, private, and philanthropic capital to support environmental conservation and restoration initiatives. The initial combination of limited public and philanthropic funds attract and mobilise the private sector to invest, thus increasing the pool of capital available for nature restoration and conservation projects. This approach frequently includes risk-sharing agreements, in which public or philanthropic money assume the higher-risk aspects of a project, making it more appealing to private investors. Blended finance supports on closing the gap between nature restoration projects' risk-return profiles and private investors' expectations. (See section 2.2. where a comprehensive description of a blended finance scheme is detailed).

Figure 1 illustrates these three main financing sources for ecosystem restoration.

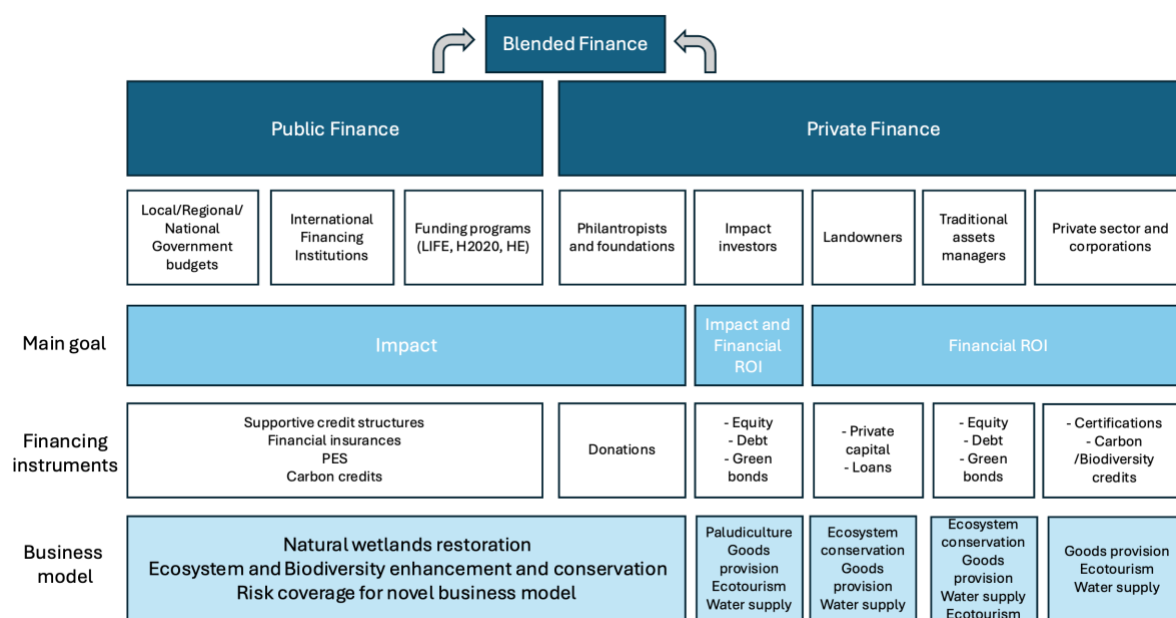


Figure 1. Author's own elaboration.

Each of these funding options has pros and cons. Public funding is frequently required to start projects and provide basic support, whereas private funding can provide the necessary scale and innovation. While the first remains the principal source of biodiversity financing, private investment in biodiversity conservation and restoration is gaining momentum with offset programs (carbon/biodiversity) accounting for a considerable share of financial contributions. These programs, which are often imposed by legislative obligations, involve businesses compensating for their impact on the environment by investing in conservation or restoration projects elsewhere. This trend indicates an ongoing shift towards more diversified and innovative funding sources in the biodiversity sector, possibly opening the way for increased private-public partnerships and market-based solutions to address environmental challenges.

However, ecosystem restoration initiatives, particularly those including wetlands, frequently struggle to secure corporate finance due to their low profit potential. Private investors and commercial financial institutions often reject these projects as investment opportunities. The few cases of considerable corporate involvement in such initiatives have typically been motivated by unusual conditions, such as the promise of substantial economic benefits with minimal risk or the necessity to rehabilitate severely damaged land caused by the company's own activities. Some examples of these cases are the following:

- Rio Tinto's Madagascar Conservation Project ¹⁰: Rio Tinto, a mining company, initiated a significant conservation project in Madagascar to offset the environmental impact of its ilmenite mine. The company established protected areas and funded conservation efforts to compensate for the biodiversity loss caused by its mining operations.
- Outokumpu (Finland) – Kemi mine (Steel Plant) ¹¹: as part of their sustainability plan, Outokumpu has undertaken several environmental rehabilitation projects at their operational sites. These include initiatives to reduce emissions, restore polluted land, and improve water management systems. Its returning effect can be seen on the impact their artificial ponds have on attracting autochthonous bird species.
- Eni (Italy) - Gela Refinery ¹²: facing increasing regulatory pressure and legal obligations, Eni began a comprehensive environmental rehabilitation program at the Gela site starting in the late 2010s. This included the remediation of contaminated soil, restoration of wetlands, and efforts to improve air and water quality.

This reluctance from the private sector underlines a fundamental issue in funding ecological restoration programs, which frequently lack the immediate financial incentives that normally drive corporate investment decisions.

The problem is not a shortage of funds available in the world for ecosystem restoration; rather, it is a lack of incentive to invest from private groups and other relevant stakeholders. Projects that can bring together the efforts of all necessary players benefit everyone: restoration is accomplished, society benefits, and governments and public authorities achieve their objectives, while the private sector makes a zero-loss or profitable business from their investment. According to Huwyler *et al.* (2014) ¹³, there is a gap between needed conservation investment (300-400 billion USD) and the current one (52 billion USD), indicating a significant opportunity for improvement. Private actors can play a role in this by investing in what they believe to be profitable restoration and conservation projects, as well as collaborating with public institutions to improve these types of crucial initiatives.

Blended finance serves as a crucial link here, leveraging the strengths of both public and private sources to achieve the desired outcomes for nature restoration projects and the established by the SDGs. Successful financing strategies typically involve a combination of these sources, tailored to the specific context and objectives of each project. Some illustrative initiatives that have been working recently on the implementation of blended finance schemes are:



- Fairventures Social Forestry ¹⁴ projects: this German for-profit social venture came up with the idea of implementing a scalable business model to battle against the heavy deforestation occurring in Indonesia, one of the world's deforestation hotspots. Following market-based approaches, FSF propose an initial investment (seed funding) to establish proof of concept based on blended financing arrangements, including grants, soft loans and patient equity. Further scale-up phases would be based on debt financing which require from the participation of funding institutions to be source of capital, such as the Land Degradation Neutrality Fund ¹⁵.
- Althelia Biodiversity Fund (ABF) – Brazil ¹⁶: Althelia was created by a French asset Manager, Mirova, to destinate around 100 million USD blended finance to protection, restoration and improvement of biodiversity and local communities in the Amazon area in Brazil. Among the initiatives to be implemented, ABF invest in carbon projects, Non-Timber Forest Products (NTFP) projects, agroforestry, sustainable farming, etc.
- The Africa Agriculture and Trade Investment Fund (AATIF) ¹⁷: a blended finance vehicle that focuses on fostering private sector development in agriculture in Africa. The fund provides financing to improve agricultural value chains, increase productivity, and promote sustainable practices.
- Forest Carbon Partnership Facility (FCPF) ¹⁸: this fund, managed by the World Bank, is a blended finance initiative that supports efforts to reduce emissions from deforestation and forest degradation (REDD+). It provides results-based payments to countries that successfully reduce emissions, using public and philanthropic capital to catalyse private sector investment in forest conservation projects. The goal is to create financial incentives for the protection and sustainable management of tropical forests.

In the following section, we further explain the main items that characterise a blended finance scheme.

2.2. Breaking down a blended finance scheme

Following the OECD classification ¹⁹, blended finance approaches are composed by two key financing elements which are the instruments (a monetary tool used to allocate, manage, or leverage capital from different sources to achieve development outcomes while also ensuring financial returns) and the mechanisms or frameworks through which public and private capital are mobilised, combined and deployed to achieve specific objectives. A crucial aspect of the blended finance approach is its foundational premise of incorporating *concessional* elements in the provision of funding. This means that the financing terms are deliberately structured to be more favourable than those typically available in the market. The concessional nature of these arrangements is a key feature that distinguishes blended finance and makes it particularly suitable for projects that might not otherwise attract traditional market-rate funding. By offering terms that are 'below market,' such as lower interest rates, extended repayment periods, or more flexible conditions, blended finance strategies aim to gather investments in areas or projects that have significant social or environmental impact but may present higher risks or lower financial returns in the short term.

2.2.1. Instruments

a) Debt (loans and bonds)

Here is important to first define what a Development Finance Institution (DFI) and Impact Investment organisations are:

- DFIs: financial organisations, typically backed by a government or an international organisation, that provides funding and financial services to support development projects in developing countries. DFIs focus on promoting economic growth, reducing poverty, and improving living standards by investing in projects that may be too risky or not immediately profitable for traditional private investors.
- Impact Investment organisations: a type of entity that specifically focuses on generating both financial returns and positive, measurable social or environmental impact. These organisations invest in businesses, projects, or initiatives that aim to address societal challenges, such as poverty, education, healthcare, environmental sustainability, or economic development, while also seeking to make a profit.

These groups often lend to businesses, either directly or indirectly, through financial institutions, requiring the borrower to repay the principal plus agreed-upon interest at a fixed or variable rate. A loan may be secured with property or other assets, cash, inventory or receivables. *Concessional loans* are also increasingly being employed in nature restoration projects that employ a blended finance approach to ease solvency difficulties or lower the debtor's repayment load. These loans provide more favourable terms, such as lower interest rates or longer repayment periods.

Another type of debt instrument is the bond (also commonly employed in blended finance schemes), which is a fixed-income instrument issued by governments, public utilities, banks, or companies to raise cash for expansion and development. Investors who purchase bonds become debtholders or creditors of the emitting entity and are paid an agreed-upon interest rate for the duration of the bond. If the bond is designed to achieve social, governance and environmental goals, they have received the name of "*Green Bonds*" (see below the *Impact Bonds mechanisms*). The main distinction between bonds and loans is that bondholders can sell them in the market, whereas loans are arrangements between two entities in which one borrows money from the other but cannot sell this agreement to any external interested party. Overall, these instruments are frequently used by DFIs and Impact organisations due to their ease of design and implementation. Because of their high level of assurance, they pose a minimal amount of risk to potential investors, while the financial returns are also modest.

b) Mezzanine: First Lost Capital

A mezzanine instrument is a hybrid form of capital gathering in between equity and debt with the intention of providing flexibility in structuring financing deals. There are a wide variety of specific mezzanine approaches, but one of the most frequent used in blended finance structures is the First Lost Capital ²⁰. In this instrument, an investor or grant-maker agrees to absorb first losses in an investment with the intention to attract participation of other co-investors that otherwise would be reluctant to enter in

the financing structure. As any other instrument, mezzanine ones contribute significantly to accelerating impact, optimising resources and achieving better terms for investees.

c) Equity

A type of investment where money is provided to a project or company in exchange for ownership shares. This means the investor becomes a part-owner of the project or company and can share in its profits or losses. In blended finance, equity instruments are frequently used alongside public or concessional funds to attract private investors by making the whole investment appealing and risk-free. It can provide long-term growth capital that private enterprises in developing and emerging markets often lack.

d) Grants

A well-known instrument because of its widespread use in project pipeline activators in academics and research contexts. They have recently been used to raise private sector funds for blended finance and impact investment in support of the SDGs. They are especially important in less established sectors and risky areas that require private capital to enter ²¹. This approach works by the granter offering funds to help develop the project in exchange for pre-agreed-upon outcomes (thus the name "performance-based grants"). These grantmakers are typically public or philanthropic institutions that strive to have a positive impact on social, economic, or environmental factors (by fostering business growth, job creation, and significant aimed outcomes such as waste reduction, green energy increase, or gender equality promotion), thereby benefiting the community ²².

e) Guarantees

This instrument is employed in combination with other awarding funds instruments in which a guarantor covers a portion, or the entire amount of the equity, loan, or other financing instrument capital granted, acting as insurance in the event that the capital value is lost, or non-payments occur ²³. Guarantees are an excellent risk-reduction tool, with the potential to reduce return-on-investment concerns in the private sector. It is critical to recognise that guarantees fund activation occurs only when underlying investment fails, rather than resulting in a continual outflow of funds and benefiting the final establishment of an optimal budget for environmental/social/economic development initiatives.

f) Payment for Ecosystem Services (PES)

PES is one of the most known and frequent methods for raising the financial capital needed to deliver large-scale wetland restoration ^{24,25}. This strategy aims to provide monetary incentives for either the improvement or maintenance of ecosystem services following ecosystem restoration, typically serving to mitigate ecological harm in different regions. Specifically, a user (or beneficiary) pays an ecosystem service provider (for example, a landowner or a manager of a nature area) for the management of the land's natural resources and the services that come with them as offsets (food, materials, good water quality, enhanced levels of pollination, restoration and maintenance of the cultural levels, such as sense of belonging to that natural area, etc.).



g) Carbon credits

Carbon credits have emerged as a significant financial instrument in nature restoration projects, leveraging market mechanisms to address climate change and promote environmental conservation. They represent a quantifiable amount of greenhouse gas emissions reduced, avoided, or sequestered through various activities, including nature-based solutions. They can be generated via the implementation of nature-based solutions funded projects and can be sold like a marketable item to entities looking to offset their own emissions or meet regulatory requirements, according to the World Bank ²⁶.

The rise in popularity of carbon credits in nature restoration projects is attributed to their capacity to provide financial incentives for conservation and sustainable land management. They enable project developers, who frequently involve local communities and economic groups, to monetise the environmental advantages of their restoration efforts. This market-based strategy has attracted a wide range of stakeholders, including governments, corporations, and investors looking to support climate action while potentially earning profits through the sale of these credits in cap-and-trade carbon markets, such as the EU Emission Trading System (EU ETS) ²⁷. These markets were initially established after the Kyoto Protocol and developed at regional, national, even corporate sectors levels worldwide, for countries and industries to use them in case they reach their top cap emissions. These markets and carbon credits are largely driven by government policy and are specifically known under the name of “compliance carbon markets”.

On the contrary, a “voluntary carbon market (VCM)” exist and has experienced a boost since the settled of the compliance one in 2005. The whole concept was already floating back in early 90s with the first voluntary emissions offset project implemented by AES Corp., an American electric power company, after being advised by the World Resource Institute (WRI) to plant trees and slow deforestation in Guatemala to offset the emissions of their coal plant in the US ²⁸. Then, the Chicago Climate Exchange (CCX) was founded and become operational in 2003 as one of the first major voluntary carbon trading platforms. In 2007, the voluntary carbon market received a substantial boost with the launch of the Voluntary Carbon Standard (now Verified Carbon Standard or VCS) providing a robust certification standard for voluntary carbon projects. Since the late 2010s, the voluntary carbon market continued to mature, with a greater emphasis on project quality, impact measurement, and transparency. After Paris Agreement, the “net-zero” concept was the mainstream and carbon credits projects were more and more demanded, not only in numbers but in quality too. Figure 2 illustrates this brief historical description of the VCM growth.

Carbon credits have become especially important in the context of international climate agreements and corporate sustainability goals, boosting demand and opening opportunities for funding large-scale ecological restoration projects. However, it is crucial to emphasise that the success and integrity of carbon credit schemes rely on comprehensive measuring, reporting, and verification mechanisms to assure their real environmental impact. The recent State and Trends of Carbon Pricing, 2024 developed by the World Bank Group, provides objective and up-to-date information on key developments in carbon pricing ²⁹.



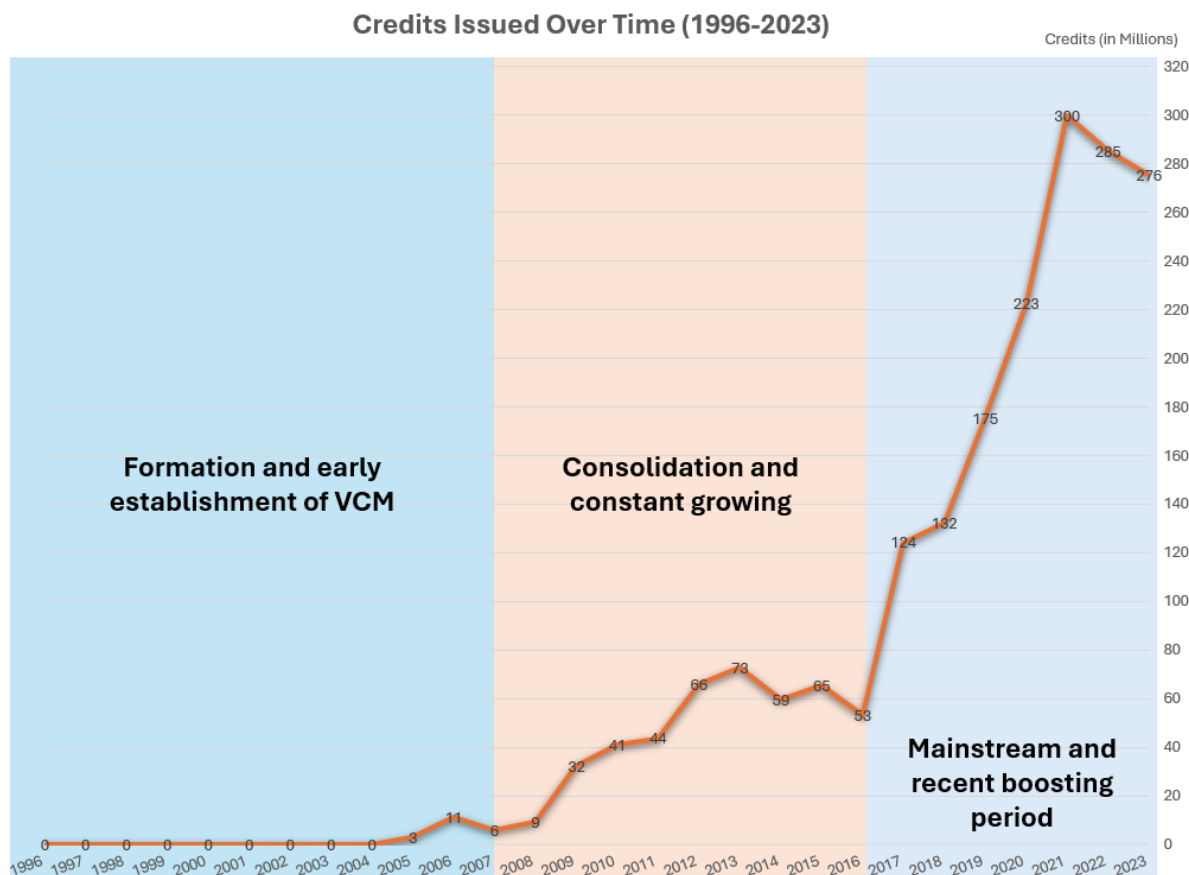


Figure 2. Author's own adaptation from the Berkeley Voluntary Registry Offsets Database v7³⁰.

2.2.2. Mechanisms

The previous financial instruments can be applied, mixed, modified and used broadly to create more complex and tailored financing solutions adapted to a selected financial mechanism to acquire the format of a ready-to-be-implemented framework. The most prominent financing vehicles that can be identified are the following:

a) Funds/Structured funds

A structured fund is an investment vehicle that pools capital from multiple investors and allocates it across different asset classes or investment strategies. The way this type of framework manage risk is through the establishment of investment tranches with different risk-return profiles to attract various types of investors. As shown in figure 3, three types of shares can be identified:

- Class A - senior shares: the least risky because they are protected from losses by the Class C and Class B shares, therefore being targeted by private investors.
- Class B - mezzanine shares: typically invested by DFIs.
- Class C - junior shares: public donors and philanthropists often acquires these shares which are tapped first if the fund experiences financial losses.



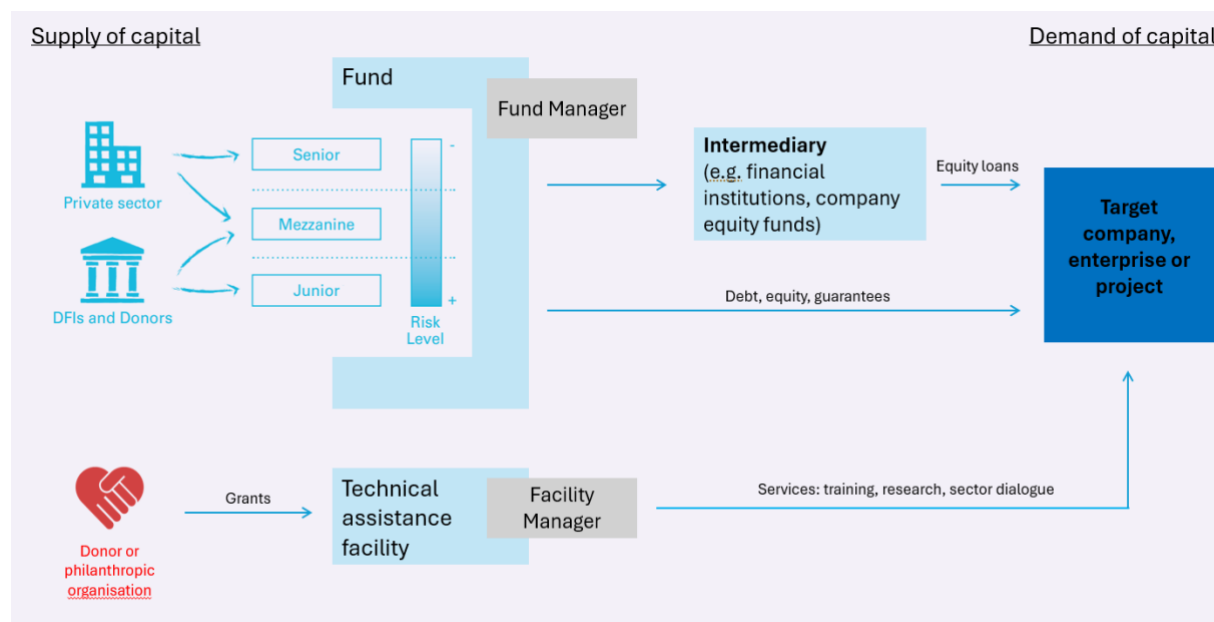


Figure 3. Elements of the structured fund mechanism. Adapted from Koenig and Jackson, (2016) ³¹.

A fund manager controls the fund's activities and assets (reporting to an investing committee) to ensure the financial viability, and a technical assistance facility or board, being represented by a facility manager, aids in achieving environmental impact. In the nature restoration sector, there are currently multiple funds (e.g., Althelia Climate Fund, The Nature Conservancy's NatureVest, etc) working towards investing in a diverse portfolio of environmental restoration projects, including reforestation, wetland restoration, and sustainable agriculture, and also companies or enterprises whose mission is bound to environmental conservation and sustainable resource management. The main financing instruments used by these funds are debt, equity, and grants, often structured in innovative ways to accommodate the unique characteristics of nature-based projects. Among the main revenue sources, a fund approach could consider carbon credits, payments for ecosystem services, sustainable commodity production, and ecotourism. To reduce risk, the fund uses measures such as portfolio diversification, insurance products, and collaboration with local organisations. Financial returns as well as criteria for environmental and social impact are used to measure performance. The fund's structure enables the alignment of financial returns with conservation objectives, attracting a diverse spectrum of investors with varying risk-return profiles.

b) Development/Social/Environmental Impact Bonds

Meaning Development/Social Impact Bonds, DIBs and SIBs are also examples of outcome-based and Pay for Performance (PFP) financing that has raised in popularity to be applied in blended finance projects. A clear description of such strategies is that they "are results-based contracts in which one or more private investors provide working capital for social programs, implemented by service providers (e.g., NGOs), and one or more outcome funders (e.g., public sector agencies, donors, etc.) pays back the investors their principal plus a return if, and only if, these programmes succeed in delivering results", according to Dalberg Advisors ³².

The difference between SIBs and DIBs is who pays for the achieved results. In a social impact bond, the outcome payer is typically the domestic government, whereas in a DIB, the outcome payer could be a donor, such as a government or multilateral aid agency, or philanthropic funding.

Another type of Impact Bond instrument is the **Environmental Impact Bond (EIB)**³³, designed to promote resource efficiency and attract private capital for the restoration of natural infrastructure, which is typically associated with Nature-based solutions. As previously stated, they are executed as a PFP contract, with general targets for the contractor to meet and the specific methods used left to the contractor's discretion. Additionally, if the project outperforms expectations throughout the monitoring period, investors receive an 'over-performance payment (OPP)' in addition to a baseline rate.

An EIB approach requires from the correct application of metrics during the implementation of the project activities. In an ecosystem restoration project, two groups of metrics should be monitored:

1. Metrics that control the restoration: This group ensures that the restoration activities are progressing well and that the natural service is being effectively recovered.
2. Metrics that trigger the OPP: A single or selected group of metrics, which are part of the restoration control metrics, determine if performance exceeds expectations. They usually measure the Ecosystem Services (ES) that are most valued by the stakeholders.

These metrics should have the following characteristics:

- Readily measurable and verifiable in a cost-effective manner.
- Attributable to the performance of the project.
- Aligned with the risk appetite of investors.
- Fit the payors' planning window for outcome achievement.
- Fit the investors' time horizon for validation.
- Not easily addressed through service provider contracts or insurance mechanisms.

Payments can be delivered through taxes levied by local governments (a typical strategy), but there is also an alternative called a *Resilience Bond*. Resilience Bonds are debt instruments tied to insurance mechanisms that monetise the physical and financial risk reduction benefits of resilience projects, which could be designed for investments in natural infrastructure. In this model, expected risk reductions would lower premium payments and the cost of capital for borrowers. The savings generated are used to fund the risk reduction project. It is critical to demonstrate the link between the wetland restoration project and the risk-reduction services to assets and operations.

The common structured found in a DIB/SIB/EIB scheme involves multiple players with a relevant role for the correct functioning of the approach (Figure 4):



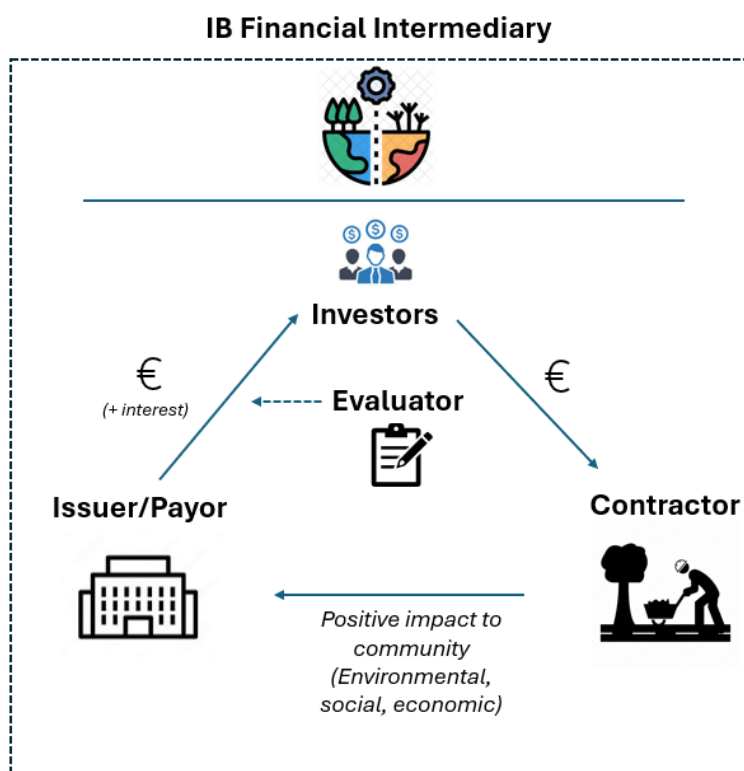


Figure 4. Environmental Impact Bond model diagram (adapted from Herrera et al. 2019³³).

- i. Project Initiator/Issuer and Payor: usually government agencies or public bodies that identify the need for the restoration project and initiates the Impact Bond process.
- ii. Investors: Private individuals, institutions, or impact investors who provide upfront capital for the project.
- iii. IB financial intermediary: an organisation that structures the bond, manages cash flows, and facilitates transactions between parties.
- iv. Contractor/Service Provider: the organisation (public, private, NGOs) or team responsible for implementing the projected actions under the issued bond.
- v. External evaluator: A third-party entity that assesses the project's outcomes and determines if the agreed-upon metrics have been met.

c) *Public-private partnerships (PPPs)*

PPPs may be referred to as “long-term contracts between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility”³⁴. In the context of nature restoration, PPPs can be powerful financing vehicles that combine public sector goals with private sector efficiency and innovation. It can take various forms based on its longer-term contacts between public-private parties main characteristic, such as

Design-Build-Finance-Operate-Maintain (DBFOM) [†] or Build-Operate-Transfer (BOT) [‡] models, and utilise financing mechanisms like green bonds, results-based financing, Payment for Ecosystem Services (PES) or Conservation trust funds. While PPPs offer benefits such as access to private capital, expertise, and increased efficiency, they also face challenges including contract complexity and potential conflicts between profit motives and conservation goals. Successful implementation requires clear legal frameworks, robust monitoring systems, and effective risk management strategies. Key stakeholders include government agencies, private companies, NGOs, local communities, and investors. Examples of PPP models in nature restoration include habitat banking, sustainable forestry, and wetland restoration projects.

d) Community Asset Transfer (CAT)

CAT is a mechanism for transferring ownership or management of public assets to community organisations (such as charities, social enterprises, or community groups) ³⁵. Nevertheless, it can have important financial implications and be used to enhance nature services for the public benefit. For example, by delegating ownership and responsibility to communities, local governments can lower the expense of operating and maintaining a natural site. Additionally, an increase in revenue creation can be achieved by investing these economic advantages in local services while maintaining operations. Furthermore, a community group would have access to funds that public bodies do not (grants, contributions, or social investment). Overall, the whole concept revolves around a CAT-based organisation to manage the multiple ecosystem services (assets) that a portion of land possesses for the benefit of a wider variety of social and economic stakeholders, allowing the opening of the scope to receive interest from a higher number of investors.

CATs sometimes pose a solution to some challenges that PES normally encounter. In this line, Canning et al. precisely reviewed the common challenges across PES schemes, identifying financial viability, keeping the scheme credibility and ensuring social license for the scheme to operate. They suggested that CAT approach, such as the described by Costanza et al. ³⁶ could overcome these challenges.

[†] DBFOM: Comprehensive and integrated project delivery method that combines multiple phases (the ones referred in its own name) of a project's lifecycle into a single contract, typically awarded to a private sector consortium.

[‡] BOT: very similar approach to the DBFOM, with some particular differences. For example, under BOT methods, ownership throughout the concession period may be held by a private entity, whereas in DBFOM, it is held by the public body. Also, DBFOM involves more complex financing arrangements. Overall, BOT focuses more on construction and operational aspects, while DBFOM puts more weight on design and long-term maintenance of the assets in the project.

3. Regulations and Guidelines of influence in Nature Restoration Financing and REWET

In this section, a brief overview of three significant regulations and initiatives that are shaping the landscape of nature restoration efforts is described: the Nature Restoration Law, the Peatland Code and the Global Peatland Initiative. These frameworks represent a diverse range of approaches, from legislative measures to international collaborations and voluntary standards, all aimed at promoting and facilitating the restoration of natural habitats. By examining these key initiatives, we can gain insight into the current regulatory environment and the evolving best practices in nature restoration, particularly as they relate to financing and implementation strategies.

3.1. Nature Restoration Law (NRL)

The recent NRL was approved by the European Commission to halt and reverse biodiversity losses³⁷. It has the potential to provide an essential framework for Europe's long-term biodiversity and ecosystem service restoration goals, while also demonstrating worldwide leadership in addressing pressing environmental issues. After considering the problems in addressing these concerns by the Member States and the failure from EU legislation and policies, the NRL force countries to implement novel instrument to achieve the major international agreements in term of biodiversity improvement (i.e., the Kunming-Montreal Global Biodiversity Framework).

The NRL separates itself from previous directives, policies, and guidelines by addressing a wide range of European ecosystems while providing explicit, quantifiable restoration goals with definite dates. While it shares certain common goals and tactics with existing frameworks, the NRL's scope is broader and more precise. A notable example is its treatment of drained peatlands, where the law mandates that "Member States shall put in place measures which shall aim to restore organic soils in agricultural use constituting drained peatlands." The NRL further delineates progressive targets for addressing these ecosystems, specifying that 30%, 40%, and 50% of such lands should be restored by 2030, 2040, and 2050, respectively. Importantly, the law emphasises the critical role of rewetting in peatland restoration, explicitly detailing the proportion of restored areas that should undergo this process too.

This is just a glimpse of how ambitious the NRL targets and timelines to achieve them are. Consequently, it encounters similar challenges than other directives with gaps between targets and effective implementation options, with a clear downfall in the allocation of sufficient human and funding resources, apart from robust implementation procedures and administrative capacities. To achieve the correct implementation at each nation level, a resilient funding structure is needed, not only including financial investments, but also cooperative organisations and institutions, business models and social acceptability of the proposed measures. Moreover, the private capital mobilisation is also required by the NRL to be enhanced by Member States. Article 80 specifically mention available national and private initiatives, such as the InvestEU Programme, which *"offers opportunities to mobilise public and private finance to support, inter alia, the enhancement of nature and biodiversity by means of*

green and blue infrastructure projects, and carbon farming as a green business-model.” This is of utmost importance in what is needed to be addressed by projects like REWET by also putting the scope in results-based support procedures, innovative schemes (such as carbon removal certification schemes) and the implementation of financial instruments and mechanisms.

3.2. The Peatland Code (UK)

The UK Peatland Code ³⁸ exemplifies an innovative approach to blended green finance for peatland restoration in the United Kingdom. Serving as a benchmark model, it effectively combines public funding with private investments in a sustainable and robust manner. Launched in 2015, this voluntary certification standard was designed for UK peatland restoration projects seeking to market the benefits of their conservation efforts. The Code provides assurance to buyers of carbon credits generated from these projects, thereby creating a credible framework for private sector involvement in peatland restoration.

It does so by setting out a series of best practice requirements including a standard method for quantification of GHG benefit, that includes the commitment from the project to keep monitoring the carbon benefit regularly over the lifetime of the project. Private buyers motivated to achieve corporate social responsibility can trust on this procedure to purchase peatland carbon units upfront, hence providing the project with add-on financing to implement the planned actions.

The Peatland Code serves as a valuable benchmark and baseline scenario for the development of similar frameworks across Europe. To date, only Belarus ³⁹ and Germany ⁴⁰ have made notable progress in establishing related initiatives using voluntary carbon markets. While these approaches have demonstrated clear advantages in attracting private investments through carbon emissions quantification and the generation of carbon credits, there is still room for improvement. Moxey et al. 2021 ⁴¹ conducted an investigation on a case study where the Peatland Code was being implemented and revealed some observations for improvement of these frameworks that should be noted regarding:

1. Awareness of the initiative: peatland restoration benefits and the Peatland Code are not widely known. More publicity is needed to increase awareness and uptake among land managers.
2. Increased participation: willingness varies due to cultural ties. Some see carbon income potential, while others resist change due to tradition or past experiences.
3. Upfront funding and financing: Restoration requires significant upfront costs. Public grants are necessary, as carbon market prices alone are insufficient.
4. Bureaucracy limitations: applying for joint funding is complex. Interactions between schemes add complications. Public and private funding should be designed together with flexibility.



5. Lack of specialist and knowledge capacity: this is even more acute at local restoration levels. Therefore, ambitious restoration targets need to be followed by efforts to increase this capacity.
6. Income concerns: one of the main downsides attached to nature restoration and its ability to generate revenues. Fears of ongoing losses and uncertainty about future support hinder uptake.

The authors propose some precise and positive recommendations to overcome the identified downsides. In the short term, efforts should focus on raising awareness of the Peatland Code and restoration benefits among landowners and managers through targeted campaigns by public bodies and NGOs. These efforts should be tailored to different audiences, considering varying attitudes towards environmental issues. Promoting sustainable land management and blended finance through marketing and advisory campaigns may be more effective than focusing solely on payment rates and scheme design. Additionally, bolstering specialist restoration capacity through training programs is crucial. Long-term solutions involve shifting public policy support towards explicit rewards for ecosystem services delivery, aligning with the "public money for public goods" concept. Moreover, assurances should be provided that current restoration activities will not be penalised under future arrangements. To facilitate blended funding, interactions between public funding schemes and the Peatland Code need improvement, including greater flexibility in application timing and additionality estimation. Finally, joint planning between public and private funding schemes is necessary to allow for increased private sector contributions in the future.

3.3. The Global Peatlands Initiative (GPI)

The Global Peatlands Initiative (GPI) ⁴² is an effort by leading experts and institutions formed at the UNFCCC COP in Marrakech, Morocco in 2016 to save peatlands as the world's largest terrestrial organic carbon stock and to prevent it being emitted into the atmosphere. The GPI conducts international activities and within four initial partner countries: Indonesia, Peru, Democratic Republic of Congo and the Republic of Congo. Their global activities include a rapid and comprehensive global assessment of peatland extent and carbon content followed by a more detailed analysis of sustainable peatland management options, South-South and Triangular Collaboration, and private sector engagement.

The REWET project has recently joined the GPI Research Working Group which aims to pool resources and expertise to achieve strategic policy and market impacts that can protect, restore and sustainably manage peatlands. Starting with Europe, the group is interested in aligning efforts and finding synergies among different European Peatland-related projects, as it wants to promote cross-project cooperation to scale up peatland restoration.

The REWET consortium recognises the value of collaborating with relevant projects through the GPI platform. This cooperation is expected to facilitate overcoming key challenges (as the above mentioned for the Peatland Code) in raising awareness about global nature restoration initiatives among society, public authorities, and the private sector. By joining forces with other projects, REWET aims to enhance the visibility and impact of its important work in peatland restoration and management,

and to further advance in the tasks associated with WP6 and the development of sound business models to enhance financing of restoration projects.



4. Risk Management

The previous sections have highlighted a consensus that generating self-sustaining financial models for nature restoration projects and implementing NbS at nature sites is significantly dependent on establishing strong market-based approaches and actively engaging the private sector. However, this transformation will require a stronger effort from public authorities and organisations to widen their focus beyond traditional public finance, including market-based initiatives and other complementary financing channels. Despite the potential benefits, a number of factors have slowed the development of these creative funding options. The issue remains: what specific challenges have prevented these innovative funding solutions from reaching a higher maturity level?

4.1. Limits to scalability

NbS and nature restoration initiatives have been extensively studied in terms of the common challenges they typically face when attempting to use a market-based strategy to monetise the ES supplied in a specific location.

- a) The quantification and mapping of those natural services lack methodologies and standards due to their complex implementation and wide margin of error ⁴³. Not only that, but because not every single ecosystem service is tangible, quantifiable, or measurable, it is difficult to characterise the main aspects of "biodiversity" in order to consider it for conversion to credits and marketable assets ⁴⁴.
- b) The private sector is primarily interested in capitalising on ES related to forestry, agriculture, and water provision due to their commercial potential. The balance of the rest of the services (mainly supporting, regulatory, and cultural ones) complies with non-rival and non-excludable features, implying that they belong more to the public and thus the private sector cannot manage them sustainably for profit purposes ³⁶. Carbon and biodiversity markets are emerging and have recently been used to attract investors to nature projects; however, there is still a long way to reach a peak maturation level as they cannot sustain the upscaling of the initiatives by themselves ⁴⁵.

To effectively scale up NbS, it is crucial to acknowledge and implement the innovative financial mechanisms discussed earlier in this report and any other novel upcoming framework. In addition to promoting these measures, the following proactive governance strategies could be adopted to enhance the scalability of NbS:

- Tax environmentally harmful activities ⁴⁶ and supportive tax regimes of green innovations and solutions ⁴⁷.
- Redirect government subsidies to more beneficial usage of land rather than intensive, extractive and exploitative industries (fossil fuels, intensive agriculture or fishing).
- Maximising public investment in nature is crucial for delivering essential public goods. Recent shifts in macroeconomic policies, such as those implemented to address inflation and facilitate COVID-19 pandemic recovery, have

demonstrated that investments in nature and biodiversity conservation can be effectively integrated into broader economic strategies ⁴⁸. This approach falls within the blended finance model discussed earlier in this report, emphasising the significant role that various public entities, beyond regional governments, play in mainstreaming Nature-based Solutions (NbS). For instance, institutions like the European Investment Bank, through its natural capital financing facility, exemplify how diverse public bodies can contribute to advancing NbS initiatives.

4.2. The People-Nature dichotomy

The adoption of market-based approaches to environmental conservation has inherent risks if not properly regulated and monitored. Assigning monetary values to natural materials and establishing markets around them has the potential to create a disconnect between people and nature, weakening the long-term sustainability and societal advantages of NbS ⁴⁹. A prime example of this worry is remote investors' participation in natural capital markets. These investors, who are primarily concerned with creating cash flow and maximising profits, may unintentionally jeopardise the delicate balance of social and environmental considerations. Their actions can have a direct impact on the local-level interactions between people and nature that are central to the NbS concept ⁵⁰. Furthermore, if external investors focus their efforts entirely on altering specific lands to generate carbon credits, they may downgrade the benefits of other critical ecosystem services. This narrow focus may result in NbS advantages falling short of their expected impact, since the holistic approach to ecosystem management is weakened ⁵¹.

NbS are particularly crucial for lower-income countries seeking economic growth. However, it's important to recognise that NbS should not be viewed as a tool for unlimited expansion. Current economic models, with their heavy reliance on energy consumption and material resources, often lead to unsustainable development practices that exploit land and natural resources excessively ⁵². Many researchers and studies suggest that shifting focus away from GDP growth as the primary measure of success is essential for addressing both human and ecological well-being, rather than solely economic and political objectives ⁵³⁻⁵⁶. This transition will undoubtedly present short-term challenges, such as potential job losses and inflation, as economies reduce their dependence on intensive growth. Nevertheless, in the long run, fostering a circular green economy has the potential to benefit both people and nature, ultimately achieving the transformative change that has been sought after in recent years.

4.3. Greenwashing

Greenwashing in nature conservation refers to “the deceptive practice of making misleading or false claims about environmental efforts or initiatives to appear more ecologically responsible than they actually are”. In the context of nature conservation, this involves organisations, companies, or governments exaggerating or misrepresenting their conservation efforts to gain public approval, financial support, or other benefits. Jay Westerveld, an American environmentalist and researcher, coined the term "greenwashing" back in 1986. The name came from his observations of a beach resort in Samoa that claimed to be environmentally aware by providing reusable towels. However, this eco-friendly effort was overshadowed by the resort's ongoing

development into the adjacent rural areas, which contradicted its claimed environmental concerns ⁵⁷.

To prevent greenwashing in private sector nature conservation projects, several critical strategies and considerations should be implemented:

7. Companies engaging in conservation efforts should publish transparent and accountable information about their operations, including goals, techniques, and measurable achievements ⁵⁸.
8. Third-party verification: engaging independent, accredited organisations to analyse and verify the impact and legality of conservation programs helps ensure that firms prioritise environmental concerns ⁵⁹. Not only independent parties need to play a role on this, but also governments are encouraged to monitor and enforce standards for private sector participation in conservation projects. Among the multiple actions they would implement in their oversight, they could impose fines or penalties on organisations found to be making false or misleading statements that could be identified as greenwashing.
9. Standardised reporting frameworks, like the Global Reporting Initiative (GRI) and the Task force on Climate-related Financial Disclosures (TCFD), provide a consistent and comparable way to evaluate companies' environmental performance and conservation efforts. The role of frameworks like the Global Reporting Initiative (GRI) has been discussed in promoting transparency and accountability in sustainability reporting ⁶⁰. These studies argue that such frameworks provide a common language for assessing and comparing companies' environmental initiatives, enabling stakeholders to more easily assess and benchmark organisations' sustainability efforts across different industries and regions.
10. Encourage firms to commit to long-term conservation programs, rather than short-term publicity campaigns which are typically ending in greenwashing, to ensure long-term influence on ecosystems and biodiversity ⁶¹.
11. Collaborate with conservation experts: Private sector entities should collaborate with conservation scientists, NGOs, and local people to create and implement scientifically sound programs that follow best practices in conservation biology ⁶².
12. The public and consumers have been intentionally exposed to what is called “executional greenwashing”, defined as “the use of nature-evoking elements in advertisements to artificially enhance a brand's ecological image” ⁶³. Making a turning point on this matter and increasing public awareness about greenwashing can create pressure for authentic conservation initiatives.



5. REWET Ecosystem Services (ES) and Cost of Restoration.

As part of the initial task of describing REWET business cases subjected to WP6, we conducted several meetings with the REWET Open Labs coordinators as well as circulated a survey in order to identify the primary ecosystem services provided by their respective managed sites. While healthy wetlands typically offer a comprehensive range of ecosystem services, certain services stand out as more prominent or impactful in specific locations. These key services have the potential to attract sustainable financing when restored or enhanced, making them particularly relevant to our analysis. Our discussions aimed at identifying these critical ecosystem services for each site, creating the baseline scenario for developing targeted strategies to leverage these services in attracting sustainable investments for wetland restoration and management.

Furthermore, a preliminary cost analysis of the restoration actions that are being implemented in some of the REWET Open Labs is showed in this section in order to provide a framework for understanding and estimating the financial requirements of ecological restoration projects.

5.1. REWET identified Ecosystem Services in its OLs.

The following enumeration of ES consists in the specific nature services that each OL can provide in their healthy state. It's important to note that the 'supporting services' form a fundamental category inherent to all natural environments. Consequently, each REWET Open Lab contributes equally to these essential functions, which are habitat provision (hence enhancing biodiversity), promoting soil formation (sediment retention and accumulation of organic matter) and nutrient cycling (enabling the efficient circulation and transformation of essential nutrients within the ecosystem).

OL #1 – NETHERLANDS (managed by WEnR)

OL #1 is located at the Weerribben-Wieden National Park in the Overijssel region (Netherlands). As part of the Natura 2000 area, it covers more than 10,000 hectares and is the largest fen peatland in north-western Europe. The landscape as it is present today has been formed by centuries of human intervention, especially the excavation of peat and reed cutting. The main issues that they are has faced are hydrological disturbances and water quality issues, thus required from restoration actions to improve this degradation state. One of the most recent restoration projects conducted in the region were aimed at transforming former agricultural land to a biodiverse fenland area.

The Weerribben-Wieden capitalisation of their main ES have been studied in the past by the WEnR itself ⁶⁴, opening the field to carry out this type of analysis in any nature location. establishing a precedent for conducting similar analyses in various natural settings. However, it's crucial to note that the extent of such evaluations is primarily constrained by the degree of interaction between the ecosystem and the surrounding human communities. The main insights about the OL's ES are gathered here:

- Provisioning services:

- *Water purification and supply:* Two primary companies, Dunea and Vitens, have been identified as key players in the exploitation of drinking water supply in the area. Dunea has successfully implemented a revenue model that directly supports ecosystem management by charging an additional 4 cents on top of their standard rate of €1.09 per cubic meter of water supplied. This results in an annual collection of €5.50 per customer, which is specifically allocated to the management of the dune area. The situation in the Weerribben-Wieden area is more complex, as the management of the site is distributed among various organisations, and water extraction is solely the responsibility of Vitens. Furthermore, only 40% of the extracted water originates from this specific area. Despite these complexities, initiatives to enhance water quality in these regions are being actively promoted. These efforts serve a dual purpose: improving the quality of drinking water supply and generating positive impacts on the natural environment.
- *Reed for construction:* historically, reed has been used in the Netherlands to build thatched roofs of houses. As a result, approximately 300 reed companies have established themselves in the region. However, this business sector has been shown to be reluctant to collaborate, outdated and with no interest in investing much in developing the industry. Also, small scale predominates (small plots of reed lands make it very difficult for bigger organisations to manage these lands) and companies depend on policies as the land is owned by public authorities. Still, according to some studies ⁶⁵, opportunities for domestically produced reed are still open. For example, the position of domestic reed can be improved by setting up a quality mark for domestic reed stating the place of origin. Moreover, promising applications for the innovative use of reed have been explored ⁶⁶ as insulation material, chipboard, packaging material and bank protection material.
- *Biomass production:* Weerribben-Wieden generates thousands of tons of organic waste annually. Currently, researchers are exploring ways to transform this reed sod and plant collar waste (dried bank vegetation that can be burned like peat) into innovative "BioBlocks." These sustainable building materials have potential applications in reinforced ground constructions, noise barriers, and facade cladding. This initiative aims to create economic value from the area's dead plant matter, turning what was once considered waste into a valuable resource.
- Regulating services:
 - *Flood risk mitigation:* As a wetland area, the park acts as a natural sponge, absorbing and storing excess water during heavy rainfall or flooding events. This helps to slow down and reduce the flow of water to surrounding areas.
 - *Carbon storage:* according to Atlas Natuurlijk Kapitaal ⁶⁷, the soils of the Weerribben-Wieden area contain more than 175 tons of C per ha. As a wetland, it functions as a natural carbon sink, contributing to reduce the GHG emissions to the atmosphere.
- Cultural services:



- *Recreational & Ecotourism:* The Weerribben-Wieden National Park's current landscape, characterised by its open swamp areas and stunning natural beauty, is the result of historical human influence. This unique environment has fostered a strong tourism business, with a wide choice of lodging alternatives including camping grounds, B&B, bungalow parks, and eco-hotels. The sector's economic significance is evident from 2014 data, which reveal that over 2,000 individuals work in the area's leisure industry. However, the park confronts difficulties with tourist management and conservation. There is frequently an absence of information regarding visiting destinations and insufficient instruction on preservation behaviours. Furthermore, the area has experienced greater competition among companies competing for economic benefits rather than joint attempts to preserve the site. The concept of Business Investment Zone (BIZ) for the rural areas is being implemented, offering a framework for this collaboration and for companies to take joint financial responsibility of their immediate environment.
- *Education in the nature field:* Not only the tourism industry should be promoted; also, there are further opportunities by explicitly linking the nature of the National Park to the cultural history of the area. Examples of this are the joint promotion of the Kröller-Müller Museum and De Hoge Veluwe National Park. Towns like Giethoorn, Blokzijl, Steenwijk and Vollenhove can benefit from being at the vicinity of the National Park and promoting cultural and educational actions.

OL #2 – AUSTRIA (managed by BOKU)

OL #2 is located within the Morava River basin, near the border between Austria and Slovakia. Local communities surround the area from both countries and benefit from the ES provided by the river, not only from the water source it poses but also the economic and recreational spot for the local population and the number of visitors that come to the area every year. This put a high anthropogenic pressure on the conservation of the basin which is balanced with high protection goals for the preservation and improvement of the ecosystem being implemented by the Austrian authorities. The Morava River is habitat to over 500 endangered animal and plant species a hotspot of biodiversity in Central Europe. The following ES have been identified in the OL:

- Provisioning services:
 - *Water supply:* the river serves as a vital source of water for agricultural activities in the surrounding area. It provides a consistent and renewable supply of freshwater that is essential for crop irrigation, livestock watering, and other farm-related operations of the surrounding communities. The availability of this water resource contributes significantly to the region's food security and economic stability. However, it's important to note that the use of river water for agriculture must be managed sustainably to maintain the river's ecological balance and ensure long-term water availability for both human needs and ecosystem health.



- *Food provision:* fishing is practiced in the Morava River and, while keeping the catch for private use, it can be categorised as a provisioning service for the local community.
- Regulating services:
 - *Flood risk mitigation:* as a river environment, OL #2 has an intrinsic capacity of water buffering, absorbing the excess of water during heavy rain events and protecting the local communities in the area from their potential damage to infrastructure and cultivated lands. In fact, a report made by WWF reviewed the 2006 flood events and their devastating effects along the Danube and its selected tributaries, highlighting the importance of floodplain protection and restoration in order to mitigate flood risks ⁶⁸.
 - *Carbon storage:* The river and its associated floodplains, wetlands, and riparian zones act as important carbon sinks. Aquatic vegetation, such as algae and macrophytes, absorb carbon dioxide during photosynthesis. Sediments transported by the river and deposited in floodplains and deltas can trap and store organic carbon over long periods. Additionally, the river system supports diverse plant life along its banks, which further contributes to carbon sequestration.
- Cultural services:
 - *Recreational & Ecotourism:* apart from providing food, fishing is also a recreational activity that happens in the river. Hunting and hiking are also identified and, overall, the river basin poses a recreational space for the local population and many visitors.

OL #3 – FINLAND (managed by UEF, UOULU)

OL #3 is located in Ylpässuo, near the Kiuruvesi town within the Pohjois-Savo region. It is a minerotrophic mire that occupies a total area of 139 ha from which 11 ha was donated by the University of Eastern Finland (UEF) to The Natural Heritage Foundation and has been categorised as a protected area since 2020 due to the drainage and peat extractions that caused the hydrological disconnection between the peatland and the rest of the environment. These changes affect predominantly the edges of the site in comparison to the central parts. In these 11 ha is where the experimental and restoration site is being located. Due to its protected status, the site is largely isolated from nearby settlements and human activities. As a result, the range of ecosystem services it provides is more limited compared to other locations, primarily focusing on benefits directly related to natural processes and biodiversity conservation:

- Provisioning services:
 - *Water supply:* OL #3 has multiple water bodies and ground water in its site, but the protected area status makes it prohibited to use it as source of drinking water.



- Regulating services:
 - *Flood risk mitigation*: same case as for the provision services, the flood risk mitigation and its economic impact is more associated to the vicinity of local communities. However, the site represents a buffering location when heavy rain events occur due to the restored action that has been taking place in the area.
 - *Carbon storage*: as a mire, the Ylpässuo Open Lab captures large amounts of carbon, ranging from 63 to 121 tonnes of carbon per ha in younger and older layers of soil in the mires, respectively ⁶⁹. This has a significant contribution on reducing GHG emissions to the atmosphere.
- Cultural services:
 - *Educational*: the Ylpässuo Open Lab and many wetlands in Finland pose a really positive opportunity to study in depth the impacts of healthy wetlands in battling climate change from research groups, universities and projects like REWET.

OL #4 – ESTONIA (managed by UT)

OL #4 belongs to the Ess-soo bog, an area of limnogenic origin that covers circa 320 ha, located in the southwest of Estonia. Approximately 50 ha of the eastern part of this area was drained and peat was intensively extracted, being abandoned in 1994. On the contrary to the Finnish OL, this location is not currently protected but active citizens engagement made expansion of drainage to stop and the site was restored in 2021. Now it poses a fantastic opportunity to study and measure the impacts that restoration is having at the Open Lab. The following ES have been identified in the OL:

- Provisioning services:
 - *Food provision*: the area is known for their high growth of berries in the appropriate seasons in which they mature. It can also be seen as an ES associated with cultural services, specifically to the recreational aspect of berry picking.
 - *Biomass provision*: although the pulp and paper and other related industries has impacted negatively the area due to their intensive wood extraction from forest areas, it would be a nice opportunity to design and implement a business model related to the sustainable use of timber provided by this Open Lab.
- Regulating services:
 - *Carbon storage*: same as previous OLs, the Ess-soo bog, when fully restored, will pose a significant contributor to storage carbon in the soil, hence functioning as a carbon sink helping on the release of GHG to the air.
- Cultural services:
 - *Recreational (Aesthetic)*: The OL coordinators report that there is a strong sense of connection to this natural area among local residents. The Ess-soo



bog serves as a popular destination for community members, who enjoy hiking through its scenic landscapes. During the appropriate season, visitors also engage in the traditional activity of berry picking mentioned above, further enhancing their recreational experience and connection to the land.

OL #5 – BELGIUM (managed by WI-EA, STROMING)

OL #5 is comprised of two main locations in the upstream areas of the Amblève river catchment, which are the basins of the Bêche River (Vielsalm municipality) and the Emmels River (between Sankt-Vith and Amel). These two areas are currently undergoing renovation and restoration efforts, with a primary focus on implementing NbS to slow water discharge in upstream regions. Rather than highlighting the existing ecosystem services, the following list outlines the potential enhanced natural services that are expected to emerge once the restoration actions are completed:

- Provisioning services:
 - *Water supply:* Following restoration, the area has the potential to serve as a water source, although initially on a limited scale. In the short term, this service would be represented by small water bodies scattered throughout the landscape. As the restoration process progresses and the hydrological system recovers, these water bodies could expand and interconnect, gradually increasing the area's capacity to store and supply water. This could become a valuable resource for local communities and ecosystems, particularly in the face of climate change-induced water scarcity events.
 - *Food provision:* The area includes some agricultural activity that could be enhanced by the sustainable use of water resources from the river environment. Once the riverine ecosystem is fully restored, it could provide valuable support for local farming practices, potentially increasing crop yields and diversifying agricultural output.
- Regulating services:
 - *Flood risk mitigation:* one of the main potential services that these locations can provide is flood mitigation. Under REWET, restoration activities are focused on hydrological restoration to retain and slow down water discharge. This area is suitable for natural water retention measures as it is hugely drained. Also, improving the natural water retention of the Emmels and comparing it to discharge of the Meyeroderbach. Additionally, the retention potential of restored upstream valleys will be researched in this project.
 - *Carbon storage:* in line with the rest of the OLs, OL #5 will see its current degradation level restored and improved to serve as a carbon retention ecosystem in the long term.
- Cultural services:
 - *Recreational:* Currently, due to the area's degraded state, recreational activities are limited to very casual hiking. However, this underscores the significant positive potential for recreation once restoration is completed in the longer term.



As the ecosystem recovers, the area could become a diverse and attractive destination for various outdoor activities. This might include more extensive hiking trails, nature observation points, and potentially even educational eco-tourism opportunities.

OL #6 – ITALY (managed by UniPR, ADBPO)

Open Lab #6 is situated in the Gussola oxbow lake, located in the central part of the Po River basin as it flows towards the province of Cremona. This geographic feature was formed by the river's meandering course and the presence of an embankment, resulting in the creation of a lake. As part of the REWET project, restoration efforts have been implemented to address environmental challenges in this area. The primary intervention involves lowering the embankment level to facilitate a more natural water flow from the river into the Open Lab. This action aims to mitigate the severe cycles of drought and flooding that have been reported in recent years. These fluctuations in water levels had significant ecological impacts, including alterations in oxygen solubility, disruptions to microbial activity and frequent eutrophication events. The following ES have been identified in the OL:

- Provisioning services:
 - *Agriculture:* in the recent REWET semestral consortium meeting in Parma, we had the opportunity to visit OL6 and gain detailed insights into the ongoing research and the positive impacts of the project's restoration actions. UniPR and ADBPO organised a roundtable session, bringing together consortium members and key local stakeholders of the Gussola oxbow lake. A notable ecosystem service related to provisioning was highlighted by a representative from a poplar cultivation organisation. The natural conditions of the area support sustainable poplar growth and harvesting, even allowing for FSC certification of the poplars sold in the market, typically used for premium quality particleboard production. Significantly, 70% of the Po River basin's floodplains are covered by poplar plantations, indicating that the state of the wetlands surrounding the river has a substantial economic impact on this agricultural activity.
- Regulating services:
 - *Flood risk mitigation:* The area's capacity to buffer and absorb water during flooding events is recognised as a valuable ecosystem service. The site's impermeable soil characteristics allow water to remain in the area for extended periods, providing a consistent water source for nearby agricultural activities. Additionally, restoration actions, such as lowering the embankment, have enhanced the area's flood management capabilities. These interventions have resulted in less disruptive flooding events compared to the previous state, where negative impacts from flooding were more frequent. The improved flood mitigation capacity not only protects local communities and agricultural lands but also demonstrates the effectiveness of nature-based solutions in adapting to climate change-induced extreme weather events.



- *Carbon storage:* UniPR is conducting comprehensive research in OL6 to assess its carbon storage potential. This study includes analysing the chemical composition of the river soil, examining both inorganic and organic components. Additionally, researchers are investigating the carbon interchange between soil and water, as well as monitoring greenhouse gas (GHG) emissions following restoration activities. By understanding the chemical retention properties and carbon dynamics of the restored area, the research will contribute to a better understanding of how such ecosystems can function as effective carbon sinks.
- Cultural services:
 - *Recreational:* in the round table session, some local neighbors were representing the local community of the oxbow lake. A group of recreational fishermen and a hunter were asked about their perspectives on the site and the natural services it provides to the citizens.
 - In the case of the fishermen, they think that restoration activities and water entering the lake has brought an increase in the amount of wildlife. Before restoration, it was very difficult to navigate the area; now, the interventions have had a positive effect on this.
 - Hunter insights on conserving the nature of the site are positive if it promotes his recreational activities. He clarified that only focus on hunting wild boars, which are actually posing a danger to humans due to the potential spreading of diseases from them (zoonosis).

An interesting observation emerged from these stakeholders: they expressed concern that the site improvements resulting from restoration actions might have unintended negative consequences. Specifically, they anticipate that the enhanced ecological value of the area could lead to an increase in external visitors and eco-tourism activities. While this could bring economic benefits, these stakeholders worry about potential disruptions to their current practices and the local ecosystem.

- *Educational:* some of the UniPR students present in the roundtable were giving also their opinions on how this site has impacted them. There was a general agreement on its positive impact to its education since it is allowing them to study nature and environment on site. In this line, Prof. Marco Bartoli (OL coordinator) shared his excitement about the possibility that these projects give to researchers that have been dedicating most part of their professional career studying the environment in the laboratory. This is evidence on how nature can provide a cultural service at graduate levels of education, apart from being a nature spot for younger grades to start looking into what an ecosystem means.

OL #7 – PORTUGAL (managed by UEVORA, CMA)

The Paúl da Gouxa Local Nature Reserve has an area of 140 hectares and is in Alpiarça's municipality, in Portugal, about 100km from the capital, Lisbon. This pilot is based in a wetland of inland waters, with a low peatland (140 ha). The peatland area has been subject to several threats in the past due to drainage for farming, sand



abstraction activities, damp filling area, agriculture, cattle breeding, hunting, tentative peat extraction, motocross activities and night festivals.

- Provisioning services:
 - *Common reed production*: OL #7 considers the reed production of its area as a potential service to be capitalised through the implementation of paludiculture practices.
 - *Water supply and quality*: there are plans to implement restoration actions that reconnect the area with the Tagus and local rivers. This will enhance the water availability of the area for downstream applications.
 - *Agriculture*: Quinta da Atela stands out as a key beneficiary of the positive impacts and ecosystem services provided by Paul da Gouxa Natural Park. This local stakeholder reaps multiple advantages from its proximity to the park, enhancing both its agricultural and tourism ventures. The vineyard's wine production benefits significantly from the park's ecosystem services. Moreover, Quinta da Atela has strategically leveraged its location to diversify its business model, organising guided trips and tours within the natural reserve
- Regulating services:
 - *Carbon storage*: serves as an excellent natural carbon storage system due to its unique wetland ecosystem. This freshwater marsh, part of the Tagus River basin, plays a crucial role in carbon sequestration through its diverse vegetation and soil composition (aquatic plants, reeds, and surrounding riparian forests).
- Cultural services:
 - *Recreational*: The park's diverse landscape provides numerous opportunities for outdoor activities such as hiking, birdwatching, and nature photography. Its well-maintained trails allow visitors to explore the wetlands and observe the rich biodiversity of the area, including various bird species, amphibians, and native flora.
 - *Educational*: The park also offers educational programs and guided tours, promoting environmental awareness and conservation efforts among visitors.

Table 1. Summary of ES identified in the REWET Open Labs.

Open Lab	Provisioning services			Regulating Services		Cultural services	
	Food	Water supply	Biomass	Flood risk mitigation	Carbon storage	Recreational	Educational
#1		X	X	X	X	X	X
#2	X	X		X	X	X	
#3		X		X	X		X
#4	X		X		X	X	

#5	X	X		X	X	X	
#6		X	X	X	X	X	X
#7	X	X	X		X	X	X

5.2. Preliminary analysis of cost of restoration in a REWET OL.

As part of Task 6.2 in our project, we are currently conducting a thorough analysis of the restoration costs associated with both completed and planned initiatives across the REWET Open Labs. However, it's important to note that this analysis is still in progress due to information gaps from certain sites. Consequently, the data presented here represents a preliminary version of our intended analysis. As we continue to gather and process more information, we anticipate that this analysis will evolve, offering a more complete picture of the costs involved in wetland restoration projects within our Open Labs.

Based on Cost-Benefit Analysis (CBA) concept^{70,71}, this methodology is crucial when developing economic models or incentivising the economic capacity of a nature site. This analysis serves as a baseline scenario in understanding the financial feasibility and long-term sustainability of conservation efforts. By thoroughly examining the costs associated with restoration, stakeholders can make informed decisions, allocate resources efficiently, and create more accurate economic models that reflect the true value of ecosystem services.

The Cost Study has been developed in Microsoft Office Excel and it is comprised by different tabs that accounts for several aspects of importance for the final evaluation. First, a description tab is included to detail the basic information of the Open Lab (Figure 5).

ZONE	BELGIUM		
SURFACE (ha)		13.69	
TYPE OF WETLAND	Floodplain		
STARTING YEAR OF RESTAURATION	2020	CURRENT YEAR	2024

Figure 5. Basic information tab about the site under restoration actions.

Next tab will be the “Initial Investment” break down, that includes any upfront economic contribution made prior to the star of the restoration actions (Figure 6). In the OL #5 in Belgium, this concept can be represented by the initial land acquisition cost where the restoration actions are being implemented. Further examples of this concept could be permitting and legal fees, project planning and design, baseline monitoring equipment, etc.

INITIAL INVESTMENT					
ITEM NAME	QUANTITY	UNIT	TOTAL COST	COMMENT	
Land purchase: Life Nardus	48.94	ha	258,675.00 €		
Land purchase: Aire protégé	8.9	ha	52,556.60 €		

Figure 6. “Initial Investment” tab of the cost analysis of restoration.

Then, a “Restoration Cost” tab is included to detail the restoration interventions and their associated expenses to count in the total calculation (Figure 7). Not only that but also the periodic maintenance and monitoring actions related to the process of renovation. Examples of the items included in this table are: preparation of the land, general heavy restoration actions[§], plant seeding, fencing, workers salary, etc.

RESTORATION COST						
ITEM NAME	QUANTITY	UNIT	TOTAL COST	COMMENT	YEAR	
Premature harvesting of spruce trees			152,848.55 €			
Heavy restoration work 2022			52,710.63 €	pressing off the toppling,		2022
Heavy restoration work 2023			20,572.00 €	pressing off the toppling,		2023
Seeding			30,640.00 €			One time
Fencing			35,576.00 €			One time
Workers			35,000.00 €			Per year
Periodic monitoring and measurements						

Figure 7. “Restoration Cost” tab of the cost analysis of restoration.

Finally, a “Profit” tab is added as counterpart of the expense’s tabs (Figure 8). This tab is designed to capture and analyse the potential economic benefits and revenue streams generated by the restoration project. The current considerations of profits from the OL #5 are the ones derived from grazing (natural graze sold to farmers for their livestock) as described. However, potential considerations in this tab could be the results from ES valuation of the site: sustainable resource harvesting (reed, fish), ecotourism revenue, carbon credits, etc.

PROFIT						
ITEM NAME	QUANTITY	UNIT	TOTAL SELL	COMMENT	YEAR	
Grazing	10	500 €/ha	5,000.00 €		2020	

Figure 8. “Profit” tab of the cost analysis of restoration.

The template includes formulas that will systematically account for both the initial investments and the recurring expenses and incomes, generating a calculated net balance for each year of the project's lifespan. This annual net balance calculation offers a clear and dynamic representation of the project's financial health over time, enabling stakeholders to visualise the financial trajectory of the restoration effort, identify break-even points, and assess the long-term economic viability of the project (Figure 9).

[§] The related comment box for these heavy restoration items specify the following actions: Shaping, pressing off the organic material, deep milling and harrowing. Also pushing off organic material from cutting spruces and putting on piles.

BALANCE			
YEAR	COSTS	PROFIT	NET BALANCE
0	311232		- 311,231.60 €
2020	101216	5000	- 96,216.00 €
2021	35000	5000	- 30,000.00 €
2022	87710.6	5000	- 82,710.63 €
2023	55572	5000	- 50,572.00 €
2024	35000	5000	- 30,000.00 €
2025	35000	5000	- 30,000.00 €
2026	35000	5000	- 30,000.00 €
2027	35000	5000	- 30,000.00 €

Figure 9. Net Balance per year tab.

The template incorporates a sensitivity analysis of the identified costs to evaluate how different cost-related variables influence the overall financial results of a restoration project and its associated activities (Figure 10). This preliminary example demonstrates which annually recurring actions have a more substantial long-term impact when subjected to a variance rate. For illustration purposes, an average annual variance rate of 10% is applied to these periodic costs.

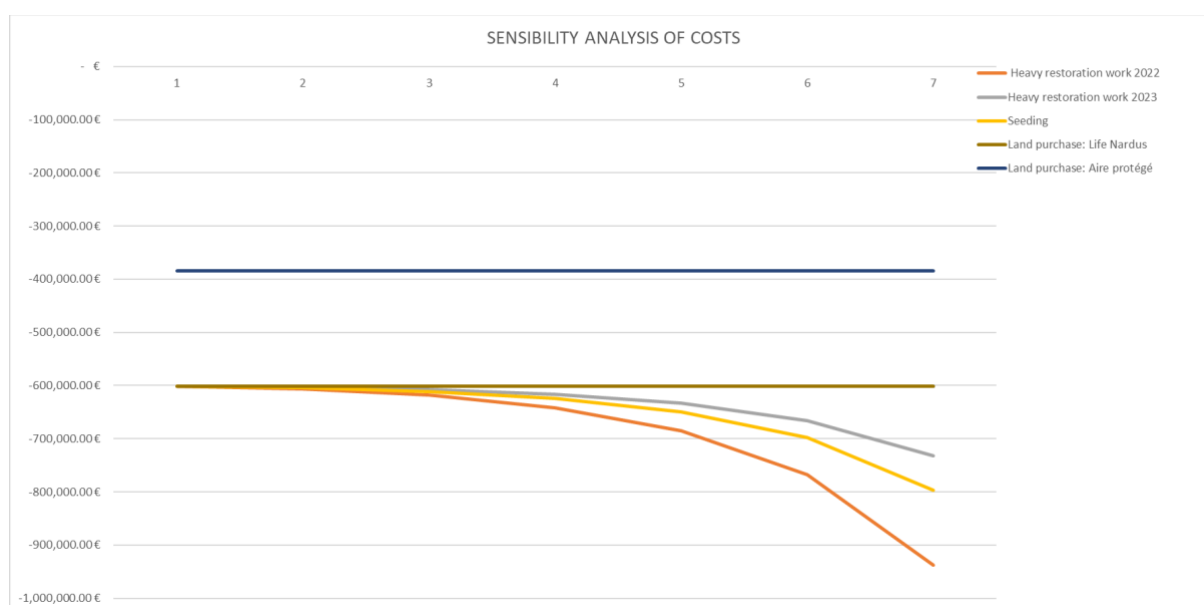


Figure 10. Sensibility analysis of the costs of restoration.



6. Conclusions

Nature restoration projects are essential for preserving biodiversity, combating climate change, and maintaining ecosystem services. Financing such projects can be complex and often requires a mix of funding sources to enable the sufficient scale that provides a significant impact to society and environment. This report reviews the main ways to finance these types of projects, typically involving public and private funding sources, or a combination of both, which can be called blended finance approaches. These approaches often use several financing instruments (debt, mezzanine financing, equity, grants, guarantees, PES, and carbon credits) and mechanisms (structured funds, impact bonds, PPPs and CATs) that can be found in the literature and in reported case studies. Blended finance approaches are increasingly important in bridging the gap between available funds and needed conservation investment. These strategies leverage the strengths of both public and private sources to achieve desired outcomes for nature restoration projects and support Sustainable Development Goals (SDGs).

The report also contains a highlight of three key regulatory frameworks and initiatives currently shaping nature restoration efforts:

1. The Nature Restoration Law is the EU directive to be followed in the coming years to achieve already agreed restoration of ecosystem goals in the EU. It emphasises the need for robust funding structures, private capital mobilization, and innovative financing schemes.
2. The Peatland Code UK provides a voluntary certification standard combining public funding with private investments for peatland restoration. Nevertheless, some studies have raised some observations about limitations of this initiative.
3. The GPI poses an international effort to protect peatlands as significant carbon sinks, focusing on global activities and partner countries. REWET's involvement in the GPI Research Working Group aims to enhance cross-project cooperation and overcome challenges in awareness and implementation.

While private sector involvement is crucial for scaling up restoration efforts to meet project goals, this report identifies several common risks associated with designing and implementing nature conservation and restoration frameworks. These risks fall into three main categories: limitations on scalability, the potential negative impacts on the relationship between people and nature when focusing solely on economic growth through market-based approaches, and the significant risk of greenwashing. Recognising and addressing these challenges is essential for developing effective and sustainable restoration strategies that balance economic incentives with long-term environmental and social benefits.

Finally, the initial phase of the WP6 work within the REWET project has concentrated on identifying and profiling the primary ecosystem services present in each Open Lab. Section 5 provides a comprehensive list of these services, highlighting their potential for capitalisation through the development of innovative business models. To support this effort, a preliminary Cost-Benefit Analysis is included in this document. This analysis will aid the consortium in assessing the financial viability and long-term

sustainability of conservation initiatives, while also facilitating the development of more precise economic models that accurately reflect the true value of ecosystem services.



7. Next steps

Deliverable 6.3 contains preliminary findings aimed at laying the groundwork for Task 6.2, which focusses on REWET Business Models in Work Package 6 of the project. These first insights serve as a stepping stone towards the task's completion and subsequent submission of Deliverable 6.4, in M48. As further steps that we are proposing to advance in the following months, we are considering:

- Explore and expand the potential collaborations with organisations and public bodies for the implementation of innovative financing mechanisms in future nature restoration projects. Further advance on this matter would be supported by other WPs and tasks of the project (i.e. interviews with economic actors and stakeholders, observatory and innovation reports, C&D clustering activities, etc).
- Further develop and refine the CBA for each Open Lab (OL) undertaking restoration actions by incorporating new data and insights as they become available to improve the accuracy and comprehensiveness of the analysis.
- Explore innovative ways to sustainably capitalise and market the REWET Open Labs Ecosystem Services.
- In doing so, we will be able to design sound and feasible business models that demonstrate clear ROI potential for private investors. These models will be presented in a Business Model Canvas format, incorporating all collected evidence, information, contacts, potential channels, and end-user stakeholders.



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